



Thailand's Experience in the COVID-19 Response



Editor
Supakit Sirilak, MD, MPHM
August 2020

Disclaimer: Hanuman is one of the central characters of the Hindu epic Ramayana and is viewed as the ideal combination of “strength, heroic initiative and assertive excellence” (Wikipedia). Hanuman has an important role as a warrior in “Thai Khon” - a traditional Thai masked dance drama depicting the life and glory of Rama. Thai Khon has been listed as intangible cultural heritage of humanity by UNESCO since November 2018. We thus use Hanuman to illustrate the power of goodwill from all sectors in Thailand in fighting against COVID-19 in the front page of this book.

Picture credit: <https://www.pinterest.com/pin/776589529478038826/>

Foreword



His Excellency

Mr. Anutin Charnvirakul
Deputy Prime Minister and
Minister of Public Health

“COVID-19 has challenged the capabilities of Thailand’s public health system. It has showcased our strengths, but at the same time, exposed our weaknesses.

Thailand can no longer rely on medical supplies from overseas, but must work towards self-reliance on both development and production of these supplies.”



Dr. Satit Pitutecha

Deputy Minister of Public Health

“COVID-19 has stopped the world, has made many things bad, but there are some good things that will come out of it.”



Dr. Sukhum Kanchanapimai

Permanent Secretary,
Ministry of Public Health

“Thailand’s success in managing the COVID-19 situation is owing to a combination of these factors - leadership of the high-level administrators, rapid and early responses, efficient disease control planning, access to essential healthcare services at both public and private facilities, and more importantly the public cooperation”.



**Supakit Sirilak,
MD, MPH**

Editor

“COVID-19 is the most challenging pandemic. It is important not only that Thailand successfully controlled the first wave, but also on “how”. This book, with efforts of all contributors, covers what happened and what we have learned.”

Contributors



**Sopon Iamsirithaworn
MD, MPH, PhD**



**Soawapak Hinjoy
DVM, MSc, MPH, DrPH**



**Noppavan Janejai
M.Pharm**



**Suriwan Thaiprayoon
PhD**



**Ratchakorn
Keawpramkusol
PhD**



**Alisa Yanasan
MD**



**Wattana Masunglong
B.A., M.A.**



**Chitphanu Sidet
B.Sc. (Public Health)**



**Pitchapa Kleeblumjeak
B.A**



**Napassawan Onsai
B.B.A.**



**Royce Tsukayama
B.Sc, MPH**

Table of Contents

Foreword	2
Abbreviations	5
Introduction	7
Overview of the COVID-19 Situation in Thailand	9
National Capacity and Preparedness for the Outbreak	15
National Laboratory System Capacity	24
National Strategies Responding to COVID-19	29
National Exit Strategy	42
Addressing COVID-19 through International Cooperation	46
Key Success and Challenges	47
Lessons Learned	51
Conclusion	53
Bibliography	54
Annex 1 Thailand COVID-19 Management Organogram	56
Annex 2 Clinical Management of COVID-19 Based on Disease Severity	57

Abbreviations

AOT

Airports of Thailand

ASEAN

Association of Southeast Asian Nations

CCAT

Civil Aviation Authority of Thailand

CCSA

Center for COVID-19 Situation
Administration

COE

Certificate of Entry

COVID-19

Coronavirus Disease 2019

CPG

Clinical Practice Guideline

DDC

Department of Disease Control

DMSc

Department of Medical Sciences

EC

Emergency Committee

EID

Emerging Infectious Diseases

EOC

Emergency Operations Center

FDA

Food and Drug Administration

FETP

Field Epidemiology Training Program

GISAID

Global Initiative on Sharing All Influenza
Data

GHS

Global Health Security

ICU

Intensive Care Unit

IVD

In Vitro Diagnostics

JEE

Joint External Evaluation

MOFA

Ministry of Foreign Affairs

MOPH

Ministry of Public Health

PHEIC

Public Health Emergency of
International Concern

PMOC

Prime Minister Operating Center

PPE

Personal Protective Equipment

PUI

Patient under investigation

RT-PCR

Real Time- Polymerase Chain Reaction

RUO

Research Use Only

SAO

Sub-district Administrative
Organization

STAG

Scientific and Technical Advisory Group

UHC

Universal Health Coverage

VHV

Village Health Volunteer

WHO

World Health Organization

Introduction

The COVID-19 pandemic has become a global threat with devastating consequences. No single country alone can tackle the devastation and multifaceted challenges posed by this pandemic. Intense cooperation and collaboration are needed at all levels to curb the pandemic, in the spirit of global solidarity.

Thailand detected its first novel coronavirus infected case in early January 2020, making it the first place outside of China to detect a case. With large numbers of Chinese tourists coming to Thailand during the New Year holiday in late December 2019, the country reported the first case of novel coronavirus infection in a Chinese tourist on 13 January 2020. More cases were also detected in the subsequent week of January. This situation prompted the Department of Disease Control of the Ministry of Public Health to activate its emergency operations including closely monitoring the situation, developing its incident plan, appointing the incident commander, and preparing the workforce and health facilities to respond to the potential outbreak (Department of Disease Control, 2020).

The COVID-19 situation in Thailand began to evolve with a gradual increase of new confirmed cases during January - February 2020 whereby the health facilities could accommodate these cases and prepare essential health resources. During this time, a number of public health measures were introduced to control the virus. Thailand also declared COVID-19 a dangerous communicable disease under the Disease Control Act, B.E. 2558 in late February 2020 to intensify active surveillance and control the disease (Government Gazette, 2020), two weeks prior to the WHO declaring COVID-19 a pandemic.

The number of new cases rapidly increased in March, with more than a hundred cases reported daily. The government further escalated the response from the ministerial level to the national level through the National EID Committee and then set up the *Center for COVID-19 Situation Administration (CCSA)* led by the Prime Minister. The CCSA began to serve as a single command centre employing a whole-of-government approach in managing the COVID-19 response in a comprehensive manner.

Both mandatory and voluntary measures were implemented to contain the outbreak, including the cancellation of public gatherings, remote working measures, the closure of entertainment and sport venues, and social campaigns to “*stay home, stop the virus, save the nation*” in fighting against the virus. The Thai government also provided treatment free of charge to all COVID-19 patients, including non-Thai citizens, covering diagnostic testing and treatment expenses as a means to control the spread of the virus. Travel restrictions both nationally and internationally were also enforced in the first week of April 2020. As a result, Thailand was able to flatten the COVID-19 curve with limited local transmission by early May 2020. Thailand has been recognized as the top country in making the most progress toward curbing the spread of the pandemic, according to the Global COVID-19 Index (GCI, 2020).

This book aims to share Thailand’s experience in addressing the COVID-19 outbreak and to provide policy lessons for other countries to overcome this disease.

Overview of the COVID-19 Situation in Thailand

The information in this section was obtained from the daily situation reports produced by the Department of Disease Control (DDC), Ministry of Public Health of Thailand (MOPH) (Department of Disease Control, 2020), together with the contributors' own accounts of the situation as it has developed in Thailand. The DDC's reports summarize the COVID-19 outbreak situations in Thailand and overseas, the measures being implemented at the time, as well as the way forward to mitigate the impacts of COVID-19. These reports can be found at <https://ddc.moph.go.th/viralpneumonia/eng/situation.php>.

Following the outbreak of unknown pneumonia in late December 2019 in China, Thailand scaled up its surveillance and screening measures at major international airports across the country, particularly focused on passengers traveling from or transiting in Wuhan, based on the possibility of human-to-human transmission.

The first COVID-19 case in Thailand was detected on 8 January 2020 and it is known to be the first confirmed case outside of China. The number of COVID-19 patients gradually increased and reached its peak in late March 2020 with more than a hundred cases reported daily with local transmission (World Health Organization, 2020). The situation prompted the government to take a number of measures deemed mandatory to contain the spread of COVID-19, including a national lockdown. As a result, the number of cases began to decline gradually to less than 10 cases a day.

The incidence of COVID-19 cases in Thailand can be illustrated in three phases as follows:

Stage 1: Imported Cases **(January - late-January 2020)**

Thailand was able to detect its first case from China in early January. The number of cases gradually increased from single-digit to double-digit cases a day. The Emergency Committee (EC) of the World Health Organization (WHO) advised the Director-General that the outbreak constituted a Public Health Emergency of International Concern (PHEIC) based on the evidence available, after being unable to assess whether the outbreak constituted a PHEIC one week earlier (World Health Organization, 2020). After that, Thailand promptly enhanced its containment measures in hopes of slowing down transmission and delaying the time until the country reached to Stage 2.

Stage 2: Limited Local Transmission **(late-January - late-March 2020)**

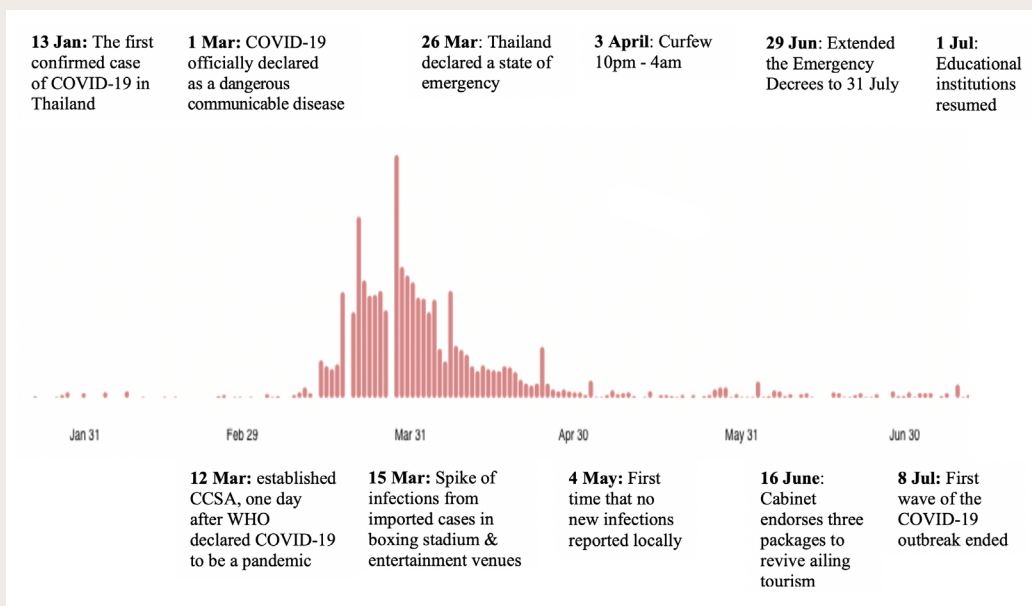
On 30 January 2020, Thailand reported its first case of local transmission, a taxi driver who reportedly developed a fever and a cough after tourists from China rode in his cab. A few days before WHO made the assessment that COVID-19 could be characterized as a pandemic threat, the Thai government officially added COVID-19 as a dangerous communicable disease pursuant to the MOPH's Communicable Disease Act B.E. 2558 (2015). The situation took a turn as there was a big jump in the number of confirmed cases, many of which are presumed to have been infected from attending boxing stadiums and entertainment venues in early March. Some of these cases were among a cluster of 11 Thai nationals who were infected following a night out in the Thonglor district with visitors from Hong Kong in late-February. Despite the spike, the government maintained that local transmission of COVID-19 remained limited in Thailand and had yet to enter Stage 3.

In early March, the government once again heightened their preparation for quarantine capacity as there were reports of a possible influx of undocumented Thai workers returning from Republic of Korea as the COVID-19 situation worsened there (Bangkok Biz, 2020). The government began making preparations for Stage 3, as local COVID-19 transmission was no longer limited and became widespread nationwide.

