Joint Intra-Action Review of the Public Health Response to COVID-19 in Thailand

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Thailand

กระทรวงสาธารณสุข
MINISTRY OF PUBLIC HEALTH

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Introduction

On 31 December 2019, the World Health Organization (WHO) reported a cluster of pneumonia cases of unknown cause in Wuhan City, Hubei Province, China. On 4 January 2020, the Thailand Ministry of Public Health (MOPH) activated its Emergency Operations Centre (EOC) and began to prepare for this emerging threat. On 13 January, the Thailand MOPH reported an imported case of COVID-19; the first case detected outside China. In the subsequent weeks and months, Thailand rapidly developed policies and with a remarkable degree of public cooperation implemented a national response to COVID-19, successfully flattening the epidemic curve while maintaining a low case fatality rate (1.68%). As of 25 September, 3,519 cases and 59 deaths had been reported. However, recognizing that Thailand remains at risk of additional outbreaks, the MOPH and the WHO jointly organized a review of the national pandemic response, with a focus on areas of strength and vulnerability, and recommendations to improve the response going forward. The Joint Intra-Action Review focuses on nine "pillars" of the national response. These are:

1. Country-level coordination, planning and monitoring
2. Risk communication and community engagement
3. Surveillance, case investigation, and contact tracing
4. Points of entry/migrant health
5. National laboratory system
6. Infection prevention and control
7. Case management and knowledge sharing in the latest innovation and research
8. Operational support and logistics in supply chain and workforce management
9. Essential (non-COVID-19) services

The review was limited to the public health aspects of Thailand's response and was undertaken by 16 interviewers working in four teams using the WHO "Country COVID-19 Intra-Action Review" framework[1]. Ninety-six individuals (see Annex 1) from ministry departments and partner organizations were interviewed. Travel restrictions precluded the direct contribution of experts based outside Thailand. Time constraints also made access to and evaluation of data impractical. While the primary intent of this review is to strengthen Thailand's COVID-19 response, the findings may be of interest to other countries as they plan or revise their responses

[1] https://www.who.int/publications/i/item/WHO-2019-nCoV-Country_IAR-2020.1

Executive Summary

What were the key elements of Thailand's successful response?

Despite the complexity and initial lack of information available on this outbreak, decisive leadership informed by the best science enabled Thailand to proactively make difficult decisions and manage the challenging circumstances. Thailand's flexible and adaptive administrative management systems enabled it to quickly respond to rapidly changing demands and execute urgent policy decisions, ensuring that human and financial resources were made available, and that professional staff understood their roles and responsibilities.

Thailand's long-term investments in infrastructure, technology and human resource capacity paid important dividends, providing the robust and well-resourced medical and public health system that proved essential. Experience with infectious disease outbreaks including SARS-1, H5N1 avian influenza, pandemic H1N1 influenza and MERS helped Thailand build expertise and understanding that enhanced preparedness, both at the MOPH and among the general public, leading to a successful response. Thailand established consistent, accurate and transparent communication that helped build trust and increased public confidence and compliance. To achieve this, citizens, residents and visitors were engaged to understand, support and comply with public health directives with minimal use of punitive or coercive measures.

The considerable resources and expertise of the private business was leveraged through active engagement, including medical, travel and hospitality, media, technology and manufacturing sectors. Finally, a "whole of government" and "whole of society" approach was adopted. Thailand's policies and interventions were improved by consultation with, or in consideration of, groups and sectors of society, both public and private. Advice and consultation were actively sought to mitigate the negative impacts of the outbreak and protect national health security.

Major Cross-cutting Recommendations

1. Build an advanced national digital data infrastructure for public health.

Effective decision making requires timely access to the right data. Thailand's current medical and public health data landscape is fragmented and dated; presenting challenges that sometimes impaired Thailand's COVID-19 response. Many of the data needed to inform decision making were either not available, not easily accessed, not formatted to facilitate analysis and communication, or were not linked to other databases. An advanced digital data infrastructure is needed to ensure timely integration of clinical, public health and laboratory data into a single secure, national system that can be easily accessed, analyzed and communicated.

2. Establish a national IPC programme at the MOPH

Thailand does not have a single national Infection Prevention and Control programme[2]. Because there are no dedicated national IPC budgets, most healthcare facilities conduct activities using their own limited resources. There are few full-time IPC professionals in Thailand. Comprehensive, geographically representative laboratory-based surveillance for hospital-associated infections (HAI) is needed to systematically identify and correct infection control problems. The establishment of a national IPC programme will benefit Thailand now and into the future. Empowered with clear responsibilities, predictable and sufficient budget and dedicated staff, and in collaboration with academic experts and professional societies, the new programme could implement transformative improvements at every healthcare facility in the Kingdom. The new IPC programme, guided by the national IC Committee would set national IPC policy and issue uniform guidance, draft a national strategic IPC plan, establish IPC training and credentialing standards, institute national laboratory-based HAI surveillance, manage the national PPE stockpile, audit IPC practices, organize an annual IPC conference, and be the point of contact for external bodies.

3. Conduct a national Intra-Action Review (IAR) of Thailand's overall response to COVID-19.

A national IAR with the participation of all government ministries and provincial authorities will identify challenges and opportunities for improved coordination, communication and management of human and physical resources. A national IAR could also promote more effective use of non-health and private sector capacities, while generating new information to support policy priorities to prepare for subsequent outbreaks and economic recovery.