The CCSA was established to serve as the nation’s special task force to manage the situation. The preparations included providing extra beds at existing facilities as well as providing additional facilities for quarantine. The government also enhanced its efforts in preventing further imported cases and added 10 more countries to the list of severely infected zones in which Republic of Korea, Italy, Iran and China, including Hong Kong and Macao had already been listed. People traveling from these countries or areas listed as severely infected zones were required to obtain necessary documents and complete a 14-day quarantine.

Figure 1 below displays the timeline of the incidence of COVID-19 cases along with the emerging situation and the government’s response.

Figure 1: Timeline of COVID-19 Incidence in Thailand



(Graph adapted from <https://covid19.who.int/region/sear/country/th>)

Stage 3: Widespread Clustered Cases (late-March - April 2020)

Thailand entered Stage 3 as the coronavirus spread rapidly and widely with a considerable number of patients at the community level. Despite being in control of the situation, the government decided that it was essential to take a bold step in controlling further spread by declaring a state of emergency on 26 March 2020 (Prime Minister Office, 2020). A curfew between 10pm and 4am, starting the following week on Friday, 3 April 2020 was imposed, restricting all people from leaving their premises nationwide to contain the spread of the coronavirus. Exemptions applied only to medical and banking personnel, logistic workers handling consumer products and necessary supplies as well as those who normally work night shifts. This national curfew came after some groups of people violated the initially voluntary physical distancing measures. The government urged provincial authorities to maintain their own previously-announced curfew with stricter requirements. Social gathering activities were prohibited, and subsequently there was a temporary ban on alcohol sales to limit social gatherings.

The Songkran Festival (Thailand's traditional New Year's celebration) was postponed due to the fear of nationwide COVID-19 spread. Normally, Songkran is a period (approximately one week) in which people return to their home provinces, resulting in high rates of movement between provinces. This year, the public was discouraged to take part in any kind of informal celebrations or return to their home provinces during the period.

The government also urged people to forgo the 'Rot Nam Dam Hua' or water-pouring ceremony, a traditional rite for young people to show respect to elders and ask for their blessings.

On 27 April 2020, the CCSA released more information about the three scenarios that the government forecasted for the spread of COVID-19, regarding the easing of restrictions from May until September 2020 (Thai PBS News, 2020). These scenarios portrayed the best and worst-case situations of the COVID-19 outbreak in Thailand. Several factors were used to determine how widespread the COVID-19 transmission could become. They included, but were not limited to, population density, capacity of Thailand's disease control system, and preventive measures such as social distancing and working from home precautions.

Scenario 1: Keep current policies

Thailand would maintain its lockdown mode with full restrictions. It was expected that there would be 15-30 new cases daily among those who are known to be in close contact with previously confirmed cases or those found through active surveillance and community screening. There would be 15 critical COVID-19 patients in intensive care units (ICU) that require ventilators. The measures under this scenario include prohibition of international inbound travel, restrictions on domestic movement of people, and an extension of temporary business closures.

Scenario 2: Relax selected policies

Only limited restrictions would be in place. In this scenario, the outbreak would slow down to a moderate pace. The government would be able to maintain the health system capacity to detect and treat infected patients and would ease some lockdown measures, although certain restriction measures may be necessary such as limitation of international inbound travelers. Low-risk businesses would be allowed to operate. There would be approximately 114 cases daily as a result, comprising of new cases such as those who are close with known cases and inbound people.

Scenario 3: Relax most policies

All lockdown measures would be lifted and the situation would become similar to the early days where there were widespread of cases due to social gatherings and substantial movement of people domestically and internationally without quarantine or follow-up. All businesses would be allowed to operate as usual. This would result in an increase to 398 cases per days. The health system in this scenario might be incapable of responding to the spread of COVID-19 effectively.

Recovery Phase: May and beyond

The government's measures and advice appeared to effectively reduce the spread as the number of cases started to drop. The Ministry of Public Health expanded criteria for COVID-19 tests for people to cover those with mild symptoms, including those who lost their sense of smell or taste. In this phase, no new local cases were detected. All new cases were undocumented immigrants, Thai nationals, and their families returning from overseas. As the situation improved with regular reports of fewer cases and deaths, the government decided to ease restrictions by allowing shopping malls and restaurants in shopping centres, convention centres, wholesale markets and swimming pools to reopen starting Sunday, 17 May 2020.

The curfew was adjusted to start from 11pm instead of 10pm to help boost the economy. Some activities in fitness centres were allowed to resume, but amusement parks, boxing stadiums and gymnasiums remained closed. Patrons were prohibited from consuming alcoholic beverages in restaurants. Airports were in operation for non-commercial and cargo flights. Despite these developments, the state of emergency remained in effect. On 8 July 2020, the government announced that the first wave of the COVID-19 outbreak in Thailand had come to an end, after there has not been a case of local or community infection for 44 consecutive days (Matichon Online, 2020).

When tracking the situation, the focus has been on two key indicators: incidence and prevalence. Since the spike, Thailand recorded an increase by at least 30 cases daily. Many of these cases previously gathered at boxing stadiums. In response, the government declared a state of emergency. The movement of people between provinces was restricted and self-quarantine was mandatory nationwide. The government ordered all educational institutions nationwide to postpone semester commencement dates.

All entertainment and sports venues were temporarily closed until the situation improved. Despite the fear that there would be super spreaders, transmission of COVID-19 was limited due to extensive contact tracing performed by health officials. The incidence curve shows a renewed but smaller increase in the average number of new cases from 30 March onwards. However, the long weekend in the first week of May provided an opportunity for people to travel across provinces, raising fear of nationwide spread.

National Capacity and Preparedness for the Outbreak

Thailand’s healthcare and health security capacities are recognised by the Global Health Security Index 2019 (Cameron, E, Nuzzo, J, Bell, J, 2019), with the second rank among 195 countries for indicators relating to its robust healthcare system, treating the sick, and protecting its health workforce (Table 1). Relevant to its ability to detect and contain COVID-19, Thailand has also demonstrated an effective system for monitoring and tracking healthcare-associated infections and providing healthcare services to healthcare workers who become sick while responding to public health emergencies.

Table 1: Thai Health System Score, 2019

	COUNTRY SCORE	AVERAGE SCORE
HEALTH SYSTEM	70.5	26.4
Health capacity in clinics, hospitals and community care centers	48.1	24.4
Medical countermeasures and personnel deployment	33.3	21.2
Healthcare access	99.3	38.4
Communication with healthcare workers during a public health emergency	100	15.1
Infection control practices and availability of equipment	50	20.8
Capacity to test and approve new medical countermeasures	100	42.2

Source: (Cameron, E, Nuzzo, J, Bell, J, 2019)



The National Institute of Health's Laboratory, Department of Medical Sciences,
Ministry of Public Health

Beyond its healthcare system, Thailand has a strong Field Epidemiology Training Program (FETP) and national laboratory system, scoring in the top tier of indicators for these capacities and demonstrating a robust electronic reporting surveillance system that functions at both national and subnational levels, rapidly collecting laboratory and epidemiological information (elaborated further in the laboratory section).

Health Facility Capacities

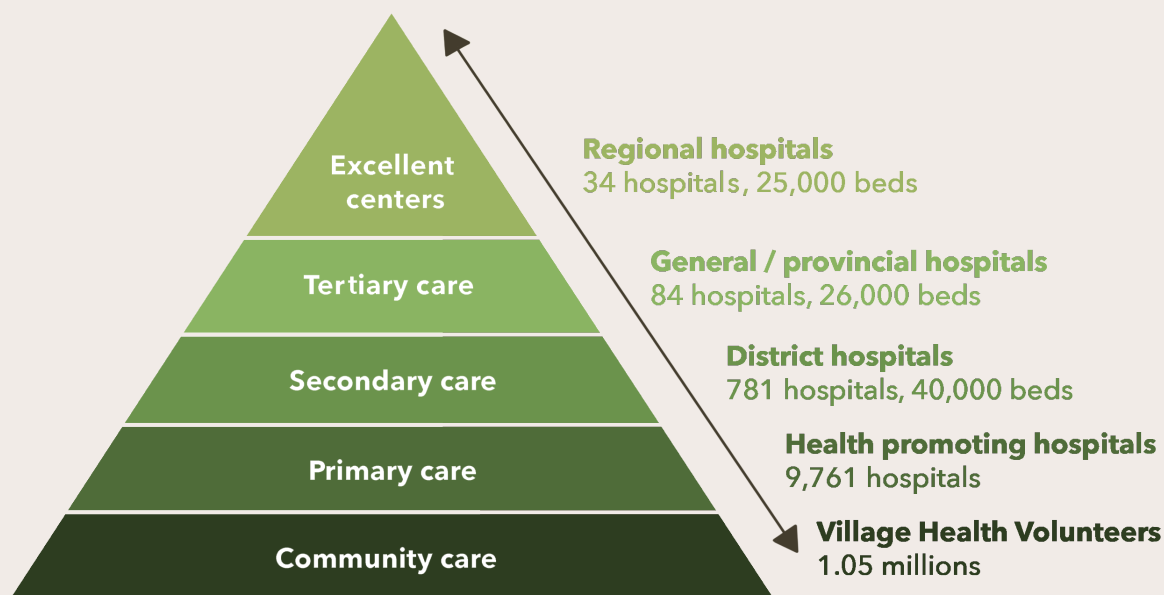
Thailand has invested heavily in healthcare infrastructure and workforce for the last four decades. In addition to urban hospitals, district hospitals and health centers were built up during that period, resulting in nationwide expansion of rural health services and broadened access to health services at the community level (Figure 2).

All Thai people have had access to essential healthcare services under the national Universal Health Coverage scheme for the past two decades.

Village Health Volunteers (VHVs) were also recruited and trained to assist health personnel to provide basic health care and health education to their communities. There are currently 1.05 million Village Health Volunteers nationwide.

These assets provide a good basis for an effective response to the COVID-19 outbreak. Village Health Volunteers have played a crucial role in providing knowledge and information on disease control to the general public, primarily to check the health condition of patients in the community and to follow up their symptoms. These volunteers have helped to minimise local transmission, raise awareness of people in the community and encourage people to abide by the disease control measures.

Figure 2: Capacities in Public/Government Facilities



Source: MOPH, 2020

Note: Excellent center can provide super tertiary care, conduct R&D, provide training, referral services and reference, policy advocacy and network.

In the early phase of the outbreak, the Ministry of Public Health reviewed its healthcare capacities to accommodate a major surge of patients and potential demand for hospital beds. After the review, the Department of Medical Services and the Department of Health Services Support were tasked to increase the number of negative pressure hospital rooms, manage hospital beds and prepare field hospitals (Table 2) to ensure all COVID-19 patients would have access to essential healthcare services.

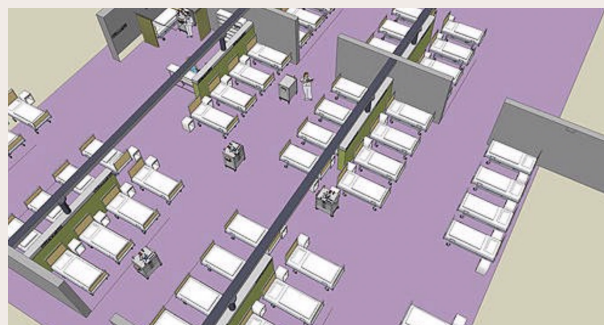
Table 2: Capacity to establish field hospitals in each health area

Health Area 1	2,876 beds	Health Area 7	701 beds
Health Area 2	967 beds	Health Area 8	935 beds
Health Area 3	324 beds	Health Area 9	588 beds
Health Area 4	616 beds	Health Area 10	466 beds
Health Area 5	2,376 beds	Health Area 11	888 beds
Health Area 6	858 beds	Health Area 12	677 beds
Health Area 13	295 beds		
Total	12,537 beds		



Picture of field hospitals

Not many hospitals had negative pressure isolation rooms or intensive care units for severe cases. This issue was solved through public and private sector collaboration. Some local private companies offered their help in building the negative pressure rooms for the hospitals in need. During this time, private hospitals also played a crucial role in providing healthcare services to COVID-19 patients in addition to the main services provided by public hospitals, which accounted for 80% of the total COVID-19 treatment services.