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[2] http://ihppthaigov.net/DB/publication/attachresearch/426/chapter1.pdf.

4. Evaluate current surveillance efforts to identify gaps, then implement a sensitive COVID-19 surveillance system, including a requirement that clinicians at designated sentinel hospitals test and report all patients who meet standardized case definitions.

To facilitate detection of individual cases, small clusters and monitor trends, a sensitive COVID-19 surveillance system must be established and sustained. Routine testing of all patients meeting standardized case definitions in designated sentinel healthcare facilities and with mandatory electronic reporting, would provide an early-warning system for community transmission.

5. Establish a committee to evaluate healthcare workforce needs, plan for cross-training (near-term) and advanced university training (long-term) opportunities.

Organized by a senior consultation committee, a national human resource mapping and planning effort will help to match human resources with assessed needs in every province. Close collaboration with academic institutions can address human resource shortfalls and strengthen capacities through incentive programmes.

6. Designate a single quarantine authority to oversee standards, training, accreditation, and monitoring of quarantine policies and systems.

Currently, the Ministries of Public Health, Interior, and Defence jointly develop and administer quarantine policy. A single existing unit should be assigned, empowered, staffed and resourced to provide technical and operational guidance, and oversight to state and non-state quarantine providers. This would ensure high standards, consistent implementation of policies, and expanded capacity while potentially reducing overall costs.

7. Establish an EOC 'concept of operations' and provide additional training for the Incident Command System to guide operations across the MOPH and collaboration with other sectors.

A concept of operations for Ministry of Public Health Emergency Operations Centres (EOC) with established and tested SOPs and additional training in the Incident Command System (ICS) will strengthen operational efficiency between EOCs at national and sub-national levels, and enable consistent application of the ICS. This will also further enhance collaboration with other Ministries, including the Ministry of Interior's Department of Disaster Prevention and Mitigation.

Table 1. Prioritized List of Recommendations.

Urgent to Prepare for Next Wave	Middle to Longer-Term Priority
Establish an integrated national data system for laboratory results, epidemiology indicators and hospital resources.	Build an advanced national digital data infrastructure that integrates clinical, public health and laboratory data into a secure system.
Establish a centralized system to coordinate procurement, manage inventories, evaluate test kit performance and efficiently distribute workload across qualified laboratories.	Designate a single quarantine authority to oversee standards, training, accreditation, and monitoring of quarantine policies and systems.
Establish a committee to evaluate healthcare workforce needs, plan for cross-training and advanced university training opportunities.	Establish a national IPC programme at the MOPH
Evaluate current surveillance efforts to identify gaps, then design and implement a sensitive COVID-19 surveillance system, including a requirement for clinicians at sentinel hospitals to test and report all patients that meet standardized case definitions.	Strengthen Healthcare Associated Infection surveillance and use surveillance data to establish national and facility-level IPC priorities.
Establish an EOC concept of operations and additional training for the Incident Command System to guide operations across the MOPH and collaboration with other sectors.	Establish IPC educational requirements for undergraduate health science students and in-service training for working professionals.
Expand capacity for screening at POEs and quarantine facilities to prepare for resumption of travel and increased cross-border movements.	Dedicate resources and create incentive programmes to ensure sufficient numbers of infectious disease and critical care specialists are available.
Develop and implement a comprehensive online training programme for COVID-19; require all HCWs with patient-care responsibilities to complete the programme.	Map existing human resources to identify gaps and plan to meet national and local demands; establish a system to ensure staffing needs are met during subsequent waves.
Conduct a national Intra-Action Review (IAR) of Thailand's overall response to COVID-19 ensuring participation from all Ministries and provincial governments.	Designate a unit to monitor the provision of essential (non-COVID-19) services.
Review and update the national Communicable Disease Act and other relevant legislation across sectors, to ensure effectiveness for large-scale, longer-term outbreaks.	Review and revise management systems with focus on localized adoption of BCP strategies.

Urgent to Prepare for Next Wave	Middle to Longer-Term Priority
Further distribute and promote the integrated, multi-sector "COVID-19 plan for safety and mitigating impact from 2019 coronavirus".	
Strengthen risk communication capacity and improve engagement with the private sector to prepare for a larger second wave.	
Increase and stabilize CDCU capacities and SAT team human resources; consider establishment of an Urban Health Volunteer model.	
Create a national data system for laboratory, epidemiology and hospital resources.	
Expand state-based quarantine capacities and categories to include additional provincial options and authorized alternative quarantine options.	
Sustain the national COVID-19 lab network to remain ready for future waves and other emerging infectious diseases.	
Implement research findings on maintaining essential preventive and case management services; study how to bring these services closer to the intended beneficiaries.	