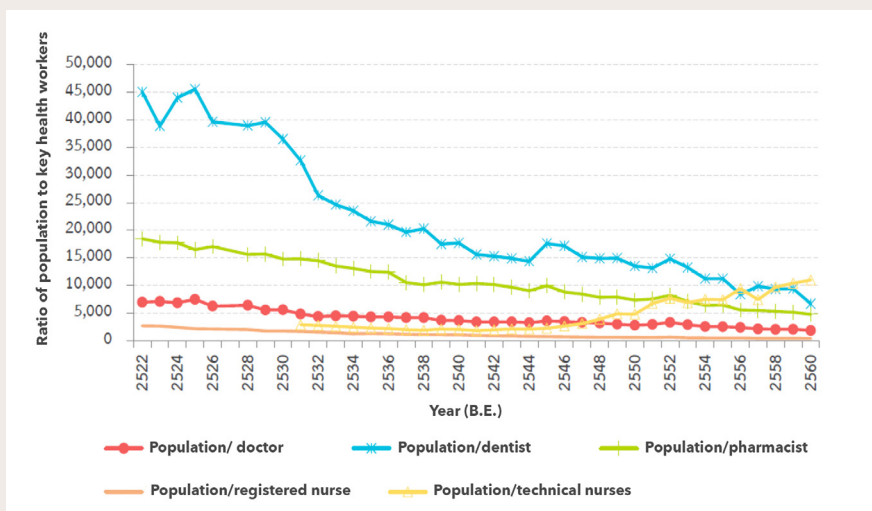
After declaring COVID-19 a dangerous communicable disease under the Disease Communicable Act B.E.2558, any hospital that detected a case would have to admit the case and report the case admission to the Ministry of Public Health for its records. Healthcare expenses of COVID-19 patients are covered by the Thai government through the management of the National Health Security Office.

Health Workforce Profile

Thailand’s health workforce profile shows that there is no substantial shortage of health workers. The ratio of doctors and nurses per 1,000 population is more than 2.28 which falls within WHO’s recommendations (Figure 3) (Noree, 2020). However, the profile suggests an imbalanced distribution of health professionals in urban versus remote areas (Figure 4).

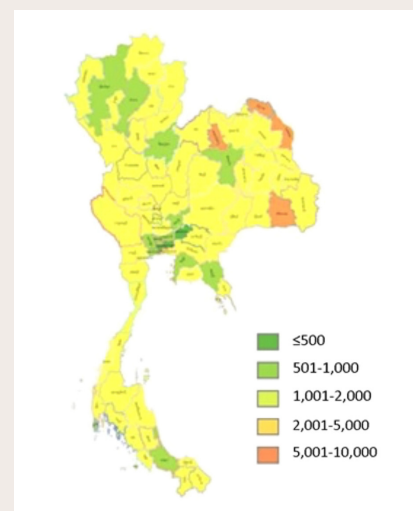
This phenomenon does not seem to impact COVID-19 case management. This is due to concentration of COVID-19 cases in Bangkok and urban areas where there is not a health professional shortage. The hospitals that admitted the most patients were able to manage their workforce in providing healthcare services to COVID-19 cases, while still providing other essential healthcare services.

Figure 3 : Ratio of population to key health workers, B.E.2522-2560



Source: Thailand health profile, 2017

Figure 4: Distribution of doctors across the region of Thailand, 2020



Source: Noree, 2020

It is worth noting that a health workforce profile does not include the public health workforce, which plays crucial roles in case identification and contact tracing. Staff from the Division of Epidemiology (DOE), Department of Disease Control and Provincial Public Health Offices in all provinces are dedicated to such tasks,

as their teams have been trained in epidemiology and ethics around public health data collection. Digital technology has also been used in assisting the staff for contact tracing and case identification.

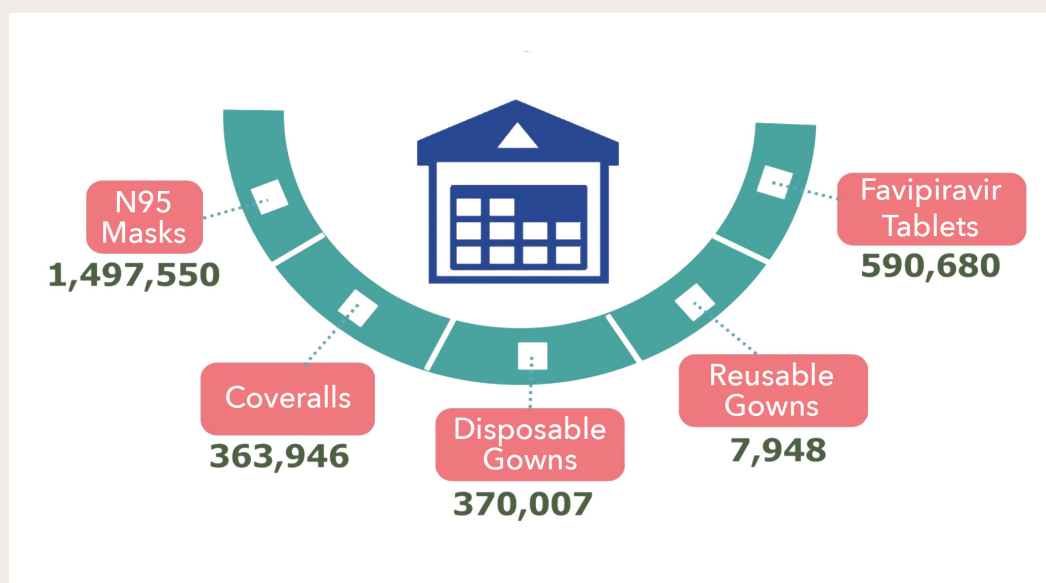
Essential Medical Supplies

As COVID-19 is a new disease with no validated treatment to date, patients received symptomatic and supportive care, such as maintaining vital signs, maintaining oxygen saturation and blood pressure, and treating secondary infections. As there is the potential of mortality COVID-19, many investigational treatments have been used, especially “Favipiravir” and other anti-viral drugs (see Annex 2).

The treatment outcome was satisfactory as the case fatality rate is less than 2 per cent in Thailand.

In this respect, the Ministry of Public Health (MOPH) tasked the Public Health Emergency Division and Government Pharmaceutical Organization, a state run agency under supervision of the MOPH, to identify the medical demand and supply gaps to procure essential medical supplies, including personal protective equipment (PPE), surgical masks, N95 masks, ventilators, and antiviral medicines for hospitals nationwide.

Figure 5: Stockpiling of Medical Supplies



Source: Thai FDA, 2020

In the early phase of the disease outbreak, Thailand faced a shortage of PPE, N95 masks and surgical masks. This shortage raised an alarm among health workers who were at a higher risk of getting infected. The Ministry of Public Health strongly urged the general public to use fabric masks instead of surgical masks, which were designed for hospital settings.

The situation improved within the month with the support from the private sector and development partners. Local manufacturers were able to use nanotechnology to produce PPE that could be reused up to 20 times. The locally-manufactured PPE was supplied to the hospitals nationwide.

Strong leadership from the Deputy Prime Minister and Minister of Public Health allowed Thailand to provide essential medicine to treat COVID-19 patients. Thailand managed to procure Favipiravir from Chinese and Japanese companies and then stockpiled this drug to accommodate a surge of patients, amid competitive demands worldwide as the virus spread globally.

“I would like to have the stockpile of the drug (Favipiravir) to boost public confidence, ensuring that all infected persons in Thailand can be cured,”

addressed by the Deputy Prime Minister and Minister of Public Health on various occasions.



photo courtesy of the MOPH Facebook

Demand Management

Thailand strongly implemented non-pharmaceutical interventions as keys for managing COVID-19 due to the lack of validated treatments for the disease. A combination strategy for containment and mitigating actions was employed to delay the surge of severely ill patients who required isolation, oxygen, and mechanical ventilation. The actions included contact tracing, self-isolation or quarantine, handwashing, respiratory etiquette, and social distancing.

In parallel, case management was performed based on clinical symptoms and criteria. It is worth noting that the first clinical practice guideline (CPG) for COVID-19 treatment was issued on 11 January 2020, only 3 days after the first case was detected. This was made possible due to collective efforts of the clinician expert group who worked closely with the Department of Medical Services.

The national CPG was regularly reviewed and updated by this group to provide the best treatment available to COVID-19 patients (Annex 2).

Hospitals under purview of the MOPH, especially in the outskirts of Bangkok and in major cities also scaled up their preparedness capacities for COVID-19 patients.

Teleconferences were regularly organized to update the situation and management protocols.

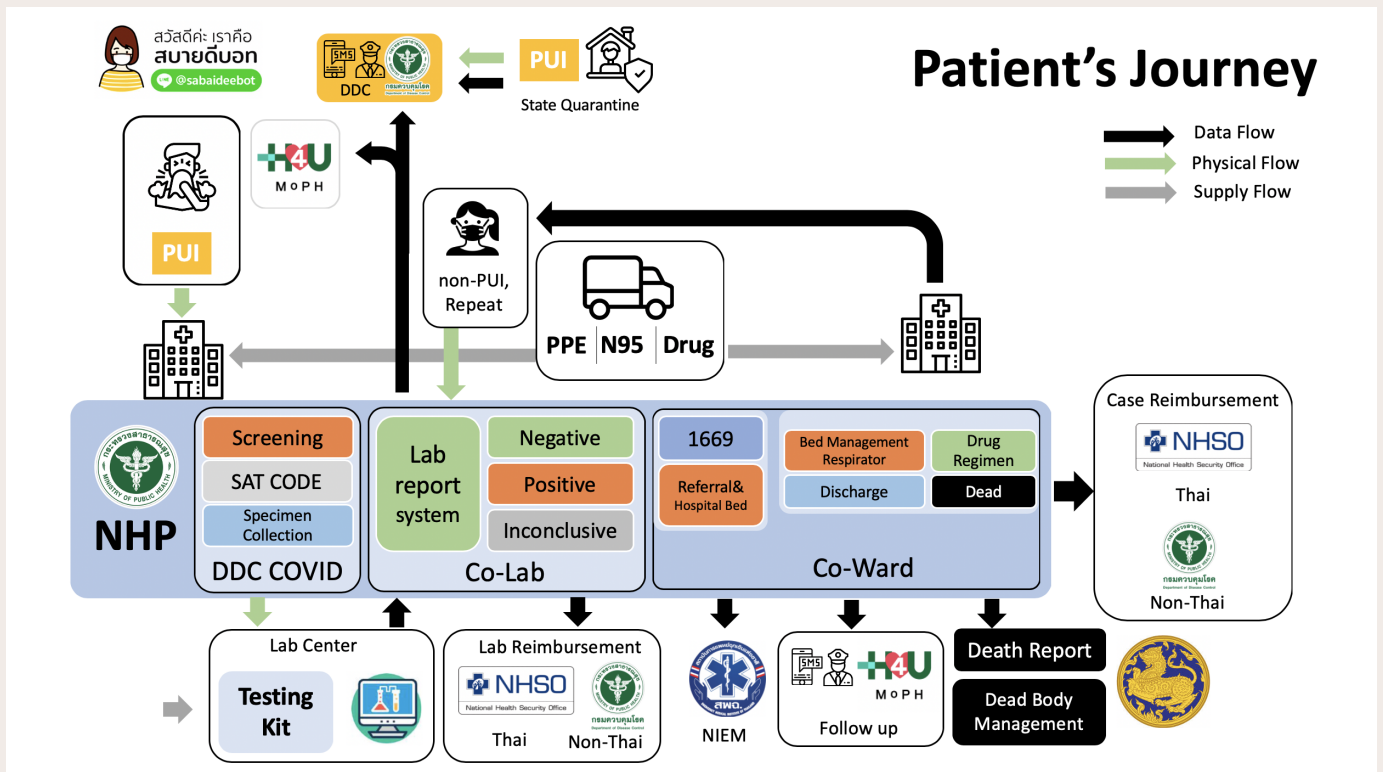
The guidelines and standard operating procedures for healthcare workers were developed such as hospital preparedness guidelines, clinical practice and treatment guidelines, guidelines on using personal protective equipment, and guidelines on the establishment of field hospitals in case of a wide spread epidemic.