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Abbreviations

BIDI	Bamrasnaradura Infectious Disease Institute
BMA	Bangkok Metropolitan Administration
CCSA	Centre for COVID-19 Situation Administration
CDCU	Communicable Disease Control Units
DDC	Department of Disease Control
DDPM	Department of Disaster Prevention and Mitigation
DMSc	Department of Medical Science
DPHEM	Department of Public Health Emergency Management
EID	Emerging Infectious Diseases
EOC	Emergency Operations Centre
GHSA	Global Health Security Agenda
JEE	Joint External Evaluation
IAR	Intra-Action Review
IDPC	International Drug Policy Consortium
FETP	Field Epidemiology Training Programme
ICS	Incident Command System
IHPP	International Health Policy Program
IUDC	Institute for Urban Disease Control and Prevention (in DDC)
MOPH	Ministry of Public Health
NCD	Noncommunicable disease
NGO	Nongovernmental organization
NHCO	National Health Commission Office
NHSO	National Health Security Office

PPE	Personal Protective Equipment
PS	Permanent Secretary, MOPH
PUI	Person(s) under investigation
RCCE	Risk Communication and Community Engagement
RTG	Royal Thai Government
SARS-CoV-2	the virus responsible for COVID-19
SAT	Situation Awareness Team (in DDC)
SOP	Standard Operating Procedure
ThaiHealth	Thai Health Promotion Foundation
Thai NIH	Thai National Institute of Health
UNAIDS	Joint United Nations Programme on HIV/AIDS
USAID	United States Agency for International Development
US CDC	United States Centers for Disease Control and Prevention
WCO	WHO Country Office
WHO	World Health Organization

Pillar 1 – Country-level coordination, planning and monitoring

Introduction

Thailand's public health emergency management mechanisms were activated with the engagement of relevant ministries to provide coordinated management of COVID-19 preparedness and response. A whole-of-society approach was employed. Building on previous experience responding to the SARS-CoV-1, H5N1 Influenza, and the H1N1 Influenza (Swine Flu) pandemic, Thailand moved quickly to expand its cooperation and capacities across government ministries and the private sector, and to mobilize its medical and public health staff. As a result, Thailand was able to control the "first wave" of the pandemic.

Strengths

Thailand delivered an effective response enabled by a strong health system and decisive leadership based on inclusive technical consultation and advice.

The effective response to COVID-19 was driven mainly by the proactive strategy of the Ministry of Public Health (MOPH) and the strong investments made by Thailand over the years into their public health infrastructure and systems such as the Field Epidemiology Training Programme (FETP) and the Village Health Volunteer system (VHV). Early activation of the Emergency Operations Centre (EOC) and the Incident Command System (ICS) at all levels also contributed. The EOC was activated in the Department of Disease Control (DDC), MoPH within a few days of the report of a cluster of pneumonia cases in Wuhan, China, and later established at the Office of the Permanent Secretary, MOPH and in all Provinces. The early and rapid response in collaboration with other agencies enabled Thailand to screen, detect and isolate the first imported cases from Wuhan. Public Health response was reinforced by the designation of COVID-19 as a 'dangerous disease' under the Communicable Diseases Act (2015).

At the national level, the Centre for COVID-19 Situation Administration (CCSA) was subsequently established as an EOC under an Emergency Decree and led by the Prime Minister, thereby ensuring unified command and integrated responses and collaboration across all agencies. The DDC played a critical role at each level of the EOCs. The EOCs frequently consulted with experts and stakeholders to support decision making and reconcile different perspectives. Finally, the MOPH response was underpinned by the rapid mobilization of budgets, human resources, and the ability to adapt the National Strategic Plan for Emerging Infectious Diseases (2017-2021) for the COVID-19 response.

Evidence was collected and analysed by careful monitoring of events inside and outside of the Kingdom to inform public health policies and monitor outcomes.

The DDC Situation Awareness Team (SAT); an integral part of the EOC, closely monitored the outbreak and relayed information to the CCSA, enabling timely policy decisions. The MOPH also monitored the global situation for new evidence and drew upon successes and errors in other countries to guide policy development, the implementation of specific control measures, and to communicate with the public. After restrictions were partially lifted, the MOPH worked with the International Health Policy Program (IHPP), mobilized partner resources, and used its social capital (the Village Health Volunteers) to conduct a survey to monitor public adherence to COVID-19 public health measures.

A strong, whole of society approach with unprecedented 'common purpose' engagement across sectors was implemented.

An unprecedented level of good-will and collaboration between public and private sectors (especially with private hospitals), helped enable a strong multi-sector response. Despite being heavily affected by COVID-19, the private sector offered resources to the government to assist the response. Informal relationships between public and private sector medical professionals formed the basis for effective communication and cooperation networks. The mobile phone app "MorChana"[3] is one example of this successful public-private cooperation.

Challenges

The Incident Command System was not always followed, and some Standard Operating Procedures were not in place or tested before the emergency.

MOPH personnel have been trained to operate under the Incident Command System and overall compliance was good. However, staff sometimes reverted to traditional organizational reporting lines. Some SOPs and other key management guidelines had to be created or revised during the emergency, suggesting they had not been adequately tested beforehand. For example, there was no SOP on when the EOC should be activated, or for when a response should be escalated based on changing levels of severity. Developing SOPs during the outbreak took resources away from the urgent tasks of managing the outbreak. Finally, the roles, responsibilities, and functional relationships between the EOC in the Department of Disease Control (DDC) and the Department of Public Health Emergency Management (DPHEM) and the EOC at the CCSA were not clearly defined and documented in relevant national plans and protocols.

[3] https://www.thaipbsworld.com/over-2-6-million-shoppers-download-thai-chana-virus-tracing-app/

The Communicable Disease Act is limited in its ability to address national-scale outbreaks.

Overall, the national Communicable Diseases Act (CDA) empowered government agencies to respond to the COVID-19 outbreak. However, the CDA was originally designed to support responses to small localized outbreaks. Due to this limitation in scope, there was a reliance on the Emergency Decree mechanism for health and non-health measures. As a result, the government also needed to repeatedly extend these short-term decrees.

The "Integrated and multi-sector COVID-19 plan for safety and mitigating impact from 2019 coronavirus" should be more widely distributed.

The MOPH developed an "*Integrated and multi-sector COVID-19 plan for safety and mitigating impact from 2019 coronavirus",* that was approved by the Prime Minister in February 2020. However, the plan has not been made widely available, constraining the ability of other sectors and international organizations to align their COVID-19 activities.

Recommendations

Establish a concept of operations for the EOCs and provide additional training for the Incident Command System (ICS) to guide operations across all levels of the Ministry of Public Health and strengthen coordination between the MOPH and other sectors.

A concept of operations for EOCs with established and tested SOPs and additional training in ICS will strengthen EOC operational efficiency, strengthen operational connections between EOCs, and ensure consistency of application of the ICS across the MOPH. This will further enhance collaboration with other Ministries such as the Ministry of Interior's Department of Disaster Prevention & Mitigation.

Review and update the national Communicable Disease Act and other relevant legislation across sectors, to ensure effectiveness for large-scale, longer-term outbreaks.

Assessing the overall effectiveness of the Act and other relevant existing laws and regulations in managing COVID-19 will ensure effectiveness against future potential large-scale pandemics. A review would also ensure harmonization of legal instruments across sectors

Further distribute and promote the integrated, multi-sector "COVID-19 plan for safety and mitigating impact from 2019 coronavirus".

Making the multi-sector COVID-19 Plan widely available will improve understanding and coordination towards common goals across all sectors of the Government and private sector. An English translation of the plan would assist international organizations and companies to align activities.

Pillar 2 – Risk Communication and Community Engagement

Introduction

Thailand understood the need to communicate regularly to the public information about COVID-19, and what actions were needed. Preparedness and response activities were conducted in a participatory manner through community engagement strategies. Messages were delivered in local languages through accessible and trusted channels. Risk communication aimed to minimize uncertainty and address risk and fear. Thailand's well-developed community health services the Village Health Volunteers, provided a channel for COVID-19 risk communications and community engagement.

Strengths

There was a clear incident command structure of risk communications functions within the Ministry of Public Health (MoPH) at the national level.

The MoPH provided regular and transparent communication to inform the public about the risks of COVID-19, responses by the health sector, and advice on how the public can mitigate risk at individual and community levels. Press briefings were broadcasted nationally by several departments within the MOPH after the 'Centre for COVID-19 Situation Administration (CCSA)'s daily press briefing. At a national level, Thailand used a single spokesperson from the health sector for the CCSA press briefings which enabled unified messages and consistent information. These health messages were passed down to Village Health Volunteers, who were an important interface between the formal health system and the community.

The government launched a multi-lingual hotline for migrants.

A COVID-19 hotline in the Khmer, Lao and Burmese languages was launched in May, with experienced volunteers as hotline responders. This enabled migrants to access advice on prevention and about how to access testing and treatment. The hotline also facilitated coordination with hospitals and reporting of suspected cases. Sign language was made available at CCSA daily briefings.

Multiple social media platforms are operating for advocacy and strategic media engagement.

In partnership with ThaiHealth, several platforms for COVID-19 risk communication were established under the name 'Thai Roo Soo COVID', including Facebook, Twitter, Instagram, LINE, YouTube, and TikTok. This allowed more creative content and public interaction with various audiences.

Challenges

Private sector media organizations were not meaningfully engaged in the response.

Private sector media companies have considerable resources and capacities to communicate with the public via an array of channels, from traditional newspapers and television to social media. For the most part, the Thai government did not establish a cooperative relationship with these companies and did not meaningfully engage them early in the pandemic.

There is an insufficient pool of risk/crisis communication professionals, especially at the provincial level.

There is a national capacity gap in risk communication, both in terms of expert human resources and strategy. This is a concern at the provincial level.

Recommendations

Strengthen risk communication capacity and improve engagement with the private sector to prepare for a possible larger second wave.

Surge capacity should be enhanced, and additional training provided, especially at the provincial level. Communications experts from international organisations, non-governmental organizations, and the private sector should be mobilized in support of the Government of Thailand's risk communication needs. A roster of communication professionals should be established and maintained.

Pillar 3 — Surveillance, Rapid Response Teams, Case Investigation

Introduction

Timely and accurate COVID19 surveillance data are essential to inform Thailand's public health response. Surveillance data are used to monitor the geographical spread of the virus, transmission intensity, disease trends, virologic features and high-risk groups; and to assess impacts on health-care services. In Thailand, adaptable case definitions that incorporated local epidemiologic data have been utilized. Communicable Disease Control Units (CDCU), formally known as Surveillance and Rapid Response Teams, worked in partnership with Village Health Volunteers to conduct timely and effective case investigation and contact tracing.

Strengths

Thailand conducted regular risk assessments leading to adjustments in case definitions to account for persons working in the travel and tourism industries.