In addition, all hospitals were encouraged to provide services to patients under “the redesign of new medical care,” which incorporates tele-medicine services to reduce congestion and prevent the disease from spreading in hospitals. These new medical care services separate patients by groups based on need, to meet a medical doctor physically. They can consult and receive medical services virtually via tele-medicine channels. For groups who still require meeting a doctor physically or who need to receive treatment at the hospital, they must have an appointment in advance.

In addition, the hospital can deliver medicine by post mail, or the patients can receive medicine at a pharmacy shop near their residence.

Furthermore, there is an integrated patient database called “Co-Lab and Co-Ward,” which is a national health database platform (Figure 6) for data collection of laboratory results, diagnoses, medical treatment as well as the distribution of personal protective equipment and reimbursement of treatment fees.

Figure 6: National health platform



Source: MOPH, 2020

National Laboratory System Capacity

It is well-recognized that laboratories play an important role in preventing, detecting and responding to the outbreak of novel pathogens. Public health laboratories provide essential services including disease and outbreak detection. During the COVID-19 pandemic, the Thailand National Laboratory System confirmed this importance.

Thailand's National Laboratory system consists of private diagnostic laboratories, public health laboratories, regional public health laboratories and one public health reference laboratory. The Department of Medical Sciences is mandated, by royal decree, as the national reference laboratory for diseases and consumer protection.

The National Institute of Health is the national reference laboratory for infectious diseases. Sub-national laboratories are located in 14 regional medical science centres across the country. These laboratories have the capacity to perform the most common microbiological diagnostic tests, as well as to refer specimens to the National Institute of Health, if required. The public health laboratory network is a linkage of reference laboratories and service level laboratories in adherence with hospital networks (including Ministry of Public Health, other government, private and university hospitals).

Linking the animal health and environmental laboratory network is applied under the One Health approach.

At the local level, the network of diagnostic laboratories is based on secondary and tertiary care hospitals and private laboratories. The tests performed by each laboratory are adapted to local needs. The designated public health reference laboratory at the Thai Red Cross Emerging Infectious Disease Health Science Center, Chulalongkorn University (TRC EID) is a research laboratory with extensive experience in the area of zoonotic viruses.

Considering access to laboratory services, in general the costs are covered by one of the three health insurance systems available in the country: Civil Servant Medical Benefit Scheme, Social Security Scheme and Universal Coverage Scheme. For outbreak investigation and response, the cost is covered by the government through the Department of Disease Control under the Communicable Disease Act B.E.2558 (2015).

Diagnostic Testing for COVID-19/Reference Lab

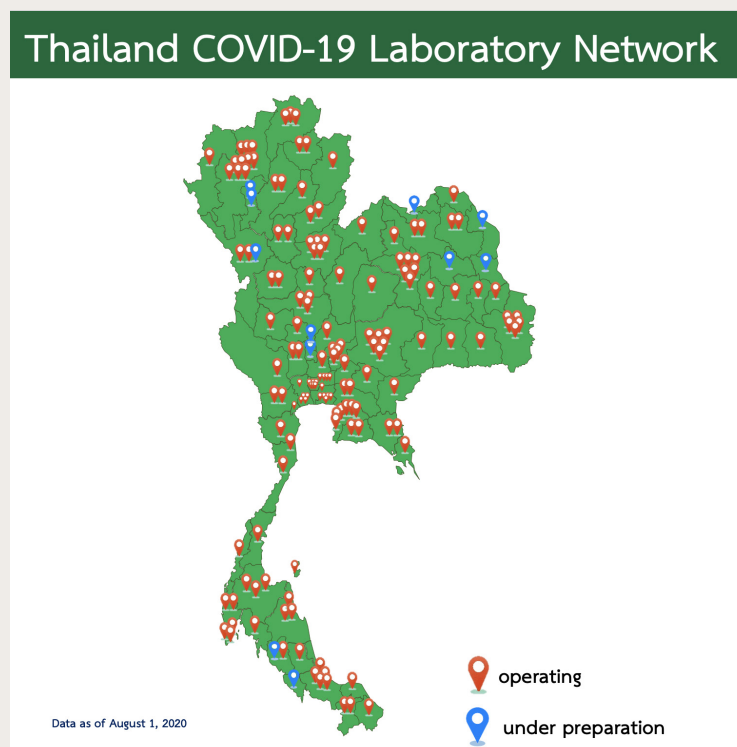
On 8 January 2020 the first suspected case (a patient under investigation, or PUI), was a female tourist traveling from Wuhan to Thailand who was identified at Suvarnabhumi Airport. This patient was confirmed to be the first COVID-19 positive case on 12 January by the Emerging Infectious Diseases Health Science Center, the Thai Red Cross Society (TRC EID) and the Thai National Institute of Health, Department of Medical Sciences.

The whole genome sequence was shared via the Global Initiative on Sharing All Influenza Data (GISAID). Within six days, the conventional RT-PCR assay was developed and was changed to Real time RT-PCR five days later.

As a consequence, in-house diagnostic testing for COVID-19 was available in Thailand while the commercial kit was not yet accessible.

By February 2020, commercial kits were gradually released into the market. Due to the limitation of knowledge on the virus as well as limited numbers of patient specimens, there were concerns on the quality of the diagnostic kits, most of which were classified as Research Use Only (RUO) while the fully validated kits were In Vitro Diagnostics (IVD).

Figure 7: COVID-19 laboratory map in Thailand



If the validation results were sufficient, the test kits would be permitted for import.

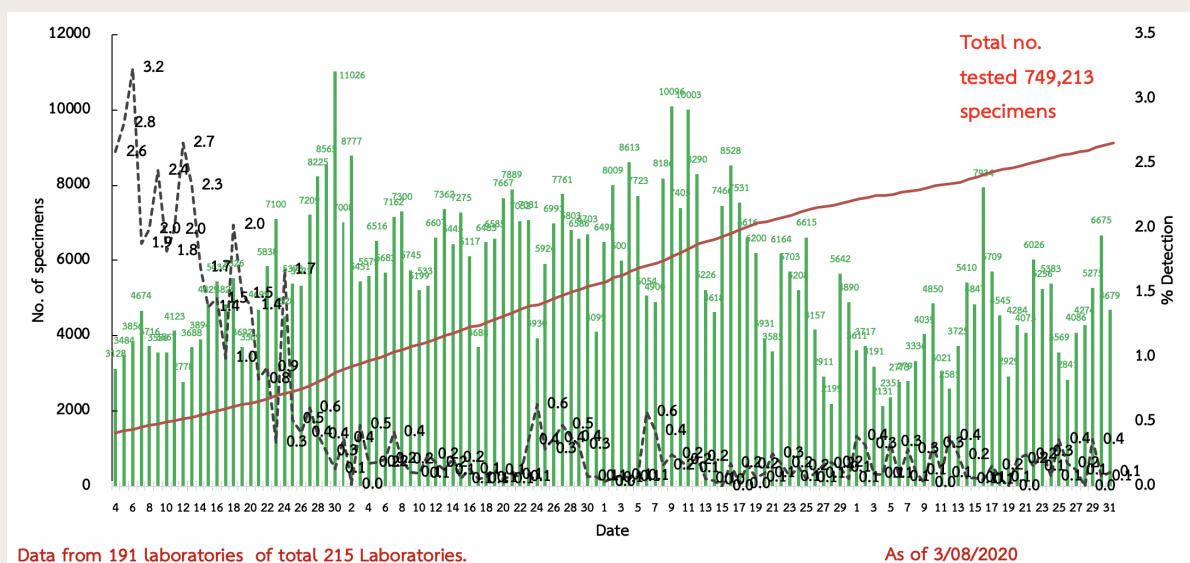
As Thailand was the second country where COVID-19 was detected, the reagents for formulation of PCR test were available during the initial stage. Nevertheless, in late January the demand dramatically increased resulting from a worsening COVID-19 outbreak in many parts of the world.

To manage this risk, the DMSc collaborated with Siam Biosciences, a Thai-born company, to successfully develop COVID-19 diagnostic test kits using technology developed by DMSc together with Siam Biosciences. Aiming towards self-sustainability, this platform intended to expand further to other molecular diagnostics in the near future. Taken together, the capacity for research and development of diagnostic tests was essential to the COVID-19 outbreak.

Recognizing that the demand for laboratory services would increase drastically, the Ministry of Public Health began preparing surge capacity for COVID-19 diagnostic capabilities. In late February, DMSc announced the policy to establish one lab in every province to report results within 24 hours. Eventually the laboratory network for COVID-19, including government and private sectors, had been established.

As of 8 July 2020, 205 COVID-19 laboratories were established: 79 laboratories (35 government and 44 private labs) in Bangkok and 126 laboratories (102 government and 24 private labs) across the country (Figure 7). In total, 749,213 specimens were tested as of 3 August 2020. (Figure 8)

Figure 8: Number of specimens tested for COVID-19 and percentage of detection



Accessibility to Laboratory Services: Successes and Challenges

In responding to the COVID-19 pandemic, Thailand's laboratory system successfully demonstrated adequate diagnostic security and the ability to manage diagnostic capacity. Even though the global situation was unfavourable and stressful, the system was able to endure a lack of reagents and supplies resulting from high global demand and lockdowns in many countries.

It is clearly evident that leadership, networking and multi-sectoral collaboration are key to success in managing COVID-19 situation in Thailand. On the aspect of the laboratory system, networking and synergizing expertise of two reference laboratories, TRC-EID and DMSc, resulted in rapid detection of SARS-CoV-2 (the causative agent of COVID-19). Participation of both of the government and private sector resulted in rapid expansion of the COVID-19 laboratory network under the policy "One Lab One Province, 24-hour Results".

Under the Emergency Decree on Public Administration in Emergency Situation B.E. 2548, announced on 26 March 2020, DMSc authorised permission for qualified laboratories to provide services.

Furthermore, DMSc and FDA worked together in ensuring the standard and quality of diagnostic kits used in the service system during the emergency throughout the validation and authorisation process.

However, there remain major challenges to overcome.

Laboratory licensing is essential in dealing with pandemic threats and public health emergencies at all steps from preparedness, detect and respond. Legislative framework is required for the management of work processes, diagnostic capacity, quality, timeliness and sharing of laboratory information. During this crisis, the authority of the CCSA, led by the Prime Minister, has been used to establish a governance mechanism.

However, if the emergency status is abolished, an authority will still be required to maintain system integrity. To overcome this problem, DMSc appointed a laboratory expert committee to provide consultations for future decisions.

Under the COVID-19 situation, it is clear that that a legal framework is required to nurture the system, maintain service quality and oversee cost-effectiveness for laboratory services. From the JEE assessment in 2017 laboratory licensing was identified as a priority action for improvement. DMSc has already proposed to establish a public health laboratory act in order to meet the needs and strengthen the country capacity in this area.