This flexibility allowed testing to expand and support early contact tracing to control the spread of infection. It also allowed cases in the community to be detected that did not have a specific travel history.

Thailand activated its response system and implemented the Communicable Diseases Act early in the outbreak

The CDA provided the MOPH with a comprehensive and secure legal framework. Thailand's response teams have met surge capacity needs to date. Over 1,000 Communicable Disease Control Units at the national and subnational levels supported the large cluster investigations in Bangkok, and later implemented case investigation and contact tracing in the provinces. The strength of the CDCU system is linked to Thailand's FETP that was established forty years ago.

Thailand's previous experience with other major outbreaks and its Village Health Volunteer model supported the CDCUs to respond to COVID-19.

Networks of Village Health Volunteers helped to detect, test and manage cases, and supported the work of the CDCUs. Most CDCUs have been trained and responded to outbreaks of influenza, and in some cases MERS-CoV. This produced a familiarity with the methods and materials of the COVID-19 response. Thailand's long-term investments in primary health care and universal health coverage also strengthened community-based health structures.

Challenges

The technical reporting infrastructure and plans for pandemic surveillance were developed during, and not prior to, the pandemic.

In the first months of the pandemic, laboratory results and epidemiologic data reporting were paper-based in some places, and email and spreadsheet-based in others. The MOPH worked quickly to address this by creating separate online laboratory (COLAB) and epidemiology (Coronavirus Disease) databases. These systems have been improved over time but changing the surveillance reporting system during the pandemic created confusion. Busy clinicians and laboratorians needed to adjust to changing systems and requirements during the outbreak. Laboratory result reporting to local authorities is still done manually in some places. Such manual processes are not tenable in a larger outbreak. This system was also established to track cases meeting the national case definitions for PUI. However, surveillance systems to test COVID-specific syndromic case definitions have not been developed. Thus, community transmission would only be detected if a person met the PUI case definition.

Complete data on all laboratory tests for SARS-CoV-2 are not available in the national surveillance data system.

Data on the total number of tests on persons that are *not* Persons Under Investigation (e.g. self-pay walk-ins, and others tested at private laboratories) are not included in the denominator of all tests in the national database. If these persons test negative, their data are not required for COVID-19 reimbursements and private laboratories do not submit them to the MOPH. As a result, the MOPH has not been able to monitor the percentage positive of all persons tested for SARS-CoV-2.

Staffing limitations reduced the ability of the SAT to perform optimally.

Despite having relatively few cases of COVID-19 in the first wave, the SAT team was not sufficiently staffed to focus on high quality data management and analyses. In Bangkok, the need to operate State Quarantine facilities removed SAT staff from the IUDC for extended periods. As the initial outbreak subsided, SAT team members were pulled back to work on non-COVID-19 activities. CDCU staffing in urban areas would need to be increased to manage a major surge of COVID-19 cases. The Village Health Volunteer model does not effectively cover urban areas such as Bangkok.

There are important challenges to access and analyze hospital resource availability data, all-cause mortality data, and pneumonia hospitalization data.

Hospital resource data (bed occupancy, ventilators, etc.), all-cause mortality data, and pneumonia hospitalization data are essential to monitor the impact of the pandemic. Hospital resource data can be accessed via a password-protected web site, or are received by selected individuals via the LINE app. While such access is “real time”, it is difficult to determine how often these data are

updated by hospitals. The lines of authority, responsible parties, and timeliness of national and subnational hospital resource data is also unclear. All-cause mortality data and hospitalized pneumonia data with a five-year baseline is not currently monitored. Trends in mortality and hospitalization data (pneumonia admissions, etc.) in relation to a baseline are also important to monitor the population impact of COVID-19.

Recommendations

Evaluate current surveillance efforts to identify gaps, then design and implement a sensitive COVID-19 surveillance system, including a requirement that clinicians at designated sentinel hospitals test and report all patients who meet standardized case definitions.

Current surveillance for COVID-19 should be reviewed against agreed common objectives with a focus on technical reporting infrastructure challenges, and on the inclusion of essential epidemiologic and laboratory data to monitor persons tested for SARS-CoV-2. This system should include persons tested in the community and in State Quarantine facilities. Data quality, timeliness, completeness and other key surveillance indicators should be considered. Solutions to improve the surveillance system should be sustained with national resources and expertise. Short-term changes to the system should have a minimal impact on the reporting procedures of laboratorians and clinicians. Routine testing of all patients that meet COVID-19 specific case definitions in sentinel facilities is needed to provide a sensitive early-warning system to detect community transmission. Consideration should be given to use existing testing and transport infrastructures for influenza surveillance to achieve this objective. The full-time attention of experienced and highly skilled staff will be needed to support this surveillance.

Increase and stabilize CDCU capacities and SAT team human resources; consider establishment of an Urban Health Volunteer model.

Human resource needs should be identified and addressed through recruitment and training of staff to increase CDCU capacity with a focus on urban environments. Consideration should be given to implementation of a modified health volunteer model in cities to further support CDCU activities. Staffing of national and subnational SAT and operations teams should be increased to allow for data management and analyses without interruption. To improve data quality, local reporters should be trained on surveillance and investigation variables, and proper data entry.

Create a national data system for laboratory, epidemiology and hospital resources.