Considering efficiency and effectiveness of the response process, the ability to perform scientific research is crucial. Inadequate knowledge on COVID-19 makes it difficult to implement control measures. Short-term research such as epidemiological studies,

test kit development and validation need to be conducted rapidly and effectively while medium and long-term research studies, such as development of vaccines, therapeutics and diagnostics, will require a higher degree of collaboration and resources. The laboratory system plays an important role in this activity. In order to accelerate research and innovation, management of biological resources such as specimens and virus is crucial. Additionally, emergency ethics is an area that needs to be explored.

National Strategies Responding to COVID-19

Early Actions

As COVID-19 emerged and spread, the global community strengthened its resolve to contain the outbreak. In January 2020, the Thailand Department of Disease Control (DDC), the ASEAN Health Cluster and the World Health Organization (WHO) took measures to coordinate efforts to stop the outbreak and prevent its further spread.

Thailand began screening measures at points of entry, installing thermal scanners with new technology in international airports across the country, in collaboration with the transportation and security sectors, and Airports of Thailand.

The Emergency Operations Center (EOC) of the Department of Disease Control was activated to Level 1 on 4 January 2020 to serve as the coordination hub for the incident response.

With the rising number of cases, on 22 January, the DDC emergency operations were scaled up to the ministerial level, the “Public Health Emergency Operations Center,” commanded by the Permanent Secretary, with technical support from the DDC.

As the number of cases continued to rise, the Ministry of Public Health urgently developed and submitted the COVID-19 Multi-Sectoral Integrated Response Plan to the Cabinet together with the “Public Health Emergency Response Action Plan for COVID-19 and Roles of Relevant Agencies” on 14 February in response to the outbreak. These were endorsed by the Cabinet in early March (Ministry of Public Health, Public Health Emergency Response Action Plan for COVID-19 and Roles of Relevant Agencies, 2020). These plans comprehensively indicate the key measures to be carried out by relevant actors to enhance health security and mitigate the impact of COVID-19.

It is worth noting that Thailand has a National Committee on Emerging Infectious Disease, chaired by the Prime Minister or designated Deputy Prime Minister, whose key responsibility is to determine the national policy and strategy for EID preparedness, prevention and response and mitigations measures.

At the outset, the Deputy Prime Minister in charge of the Ministry of Public Health chaired the Committee (Figure 9).

Figure 9: Meeting of the National EID Committee



As the situation escalated, the Prime Minister decided to chair the Committee himself, prior to setting up the Prime Minister Operating Center (PMOC) on 27 January 2020, three days before the WHO declared COVID-19 a PHEIC, which served as a united response that utilises a whole-of-society approach.

Surveillance

Thailand has implemented surveillance at three different levels including

- 1) Points of entry
- 2) hospitals or healthcare facilities
- 3) active case finding in the community by village health volunteers and related agencies from both the public and private sectors.

The Permanent Secretary of the MOPH also instructed health workers to accelerate the process of finding active cases as soon as possible by expanding screening to two more groups:

- 1) active case finding in areas with confirmed cases, unknown infections, or risk factors and
- 2) active case finding for asymptomatic cases in communities that have had confirmed cases continuously in the past 28 days.

These surveillance activities aimed to accelerate early detection in unusual situations and cases in the country.



courtesy photo from the MOPH Facebook

Risk communication preparedness

Risk communication preparedness encourages the general public via various channels, to follow the preventive and control measures to prevent infection. The Ministry of Public Health designated a spokesperson to provide the situation update and knowledge of the COVID-19 daily through live broadcasting. The Deputy Prime Minister and Minister of Public Health was often present at the daily briefing to boost public confidence and trust in the capacity of the Thai health system.

Risk communication preparedness involves continually assessing risks and monitoring people's behaviours to develop appropriate communication strategies and messages for all populations, age groups, genders and both Thai and non-Thai people living in Thailand. It supports disseminating public health and COVID-19 information via the Department of Disease Control Hotline at 1422. The hotline numbers are available in Thai and foreign languages, including English and languages of neighbouring countries.

The power of social media and celebrities has played a crucial role in raising awareness of the general public regarding the dangers of COVID-19. In the early phase of the outbreak, people were not well aware or informed about COVID-19. Some refused to wear a mask. Some ignored the disease control measures. Some failed to comply with the MOPH recommendations.

However, when a Thai celebrity couple posted on social media that they have been tested positive for COVID-19 and explained how dangerous the disease was, it stimulated fear in their followers about getting COVID-19 and motivated them to heighten "their guard" by implementing the self-protection practices and maintaining good personal hygiene. Without the information from those two celebrities and the power of social media, it is difficult to know if people would have changed their behaviours. The COVID-19 situation in Thailand may have become more destructive and more difficult to control.

Early prevention

Public health measures

At the start of January 2020, Thailand began implementing its surveillance protocol and has intensively monitored the situation both inside and outside the country. On 22 January 2020, the DDC, MOPH, Thailand scaled up the EOC to Level 3 to closely monitor the ongoing situation both at the national and international levels. The next day, travel alerts for the coronavirus outbreak were raised to Level 3.

The MOPH recommended everyone to avoid all non-essential travel to the outbreak areas. Thailand also released recommendations to manage the COVID-19 situation for all sectors and places such as self-protection for the general public, and guidance for people who returned from affected areas, as well as for business owners, for transportation services, and for religious places.

9 Ways to Avoid COVID-19 for the Thai general public

9 วิธีหนี COVID-19

- 1** ออกจากบ้านเมื่อจำเป็นเท่านั้น
- 2** ใส่หน้ากากอนามัย/ผ้าเมื่อต้องออกจากบ้าน
- 3** ใช้รถสาธารณะเมื่อจำเป็น หลีกเลี่ยงชั่วโมงเร่งด่วน
- 4** ล้างมือบ่อยๆ ด้วยสบู่หรือเจลแอลกอฮอล์
- 5** ยืนห่างจากคนอื่นอย่างน้อย 1-2 เมตร
- 6** หากต้องซ้อนมอเตอร์ไซค์ ควรนั่งหันข้าง
- 7** กินอาหารปรุงสุกใหม่ ควรแยกสำรับอาหาร
- 8** แยกของใช้ส่วนตัว ไม่ควรใช้ร่วมกับผู้อื่น
- 9** เมื่อกลับบ้าน ควรอาบน้ำทันที

จัดทำ : 26/04/63

ศูนย์ปฏิบัติการภาวะฉุกเฉิน | สายด่วน 1422 | f naq รุโร

Using ICT in tracing COVID-19

The Department of Disease Control has developed “the DDC Care” application (Figure 10) to monitor and track patients under investigation. The “Thai Chana” web application (Figure 11) was also developed by the Ministry of Digital Economy and Society to record population movement data for the benefit of contact tracing among risk groups and bringing them into the disease surveillance and investigation process. To use this application, clients are requested to register either manually or by scanning QR code before entering and exiting the permises. This is to limit the number of people allowed to be at the permises and for the case investigation team to more easily follow-up contacts if there was a confirmed case.

Figure 10: DDC Care application

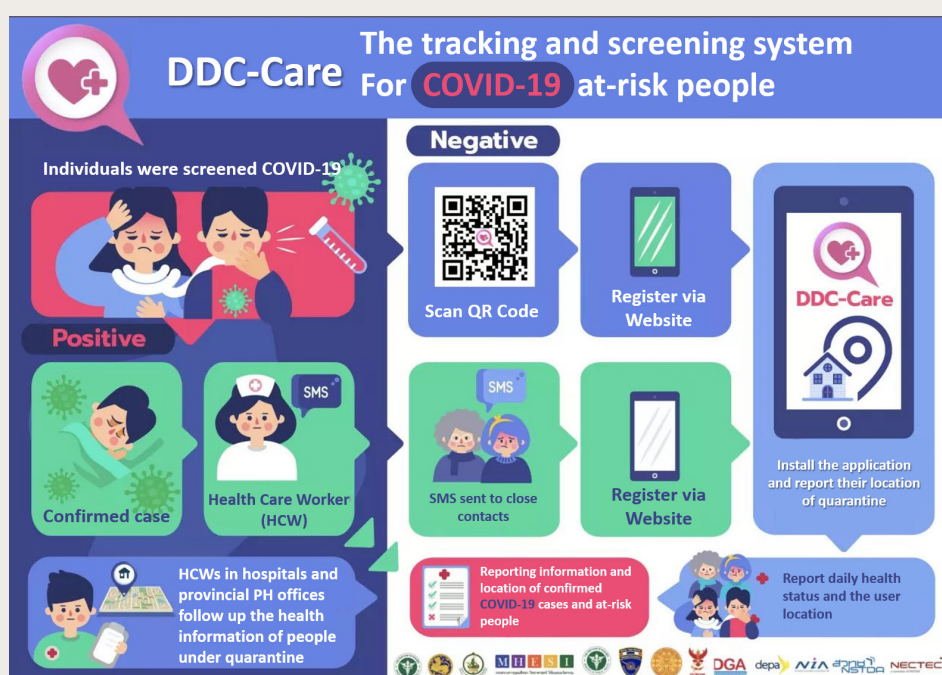


Figure 11 : “Thai Chana” web application



In addition, “Thai Chana” is designed to evaluate various activities within the country and assess the implementation of disease prevention measures in service facilities. The data collected by this platform were also analysed to guide the development of preventive and control measures.

Role of Legal Measures

Communicable Disease Act

As the COVID-19 situation evolved, the Ministry of Public Health (MOPH) made an announcement designating COVID-19 as the 14th dangerous communicable disease on 26 February 2020 (Government Gazette, 2020). This announcement came into effect following the date of its publication in the Government Gazette and was officially announced by the MOPH on 1 March 2020. This mandate allowed the government to operate with legal authority and also to order the activation of the Emergency Operations Center (EOC) at the national, ministerial and provincial levels to be implemented throughout the country.

As Thailand remained at-risk of disease transmission, to control the disease more efficiently, the Ministry of Public Health, with advice of the National Emerging Infectious Diseases Committee, declared the territories outside the Kingdom of Thailand as Disease Infected Zones of the Coronavirus

Disease 2019 (COVID-19) outbreak under the Communicable Diseases Act B.E. 2558 (2015) (Ministry of Public Health, Notification of the Ministry of Public Health RE: Territories outside the Kingdom of Thailand defined as Disease Infected Zones of the Coronavirus Disease 2019 (COVID-19) outbreak, 2020).

This announcement created tension between Thailand and the listed countries. The reason underpinning this notification was to prevent the spread of COVID-19 from the highly infected areas as indicated by WHO.

The legislation included key legal measures such as designating a responsible person from medical facilities or coroner's offices to notify the communicable disease control officers within three (3) hours after finding an infected person or suspected case on the premises. The designated officers at points of entry were granted the authority to order vehicles to be parked in a specific area, undertake measures to eliminate the risks of infection, and request travellers to undertake tests for diagnosis for any vehicle coming from one of the listed countries with ongoing spread of COVID-19.

When the COVID-19 situation gradually improved across the country, the Minister of Public Health, upon recommendations of the technical advisory committee, announced the Notification of the Ministry of Public Health Re: Abrogation of areas outside the Kingdom designated as a

Emergency Decree

Thailand announced the Emergency Decree on Public Administration in Emergency Situation, B.E. 2548 on 26 March 2020 to scale up the disease control measures, as the country was dealing with cluster outbreaks and local transmission. Under this state of emergency, people were prohibited to go outside of their residences from 10 p.m. to 4 a.m. All international and domestic flights were banned during this phase. People were requested not to travel across provinces.

All department stores (except for stores selling food and essential items), movie theatres, and business places that have mass gatherings of people, e.g. fitness centres and gyms, barbershops, markets, bars, restaurants, boxing stadiums, hotels, educational institutes, public parks, etc. were required to close for the safety of the people.

dangerous communicable disease infected zone in the context of coronavirus disease 2019 (COVID-19) on 15 May 2020 (Ministry of Public Health, 2020). This announcement was warmly welcomed by the affected countries.

All offices and companies were encouraged to comply with “work from home” policies to avoid the congestion of people in their offices. The concept of “social distancing” was introduced during this phase (Center of COVID-19 Situation Administration, 2020).

Non-Public Health Measures: Challenges and Opportunities

The Ministry of Public Health has the responsibility for the health of the nation and to cope with the disease. The Ministry of Defence, under the Prime Minister, instructed relevant agencies and every province to take comprehensive action to prevent COVID-19 from spreading across the country.

All provinces in Thailand were requested to regularly report the results of their work as the situation scaled up quickly.

All relevant sectors released their protective measures to make sure their staff would be free from infection. For example, the Ministry of Education issued an announcement instructing that their personnel were not allowed to travel to countries at-risk of COVID-19 without first obtaining permission. The Ministry of Education scaled up its standards of prevention and control measures for COVID-19 and coordinated with agencies under the Ministry of Education by notifying personnel to follow guidelines of obtaining permission to go to countries or areas at risk for COVID-19. Educational institutions announced to their staff who returned from at-risk countries/regions to stop working for 14 days and take a leave of absence to self-quarantine and practice social distancing. Students returning from overseas were requested to implement self-quarantine for 14 days.

Many news stories were reported continually to raise public awareness for people and organisations to be alert. Also, there were requests to consider suspending or cancelling mass gathering activities.

Local administrative units and agencies were assigned to monitor Thai workers returning from the Republic of Korea (South Korea), which was an at-risk area for COVID-19. Many provinces designated areas and locations to be used for mandatory quarantine according to government orders.

After the government, especially the Department of Disease Control, recommended people to postpone and avoid visiting the at-risk countries/regions, Thai AirAsia X initially announced the cancellation of all flights to and from South Korea from 6-27 March 2020. On 6 March 2020, confirmed COVID-19 cases were found in entertainment spots and after that, an outbreak occurred in a Bangkok boxing stadium on 11 March 2020.

Later, several at-risk businesses/places were closed in Bangkok to control the disease. Under the approval of the Cabinet, for example, entertainment venues, traditional massage parlours, and movie theatres in the Bangkok Metropolitan Area were temporarily closed for 14 days until 31 March 2020.

Moreover, the governors and the provincial communicable disease committee agreed to refrain from organizing activities that attract a large number of people such as concerts, trade shows, religious, cultural and sports activities due to the high risk of spreading the disease. The measures in principle and the budget allocation for implementing disease prevention and control for mitigating the impact of the COVID-19 were also approved.

This included venues where there are mass gatherings and activities including at universities, international schools, and other places that draw crowds and have a high risk of transmission such as boxing and sport stadiums, and the horse racing track in Bangkok.

Before the CCSA announced the Emergency Decree, the Civil Aviation Authority of Thailand (CAAT) issued an announcement mentioning that both Thai and foreign passengers traveling from :

- 1) China, Macau Special Administrative Region, Hong Kong Special Administrative Region,
- 2) The Republic of Italy,
- 3) The Islamic Republic of Iran and
- 4) The Republic of Korea

needed to undergo a medical examination and must present a medical certification (describing “No evidence of SARS-CoV-2 (COVID-19) infection”) in the previous 72 hours and health insurance in the amount of \$100,000 or about 3 million baht/person to be able to be issued a boarding pass and board the aircraft to Thailand.

This took effect on 22 March 2020. Four days after that, the Thailand Prime Minister announced the Emergency Decree with eight main measures including:

- 1) Curfew hours between 10 PM to 4 AM,
- 2) Temporarily closure of schools and prohibition of conducting mass gathering activities
- 3) Prohibition of meetings, seminars, and events
- 4) Ban of all international passenger flights
- 5) Mandatory quarantine in travellers who returned from abroad
- 6) Temporary closure of non-essential businesses
- 7) Religious activities could still be carried out
- 8) Refraining from traveling across provinces

Due to the COVID-19 epidemic, airlines in Thailand temporarily halted both domestic and international flights.

On the same day of the CCSA announcement, the CAAT announced a regulation under Section 9 of the Emergency Decree on Public Administration in Emergency Situations B.E. 2548 (2005) No.1 about the travel advisory to passengers planning to enter Thailand. The groups allowed to enter were to be limited to Thai nationals, non-Thai citizens who hold a valid work permit from Thai government agencies, persons on diplomatic/consular missions/under international organisations, and persons exempted by the Prime Minister. Non-Thai individuals were able to enter but needed to provide several documents including the Fit-to-Fly certificate issued no more than 72 hours before traveling. Thai nationals needed to contact and register at the Royal Thai Embassy/Consulate to receive a Certificate of Entry (COE) and a Fit-to-Fly certificate.

The Ministry of Foreign Affairs (MOFA) has served as the main coordinator to bring Thai people back home. The first group of Thai citizens returning home were those coming back from Wuhan, China. The second group came back from South Korea. An online registration platform was established to register all Thai people who wanted to return to their homeland. MOFA and relevant agencies such as the MOPH, Ministry of Defence and others have worked together to support this operation.

Before Thailand was locked down on 4 April 2020, CAAT announced the first temporary ban on all international flights until 6 April 2020 by allowing only six types of flights to enter including:

- 1) State or military aircraft
- 2) Emergency landings
- 3) Technical landings without passengers leaving the aircraft
- 4) Humanitarian aid, medical and relief flights
- 5) Repatriation flights
- 6) Cargo aircraft to land in Thailand

Fortunately, MOFA, the Royal Thai Embassies/Consulates, and relevant partners involved in bringing Thai people back home established a system where Thai nationals must contact the Thai Embassy/Consulate and provide their Fit-to-Fly certificate. Even though it took some time to get accustomed to during the initial period, it has since become smooth with all sectors collaborating.

After that, CAAT extended the temporary ban of all international flights several times. People returning are observed under State Quarantine, which are hotels approved by the Department of Health Services Support. The quarantine lasts for 14 days and each person is tested for COVID-19 twice, first between days 3-5 and then between days 11-13 of quarantine to ensure all of them are free from infection so that the disease will not be spread to other people. All facilities are supported by the government. Non-Thai citizens who enter Thailand undergo the same quarantine protocol as Thai people upon arrival but they are observed under at Alternative State Quarantine facilities.

During the Emergency Decree, many organisations changed their working concept from “Work in the office” to “Work from Home” to ensure their staff are safe from COVID-19. Many businesses/activities changed their services under the MOPH recommendations such as take away food/drinks and not allowing customers to eat in their shops. Some groups have been affected by the decree for example, employees, temporary workers and freelance workers. Thus, the Ministry of Finance proposed measures to mitigate the impact of COVID-19 on the Thai economic system.

The measures were intended to mitigate the negative effects and take care of those impacted groups. In addition, business operators and entrepreneurs who were affected by COVID-19 were to be supported and taken care of under these measures.

At the provincial level, many provincial governors took action to temporarily close borders in provinces such as Phuket, Chiang Mai, Chiang Rai, Phitsanulok, Nonthaburi, Sakonnakhon, Chachoengsao, Ranong, etc. In Ranong, from 1 April 2020, if people wanted to enter or exit the province, they had to present a medical certificate. People entering the province had to present themselves to the sub-district headman, head of village, chief executive of the Sub-district Administrative Organization (SAO) or mayor and were supposed to implement self-quarantine for 14 days.

If anyone failed to comply with those rules, they were to be punished in accordance with the law. Cross-border letters of approval had to be signed by both the local authorities and public health authority, before the applicant could cross the province or travel out from the province.

At the borders, police officers, soldiers, transportation officers and district officers set up screening checkpoints for people, passengers, and drivers who were traveling to other provinces especially from Bangkok. Between April - May 2020, some provinces scaled up their prevention measures under the authority of the provincial governors. For example, people who entered Songkhla province from high-risk provinces had to present themselves to the head of the village and self-isolate for 14 days.

In addition, the Emergency Decree did a good job to support the government agencies to cope with and control the disease until new confirmed case numbers gradually decreased to single digits.

The government eased the restrictions in many phases and evaluated citizen and business behaviours to make sure Thailand would not be faced with a second-wave of COVID-19.

All government agencies continue to closely monitor the situation to control the disease and are putting their efforts forth to raise the health stability of Thai citizens and people who live in the nation. However, the government and private sector still must closely work together and cooperate to fight against the disease.

National Exit Strategy

Preparatory Phase to Enter a “New Normal” Era

Considering that the number of COVID-19 cases have been controlled to a certain extent, the confirmed cases have been mainly people entering Thailand from risk countries. The government has realized that without preparation and the cooperation from the general public, Thailand would be at high risk of an outbreak re-escalation.

The public health protocols to guide community and business owners were prepared and discussed by the Scientific Response Team, which comprises of experts from all departments in the MOPH. The government assessed the situation and made a decision to ease the enforcement of certain measures based on information from public health, public administration, and economic factors.



Public Health Control Measures

To educate and prepare the general public on the ease of the restriction measures, the MOPH has advised the public on social protocols and guidelines in order to facilitate related stakeholders to reopen their businesses and offices.

Private sector businesses and government offices were categorised into four groups according to the risk assessment, considering the number of people in the area, contact/interaction type and contact time.

Very low-risk businesses include small, open-air business, stalls, and food delivery services without storefronts.

Low-risk businesses include small-sized business with/without air conditioning: Operating with the physical distance protocol (1 meter distancing, contact time less than 30 minutes, limited contact activities, adjust ventilation system); department stores, supermarket, banks, government offices, bookstores, street food vendors, outdoor coffee shops, petrol stations, public transport, guest houses, dental clinics, veterinary clinics, parks, outdoor sport complexes, temples/churches/mosques, dormitories/apartments/condominiums.

Intermediate-risk businesses include large, closed-space businesses with ventilation systems (strict physical distance protocols); large department stores, community malls, dine in restaurants, barber/salons, outdoor markets, school, academic institutes, indoor restaurants/coffee shops, fitness centres/gymnasiums, aesthetic clinics, golf clubs, museums, galleries, libraries, religious ceremonies.

High-risk businesses include small, closed-space/crowded businesses/long contact time (specific control measures); businesses with large crowds, exhibition centres, seminars, nurseries, elderly centres/nursing homes, spas and traditional Thai massage parlours, tattoo shops, cinemas, concerts, pubs and bars, sport events.

The reopening of businesses are guided and monitored closely by a multi-ministerial mechanism to ensure that the reopening does not increase the risk of viral transmission in the community.

New Normal Medical Service

The MOPH places an importance on the safety of the patients and health personnel. Therefore, in the health emergency situation such as this, the integration of epidemiological management and standard health services is mandatory. The core principles of the New Normal medical services aim to minimise hospital visits by utilising digital technologies.

For example, patients could consult their doctors using telemedicine. Patients with chronic conditions could get their medications refilled through home delivery service.

The New Normal medical service has been piloted in the Pattani Provincial Hospital, known as the “Pattani Model” and will be extended to other provinces nationwide.

Strategic Actions to Prevent a Second Outbreak Wave

State Quarantine

At the early stage, state quarantine was initiated to accommodate Thai citizens returning from Wuhan, China in February 2020. All of the returnees, by law, were required to sign a consent form for 14 days of quarantine at the designated quarantine facilities. The concept of state quarantine was then applied to the undocumented Thai workers (so called “Phi Noi”) returning from the Republic of Korea. After the government declared the state of emergency on 26 March 2020, state quarantine was systematically developed and fully utilised.

The management of state quarantine facilities was later assigned to the Ministry of Defence, Ministry of Foreign Affairs, and Ministry of Public Health (Department of Disease Control, Department of Mental Health, Department of Health Service Support and Department of Medical Services) in facilitating hotel operators to set up quarantine facilities as per the standard set by the government.