Laboratory, epidemiologic and hospital resource data should reside in a modern national system that includes timely data from field investigations. MOPH ownership and responsibility for data should be reinforced and all “personally managed” databases identified and integrated into the national system. Bed occupancy, ventilator availability and other key data in the hospital resource system should be added, with daily updates and automatic reporting to sub-national authorities. To

provide real-time information for decision makers, a national daily dashboard should be created that displays all PUI and non-PUI test results, national hospital bed and ventilator capacities, updated ancillary data sources (e.g. mortality and hospitalization trends), and the results of ongoing epidemiologic investigations.

Pillar 4 – Points of Entry and Migrant Health

Introduction

During the first wave of the pandemic, Thailand managed international travel and transport resources at points of entry (POE) focused on surveillance and risk communication activities. Public health measures included entry and exit screening, education of travelers on responsible behaviours, case finding, contact tracing, isolation and quarantine. The risk of imported cases was managed through analysis of the likely origin and routes of importation, specific measures to detect and manage suspected cases, quarantine, and hygiene in onboard conveyances.

Strengths

Thailand implemented early and systematic screening at Points of Entry

Building on existing capacities and presence of the Division of International Disease Control Ports (IDCP), and with early activation of coordination and response mechanisms, screening was established on 3rd January and continues to date. Implementation of POE screening was informed by analysis of travel patterns and adapted over time. As of 19 July, 6,820,323 persons had been screened at POEs, with 2,263 PUI identified and 114 confirmed cases.

Thailand implemented multisectoral collaboration at the central and POE levels.

Building on previous experiences with other major outbreaks and with improvements since the Joint External Evaluation (JEE) in 2017, consistent multisectoral collaboration facilitated successful POE and border management operations. This was enabled by legal frameworks (the Communicable Disease Act and Emergency Decrees), the involvement of different agencies in decision making, and the empowerment of provincial EID committees.

Thailand rapidly established comprehensive quarantine procedures.

Following the closure of borders to all arrivals except repatriated Thais, the MOPH quickly established a state quarantine programme. While there were early challenges such as returning citizens refusing quarantine, swift enactment of legal powers under the CDA and emergency decrees, support from other sectors (e.g. the Royal Thai Army) and multidisciplinary technical and operational support from within the MOPH enabled implementation of comprehensive quarantine procedures. Provisions were made to address non-COVID-19 health issues. Private sector hospitals and hotels collaborated to establish Alternative State Quarantine (ASQ) for Thai and non-Thai citizens in major transport hubs. Despite over 300 cases of COVID-19 in quarantined returned travelers, there has been transmission to health or hotel staff.

Thailand included migrants in the response and covered the cost of care for confirmed cases.

Thailand mobilized community-based networks and partners such as migrant health volunteers, NGOs working with migrant communities, and technical partners including WHO and IOM, to include migrant communities in awareness, prevention and response efforts, including a multilingual COVID-19 hotline for migrants Positive engagement with migrants is expected to help make these groups more receptive to POE measures when land borders are re-opened.

Challenges

Planning, staffing and additional budget support for POE screening and related capacities are not optimal.

In anticipation of resumed travel at airports, seaports and ground crossings, detailed planning, staffing and budget support will be needed to sustain POE activities for the medium to long-term. Cross-border movements via unofficial channels increase the risk of introduction of new cases. Finally, while provincial Communicable Disease Control committees are empowered to implement central directives on border closures and POE measures, immigration officials are not included CDC committees of the border Provinces where they work.

Cross-border mobility of migrant workers is insufficiently addressed in recovery plans.

There has been sub-optimal allocation of financial resources, technical support, and human resources to fully address issues related to the cross-border mobility of communities and migrant workers from neighbouring countries. There is a need to move towards long-term support to all borders (air, sea and ground crossings) with inclusive approaches to encourage movements to occur through official means informed by analysis of travel patterns and allowing for health screening, testing, quarantine, and isolation / contact tracing where necessary.

Provision of quarantine options in the provinces is insufficient.

There has been insufficient focus on preparations and support at the national and provincial levels to build capacities to enable successful quarantine processes outside of major cities and tourist hubs. Significant gaps include training and accreditation of local quarantine facilities, arrangements for financial payments, linkage with provincial laboratories, and support to local health/immigration/governor/EID committee and accommodation providers. This means that Thailand is not fully prepared for the resumption of cross-border movements beyond limited air arrivals.

Recommendations

Designate a single quarantine authority to oversee standards, training, accreditation, and monitoring of quarantine policies and systems.

Currently, the Ministries of Public Health, Interior, and Defense, jointly develop and administer quarantine policy. The assignment of authority to a single unit that would provide technical guidance and operational oversight to state and non-state quarantine providers would ensure high standards, consistent application of policies, periodic review of procedures, and expanded quarantine capacity, while potentially reducing costs. Investments should be made to adequately staff and resource the unit.

Expand capacity for screening at POEs to prepare for resumption of travel and increased cross-border movements.

Increased financial resources, human resources, infrastructure, IT support, and management support are required to safely resume cross-border travel. This includes evaluation of required processes before, during, and after travel. Structural modifications to some POEs may be required to allow for social distancing. Planning should be based on the principle of facilitating travel via formal channels in ways that protect the health of travelers, staff, and the community, rather than maintaining indefinite border closures.