State quarantine has become a key success factor in containing the high-risk population and preventing the possible spread of COVID-19 cases to the society at large.

Business Continuity Planning for Health Facilities

To reassure the confidence of in-country pandemic control, the MOPH conducted its 'after action review' with all health regions to analyse past responses, key events, local collaboration gaps and lessons learned. Each health region of Thailand was varied in contexts, strengths and vulnerabilities.

A comprehensive review assisted the Planning Committee to prepare for the uncertainty of this crisis and generate guidance for public health emergencies.

The Business Continuity Plan is to be reviewed and consulted with health and non-health experts from both the public and private sectors to prepare for the next emergency response.

Monitoring and Evaluation

Community Surveillance

Community surveillance is crucial due to the ease of restriction measures and reopening of businesses. The competent officials from health and non-health sectors shall actively conduct surveillance and have the power in accordance with the Communicable Disease Act B.E. 2558 (2015) to inspect that the activities conducted by business sectors and interprovincial traveling are in compliance with disease prevention measures. If an act is found to be risk prone to spread the disease, the competent official may give a recommendation, warning or prohibition to carry out the action.

Constant Risk Assessment and Active Case Finding

The risk populations, vulnerable groups and disease prone areas have been identified, including undocumented workers, crowded construction sites, coastal fishing zones and migrant camps. These areas were screened and monitored by related ministries and closely communicated with local bureaus of disease control with active case finding policies.

The MOPH's Public Health Emergency Operation Center also maintains its function of real-time data analysis, facilitating coordination and support for all operations and logistics (Annex 1).

During May-June 2020, Thailand conducted a large-scale screening of at-risk populations including healthcare workers, incoming prisoners, public transportation workers and migrant workers. A total of 91,166 samples were collected and tested for SARS-COV-2 by RT-PCR. Only one sample obtained from a formerly confirmed case of COVID-19 was positive.

Addressing COVID-19 through International Cooperation

The recent emergence of the COVID-19 pandemic has instilled fear in the public, put millions of lives at risk and disrupted the economy. Thailand, as an active player in the international context, has taken part in making commitments to enhance collective responses at the regional level to mitigate the negative impacts caused by the pandemic.

Bilateral ties with various countries demonstrated strong relations during the COVID-19 outbreak, as the MOPH received a number of courtesy calls from foreign ambassadors requesting for enhanced bilateral cooperation in fighting against the coronavirus. However, concrete actions remain to be explored.

At the regional level, Thailand has been actively involved in pledging commitments to mitigate the negative impacts of COVID-19 on health of the populations, societies and economies among ASEAN Member States and their dialogues partners. A series of special video conferences between health experts and senior officials was held in February and March 2020.

All of these special video conferences share a common ground in reaffirming ASEAN's determination and commitment to remain united and act jointly and decisively to control the spread of COVID-19 in the spirit of a cohesive and responsive ASEAN.

At the global level, Thailand joined the World Health Organization (WHO) member states in co-sponsoring and endorsing the World Health Assembly (WHA) 73.1 resolution on "COVID-19 response" that calls for "in the spirit of unity and solidarity, the intensification of cooperation and collaboration at all levels in order to contain and control the COVID-19 pandemic and mitigate its impact" (World Health Organization, 2020).

Thailand's fight against the pandemic is very much in line with this resolution. The country has also shared public health information related to COVID-19 with WHO since the first case was detected in Thailand.

Key Success and Challenges

Thailand's Early Action

Thailand began airport screening early, in the beginning of January 2020. This highlights the importance of early detection and enables Thailand to confirm its first COVID-19 case outside of China. The screening measures at points of entry also include investing in setting thermal scanners with new technology at international airports across the country. These efforts are an example of early collaboration between various governmental sectors, in Thailand's case, the Department of Disease Control

Leadership of the Government

To overcome the consequences of COVID-19, the most critical aspect for success has been the government sector leadership for organisational operations and performance. In early February 2020, the National Committee for Emerging Infectious Disease Preparedness, Prevention and Response meeting was convened by the Prime Minister. All relevant agencies and provinces were instructed to take all comprehensive measures to prevent COVID-19 in every part of the country.

(DDC), Transportation, Security, Airports of Thailand (AOT). Early collaboration was instrumental in making testing available for patients under investigation (PUIs). The focused testing approach allows Thailand to best utilise resources, conduct contact-tracing, and prevent exponential growth in cases on a larger scale.

All provinces in Thailand were requested to regularly report the results of their work.

The Prime Minister of Thailand and the Minister of Defence also requested the authority of the cabinet to issue the Emergency Decree (2005) in order to control the COVID-19 outbreak. However, large clusters of COVID-19 were still occurring. To mitigate the spread of the disease, cooperation among different organisations has been a crucial aspect.

A central command was established to pool and assign resources from the organisation-level to conquer this outbreak.

Therefore, the Prime Minister declared a nationwide state of emergency aimed at elevating the CCSA to function as the Centre for the Resolution of the Emergency Situation and prepared to impose more legal and stringent measures to effectively control the spread of disease.

The Prime Minister allocated a 1.5-billion-baht budget to the Ministry of Public Health for the procurement of medicine and essential medical supplies and equipment needed for treating COVID-19 patients.



Moreover, the Prime Minister closely monitored the situation at the Government House and hold meetings to discuss and follow up the progress with relevant agencies dealing with the outbreak in the country.

Implementation of Law Enforcement

Additionally, listing COVID-19 in the Communicable Disease Act as part of the response allowed the government to operate with legal authority and helped the activation of the Emergency Operations Center (EOC) at national, ministerial and provincial levels to be implemented throughout the country.

The announcement of the Emergency Decree is another factor that has increased physical distancing in public places and reduced possible risks from travelling abroad, domestically, and locally.

Public Compliance of the Government Measures

Among the general public and businesses, people were quick to adapt to their 'new normal' lifestyles. This includes complying with screening protocol at public places, working from home, and following recommendations from the government, including wearing face masks in public. People were largely tolerant to endure financial and personal sacrifice and act for the collective, a trait built into the social structure that is not seen in all societies. This includes the frontline work of the village health volunteers to reach to people at community level. The village health volunteers have been acknowledged locally and internationally as one of the key factors in helping control the spread of the disease in Thailand.

As mentioned earlier, this group helped healthcare workers provide knowledge and information on disease control to the general public, primarily checking health condition of patients in the communities and following up their symptoms. This mechanism greatly minimises local transmission, raises awareness of people in the communities and encourages people to abide by the disease control measures.



Power of Multi-Sectoral Cooperation and Flexibility in Adapting to the Changing Situation

Multi-sectoral cooperation from various organisations such as the Ministry of Defence and Ministry of Interior to implement state or local quarantine is another piece of the jigsaw for this success story. State and local quarantine facilities have been provided for all arriving passengers subject to the measures under communicable disease law and Emergency Decree, to detect and contain the outbreak in the local areas.

An innovative tool to assist the investigation teams called “ไทยชนะ (Thai Chana)” was developed in collaboration with private partners to increase the capacity of contact tracing. It has been designed for tracing patients whereabouts in public places such as shopping malls, boxing stadiums, entertainment spots, schools and universities. As for the government itself, as the situation developed, the PUI criteria were adapted to maximise the effectiveness of the DDC’s strategy.

Importantly, Thailand began encouraging its population to wear masks in public even while previously it was not recommended by international health agencies at the time. It became a common measure that most countries subsequently adopted and recommended to their people.



Lessons Learned

Thailand has gone through the first wave of COVID-19. The number of cases gradually increased from mid-January to mid-March with most of them being imported cases. From mid-March until mid-May, the number of cases rapidly increased to around 3,000 cases, mainly from local transmission. Thailand has successfully 'hammered down' this wave, with zero local cases since May 2020.

As of July 2020, the GCI showed that Thailand is ranked number one in the COVID-19 recovery index.

The country's experience with the COVID-19 response has drawn at least five lessons learned for other countries:

First

Investing in health facilities is a key success. As stated earlier, Thailand has invested in basic healthcare infrastructure for the last four decades. There are more than 1,000 public hospitals providing secondary and tertiary care services and more than 10,000 primary health care facilities or "health promoting hospitals" providing primary healthcare services to their beneficiaries across the country. During the COVID-19 outbreak, these healthcare facilities have been repurposed to accommodate COVID-19 patients while maintaining the other essential services.

Second

Universal health coverage (UHC). Thailand has achieved universal health coverage since 2002. All Thai people can access healthcare services under the UHC schemes. During the COVID-19 outbreak, the Thai government has provided essential healthcare to all infected people, including foreigners. All COVID-19 patients have accessed essential treatment without financial barriers.

Third

Contributions of more than one million village health volunteers. These volunteers have worked in complement with primary healthcare services at the community level. They have conducted door-to-door visits for health education, active case finding, disease surveillance, quarantine, and even made cloth masks for the people. They have left no stone unturned in the quest to control COVID-19.

Fourth

Taking early action. Three days after China announced the abnormal cases of pneumonia, Thailand started to screen passengers from Wuhan and within five days found the first case outside of China. This prompted strong public health measures and campaigns for hand hygiene, social distancing and the universal use of facial masks, which helped to hammer down the first wave.

A whole-of-government approach led by top political leaders is also important. Right before the peak of the first wave, Thailand established the CCSA, chaired by the Prime Minister. The CCSA has met regularly to make important, timely, evidence-based decisions.

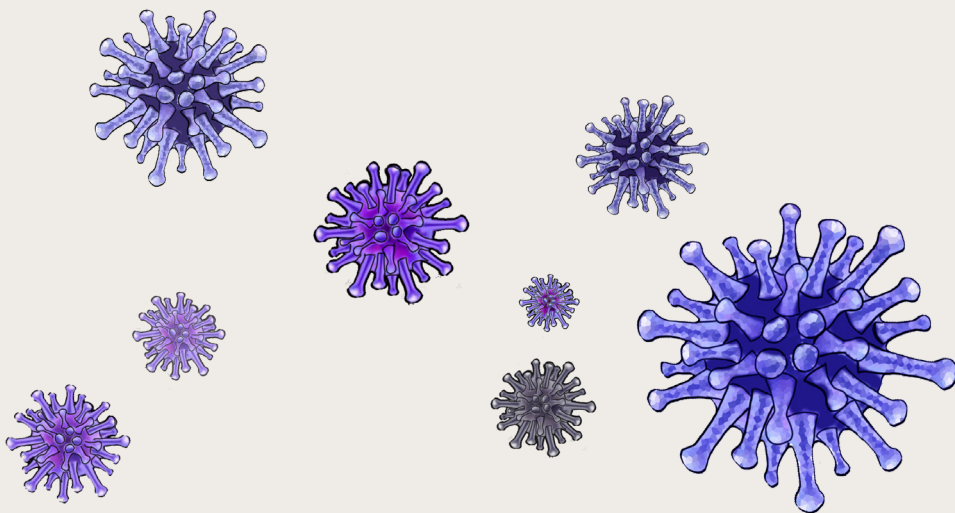
Fifth

Nationwide public cooperation on effective social measures. A daily press conference by the CCSA's spokesperson and risk communication by the MOPH executives and experts provide essential information to the public and repeatedly motivates healthy behaviours.

Thailand monitors the people's COVID-19 related behaviours every week and makes decision accordingly.

Conclusion

COVID-19 has demonstrated the importance of health security preparedness and timely response to mitigate the pandemic's impacts. Thailand's experience in addressing COVID-19 has provided at least five lessons learned for other countries in fighting the pandemic and underscoring the importance of investing in UHC and health security. Thailand has survived the first 'battle' at high social and economic costs. The challenge remains in the 'dancing phase' to control the disease while balancing cautions with acceptable and sustainable social and economic costs. Fighting COVID-19 appears to be a long war, so countries must be vigilant.



Bibliography

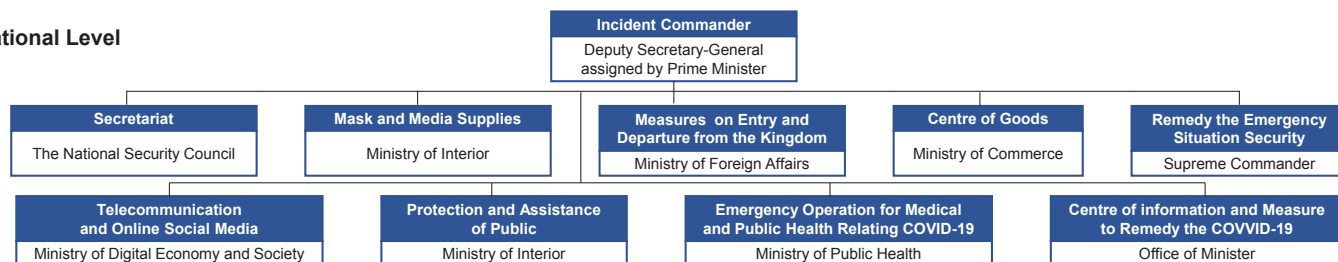
- GCI. (2020, August 8). Retrieved August 8, 2020, from The GCI Dashboard:
<https://covid19.pemandu.org/>
- Bangkok Biz. (2020, March 4). *Department of Disease Control Takes Control of 'Pee Noi' -Denying the Witch Hunt*. Retrieved 25 June, 2020, from Bangkok Biz:
<https://www.bangkokbiznews.com/news/detail/869133>
- Cameron, E, Nuzzo, J, Bell, J. (2019, October). Global Health Security Index. Retrieved June 5, 2020, from
<https://www.ghsindex.org/wp-content/uploads/2020/04/2019-Global-Health-Security-Index.pdf>
- Center of COVID-19 Situation Administration. (2020). Issued under Section 9 of the Emergency Decree on Public Administration in Emergency Situation B.E. 2548 (2005)(No.1). Government Gazette.
- Department of Disease Control. (2020). *Coronavirus Disease (COVID-19)*. Retrieved June 15, 2020, from Department of Disease Control, Ministry of Public Health, Thailand: <https://ddc.moph.go.th/viralpneumonia/index.php>
- Department of Disease Control. (2020). The Department of Disease Control Order: Emergency Operations Center working establishment on Viral Pneumonia.
- Government Gazette. (2020, February 29). Retrieved from Notification of the Ministry of Public Health Re: Designation and Main Symptoms of Dangerous Communicable Diseases (Issue 3):
http://www.ratchakitcha.soc.go.th/DATA/PDF/2563/E/048/T_0001.PDF
- Matichon Online. (2020, July 8). *MOPH says Thailand overcomes the first wave - no new cases for 44 days*. Retrieved July 10, 2020, from Matichon Online: https://www.matichon.co.th/covid19/thai-covid19/news_2258784
- Ministry of Public Health. (2020, May 15). Retrieved August 8, 2020, from
https://ddc.moph.go.th/viralpneumonia/eng/file/main/moph_notifications.pdf
- Ministry of Public Health. (2020, March 2). Notification of the Ministry of Public Health RE: Territories outside the Kingdom of Thailand defined as Disease Infected Zones of the Coronavirus Disease 2019 (COVID-19) outbreak. Government Gazette.
- Ministry of Public Health. (2020, February 14). Public Health Emergency Response Action Plan for COVID-19 and Roles of Relevant Agencies.
- Noree, T. (2020, January 29). Retaining rural doctors :lessons from Thailand.

- Prime Minister Office. (2020, March 26). *Declaration of an Emergency Situation in all areas of the Kingdom of Thailand*. Retrieved August 8, 2020, from <http://www.mfa.go.th/main/contents/files/news3-20200326-161207-994002.pdf>
- Thai PBS News. (2020, May 15). *3 Scenarios Forecasting Increased COVID-19 Cases Until September After Ease of Restrictions*. Retrieved June 20, 2020, from Thai PBS New: <https://news.thaipbs.or.th/content/292501>
- World Health Organization. (2020, January 30). *Statement on the second meeting of the International Health Regulations (2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV)*. Retrieved April 12, 2020, from World Health Organization: [https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-\(2005\)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-\(2019-ncov\)](https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov))
- World Health Organization. (2020, May 19). *WHA 73.1 COVID-19 response*. Retrieved July 10, 2020, from World Health Organization: https://apps.who.int/gb/ebwha/pdf_files/WHA73/A73_R1-en.pdf
- World Health Organization. (2020). *WHO Health Emergency Dashboard*. Retrieved May 20, 2020, from World Health Organization: <https://covid19.who.int/region/searo/country/th>

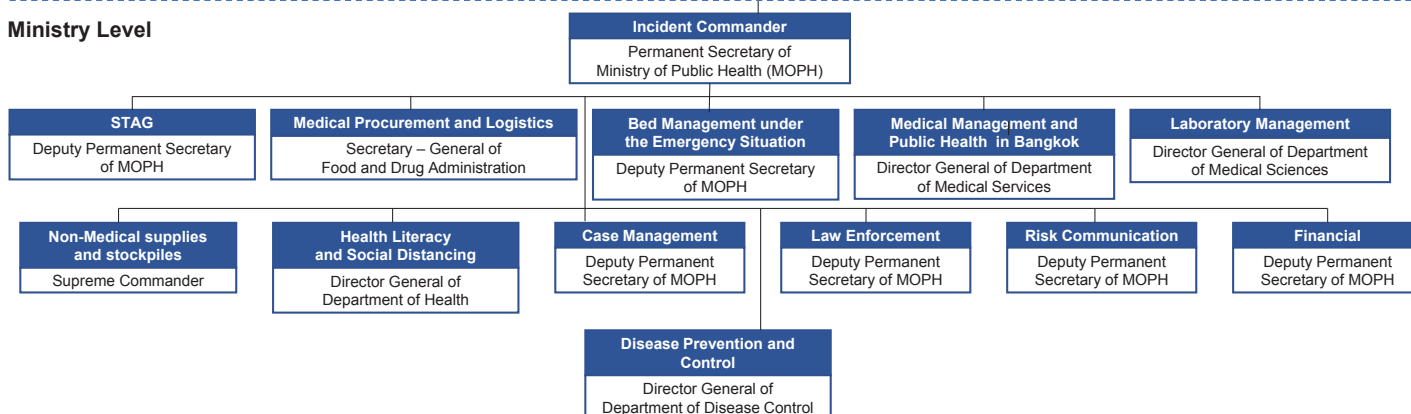
Annex 1

Thailand COVID-19 Management Organogram

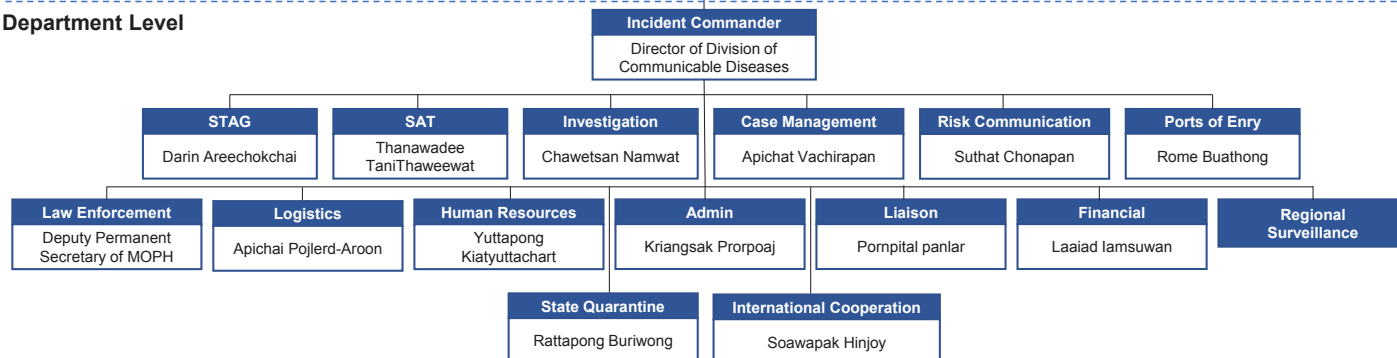
National Level



Ministry Level



Department Level



International Cooperation Task Force | 19 July 2020



Annex 2

(Revised version dated 8 April 2020) for Medical and Healthcare Personnel Guidelines for Clinical Management and Administration of Antiviral Medications for Cases of COVID-19 Infection

Clinical Management of COVID-19 based on disease severity

1. Confirmed case without symptoms (asymptomatic infection)

- Recommend hospitalization or keep under observation at designated facilities for 2-7 days. If no complications are observed, consider transferring to stay in a designated hospital or temporary patient ward for COVID-19 for at least 14 days from date of onset. After that the patient should be recommended to wear surgical mask at all times and pay extra attention to respiratory hygiene when interacting with other people until reaching 1 month from the date of illness onset.
- Provide symptomatic treatment as appropriate. No antiviral medication is needed as most patients will eventually recover and they may potentially experience side effects of antiviral drugs.

2. Confirmed case with mild symptoms and no risk factors (normal chest radiograph without significant risk factors/preexisting health conditions/co-morbidities)

- Recommend hospitalization for 2-7 days and provide symptomatic treatment. Consider administration of the following combination therapy for 5 days.
 - 1) Chloroquine or hydroxychloroquine in combination with
 - 2) Darunavir + ritonavir or lopinavir/ritonavir or azithromycin^{##}
- When the conditions have improved and chest radiograph still remained normal, consider transferring to stay in a designated hospital or temporary patient ward for COVID-19 case for 14 days from the date of illness onset. After that the patient should be recommended to stay home to recuperate and wear surgical mask at all times. Patient will also be advised to pay extra attention to respiratory hygiene when interacting with other people until reaching 1 month from the date of illness onset.

3. Confirmed case with mild symptom and risk factors:

Normal chest radiograph with one of the following significant risk factors/preexisting health conditions/co-morbidities: Aged >60 yrs, Chronic Obstructive Pulmonary Disease (COPD) and other chronic lung diseases, chronic kidney disease (CKD), cardiovascular diseases including congenital heart diseases, cerebrovascular diseases, poorly controlled diabetes, obesity (BMI \geq 35 kg/m²), cirrhosis, immunocompromised condition, and lymphocyte counts <1,000 cells/mm².

- Recommend using combination therapy consisting of at least two medications for 5 days
 - 1) Chloroquine or hydroxychloroquine in combination with
 - 2) Darunavir + ritonavir or lopinavir/ritonavirA third drug, azithromycin,^{##} may also be added to the regimen.
- If progression of infiltration is shown on chest radiograph, consider adding Favipiravir for 5-10 days depending on clinical symptoms.

4. Confirmed case with pneumonia, or in case of normal chest radiograph but presence of symptoms or signs consistent with pneumonia, and SpO₂ at room air <95%

Recommend using combination therapy consisting of at least three medications (excluding favipiravir) for 10 days

- 1) Favipiravir for 5-10 days depending on clinical symptoms in combination with
 - 2) Chloroquine or hydroxychloroquine in combination with
 - 3) Darunavir+ ritonavir or lopinavir/ritonavir
- A fourth drug, azithromycin,
- ^{##}
- may also be added to the regimen.

- Prioritize respiratory support with HFNC before invasive ventilation
- Consider using others organ supports as deemed necessary

Combination treatment with hydroxychloroquine and azithromycin is a regimen with limited clinical evidence and further studies are needed. Attending physician should closely monitor clinical conditions of the patient receiving treatment using this combination regimen and treatment adjustment may be made as deemed appropriate.