Expand state-based quarantine capacities and categories to include additional provincial options and authorized alternative quarantine options.

To allow for the resumption of international travel, including the cross-border movement of migrant workers and their families, quarantine capacity should be increased. This should include options at the provincial level to develop and/or expand both state and alternative facilities. Guidance for quarantine procedures should be evidence-based and regularly reviewed.

Pillar 5 – National Laboratory Systems

Introduction

Laboratory testing services that quickly return accurate results and are easily accessible to the entire population are essential to manage the COVID-19 pandemic. In Thailand, laboratory capacity to manage large-scale testing was achieved through collaboration among public, private and academic laboratories. The COVID-19 lab network includes 212 laboratories with the capacity to detect SARS CoV2 by real time RT-PCR.

Strengths

Together with academic laboratories, the Thai National Institute for Health (NIH) in the Ministry of Public Health quickly developed in-house real time RT-PCR assays, sequencing protocols and a national external quality assurance programme.

Minimal delays in establishing testing and confirmation capacity supported rapid case confirmation for better clinical management and case isolation. Earlier investments in laboratory capacity enabled Thailand to quickly develop diagnostic tools. The Thai NIH qualifies laboratories to perform diagnostic testing after an assessment of capacity and confirmation of their first clinical specimens. Thai NIH also provides quarterly proficiency testing to COVID-19 registered laboratories and gives timely feedback to any that under perform. This programme ensures laboratories meet standardized criteria and establishes a national laboratory standard. This was possible because the NIH has considerable experience implementing and monitoring national laboratory accreditation and quality assurance programmes. The Thai NIH also provided valuable laboratory support to neighbouring countries.

Thailand rapidly expanded the COVID lab network from 3 laboratories in January to 212 laboratories in July, including at least one capable laboratory in 60 of the Kingdom's 72 Provinces.

The decentralization of testing has substantially increased access and provides needed surge capacity for future waves of COVID 19. A newly developed web-based reporting platform (COLAB) reduced turn-around time for laboratory confirmation.

Challenges

It is not possible to accurately determine the total number of tests performed nationwide.

Results from private laboratories are not consistently reported to the national database. While all hospitals are required to report a COVID 19 case, non-PUI individuals that test negative in a private laboratory are not reported. Without this information, it is not possible to know if the laboratory

system has enough capacity for future waves, compromising Thailand's ability to plan for provision of laboratory supplies and consumables.

There is currently no centralized, national laboratory supply procurement, inventory management and diagnostic data system.

Limited availability of critical laboratory supplies and PPE undermines Thailand's COVID-19 response. Centralized procurement and management of essential commodities can optimize efficiency and prevent stock-outs. In addition, although the Thai FDA has an effective system for evaluating and licensing diagnostic products, there is no central repository for test performance data that can be accessed and used by all laboratories to guide the selection of test kits.

There is insufficient management, training and laboratory workforce to respond to a larger outbreak.

The laboratory workforce has been repurposed from routine work and research to support the COVID-19 response. Improved workforce management, expanded human resources and a real-time system to distribute testing workload across laboratories are needed to maintain acceptable productivity and responsiveness during future COVID-19 outbreaks.

Recommendations

Establish a centralized system to coordinate procurement, manage inventories, evaluate and document test kit performance, and efficiently distribute the workload across laboratories.

A single, national web-based system would monitor Thailand's overall testing capacity and improve the management of critical laboratory supplies and reagents. It would also improve the coordination of donations and assist with demand forecasting. The system would be home to a database of test kit evaluation results for the purpose of selecting an assay amongst those licensed for distribution in Thailand. Finally, a web-based dashboard would display real-time data on available laboratory testing capacity at any COVID 19 diagnostics lab. This dashboard would be a valuable tool to facilitate optimal allocation of material, human and financial resources.

Sustain the national COVID-19 lab network to remain ready for future waves and other emerging infectious diseases.

Annual laboratory budgets should include preventative maintenance contracts for laboratory equipment including biosafety cabinets, refresher training for staff, and subscription to external quality assurance programmes in addition to the required PPE and laboratory testing reagents and consumables.

Pillar 6 – Infection Prevention and Control in the Community and Healthcare Facilities

Introduction

Effective infection prevention and control (IPC) measures in healthcare facilities and in the community are essential to control the COVID-19 pandemic. In healthcare facilities, this includes an array of environmental and behavioural adaptations to prevent transmission. In Thailand, these measures are supported in healthcare facilities by certified infection control nurses and guided by the national IPC committee. In Thailand mask wearing, hand hygiene, social distancing, travel restrictions, and facility closures (collectively referred to as nonpharmaceutical interventions or NPIs), have been key interventions to prevent community spread.

Strengths

Thailand has strong national networks of infection control professionals.

IPC training, especially for nurses who are assigned in every hospital as Infection Control Nurses (ICNs), was established in Thailand more than 30 years ago. This training includes Basic IPC short training courses (2-weeks), a Programme of Nursing care of patients with infectious diseases and infection control (4-month course), and a Master of Nursing Science in Infectious Disease and Infection Control. Strong networks result from these training programmes and through an annual IPC national seminar. Thailand also has active professional societies for IPC Nurses and for IPC Physicians.

Thailand implemented effective triage and isolation systems for suspected patients.

Enabled by experience with SARS, pandemic influenza, and MERS, the MOPH established effective policies and communicated with public and private healthcare facilities nationwide. The decisive leadership and rapid execution helped hospitals prepare measures to prevent COVID-19 transmission and prepare isolation rooms and cohort wards. Acute respiratory infection (ARI) screening and triage clinics were rapidly established in all hospitals which helped to identify COVID-19 cases before admission. National daily updated information on COVID-19 cases helped hospitals assess the situation and prepare isolation rooms, human resources, PPE, and medical equipment.

The early and widespread adoption of masking, hand hygiene, and social distancing helped Thailand prevent a catastrophic outbreak.

The MOPH consistently communicated with the residents of Thailand regarding the outbreak situation, self-protective measures, and how to recognize early signs of infection. This raised awareness and motivated Thai people to do their part to combat the outbreak. Handmade cloth

masks and alcohol gel rapidly became widely available. Social distancing became normalized on public transportation and workplaces. At the subdistrict level, Village Health Volunteers (VHV), and community leaders supported communication on preventive measures and monitored compliance with mask and distancing measures. Social cohesion and a sense of common purpose grew and compliance with preventive measures followed, which directly contributed to reduced transmission risk.

Challenges

Thailand does not have a single national IPC programme.

Thailand does not have a formal national programme with dedicated staff, a predictable annual budget and a mandate to establish IPC standards and policies, conduct IPC training, promote IPC career pathways, expand healthcare associated infection (HAI) surveillance, or regulate facility level compliance. Because there are limited resources, healthcare facilities typically conduct activities using their own similarly constrained resources. There are few full-time IPC professionals at the national and healthcare facility levels. Laboratory-based surveillance for hospital-associated infections and other adverse events is also limited. The lack of such data limits Thailand's ability to identify and correct infection control problems.

Many healthcare professionals have insufficient knowledge of good IPC practices.

This situation can result in misuse of PPE, increased risk of HAI, and a reluctance to care for COVID patients. Currently, there are no formal IPC course requirements in the undergraduate curriculum of health science students (medical, dental, nursing, laboratory technician, pharmacy).

There have been national shortages of Personal Protective Equipment (PPE);

During the initial phase of the COVID-19 epidemic, shortages of PPE for HCWs was an urgent national (and global) concern. As global demand for PPE surged and because Thailand had not maintained a national stockpile, the Kingdom was forced to look urgently for new external sources, explore domestic manufacturing alternatives, and explore safe ways to reuse PPE. During the first months of 2020, a national stockpile was developed but real-time digital inventory management remains a major challenge, especially at the facility level.

Recommendations

Establish a national IPC programme at the MOPH

The establishment of a national IPC programme would support the COVID-19 response in the event of a second wave of infection and benefit infectious disease programmes in Thailand (including for TB and Anti-microbial Resistance) far into the future. If empowered with clear responsibilities and

given enough budget and dedicated staff, a new IPC programme could implement transformative improvements at every healthcare facility in the Kingdom. It would set national IPC policy and issue uniform guidance, draft a national strategic IPC plan, establish IPC training and credentialing standards, institute national laboratory-based HAI surveillance, manage the national PPE stockpile, audit IPC practices, organize an annual IPC conference, and be the point of contact for external bodies.

Strengthen Healthcare Associated Infection surveillance and use surveillance data to establish national and facility-level IPC priorities.

Data on Healthcare Associated Infections (HAI) are needed to plan, implement, monitor, and evaluate IPC practices. Unfortunately, such data are generally insufficient, incomplete or inaccessible in Thailand. This is particularly true with laboratory-confirmed HAI data. A national HAI surveillance system with advanced microbiological laboratory capacity, mandatory reporting requirements, and supported by enough budget and staffing is needed. Such a surveillance system would also directly contribute to national efforts to reduce antimicrobial resistance.

Establish IPC educational requirements for undergraduate health science students and in-service training for working professionals.

An IPC course requirement should be integrated into the undergraduate curricula for all health science students. For currently practicing professionals, a basic in-service IPC training course should be required bi-annually for all hospital personnel in both the public and private sectors**.**

Pillar 7 – Clinical Management

Introduction

SARS-CoV-2 infection can present with a wide array of signs and symptoms, ranging from asymptomatic to severe disease. Evidence suggests that both pre-symptomatic and symptomatic patients can be infectious. The risk of disease transmission, quality of care and patient safety are concerns at all stages of the illness. During the first wave of the pandemic, few evidence-based treatments were available, and clinical management of the virus was poorly understood. Still, Thailand succeeded in keeping the case fatality rate at around 1.7%.

Strengths

Thailand rapidly developed, and frequently updated national clinical practice guidelines based on new information.

Experience with other respiratory infectious disease outbreaks quickly led Thailand to mobilize experienced experts. The development and timely revision of the national Clinical Practice Guidelines (CPGs) and frequent communication to health care professionals nationwide, likely minimised case mortality. Inclusion of cases definitions in the CPG facilitated early case detection and supported epidemiologists and laboratorians to conduct timely and comprehensive case and contact investigations, which helped lower the transmission rate.

Thailand hospitalized all laboratory-confirmed cases and carefully discharged recovered patients, thereby reducing mortality and lowering community transmission.

Rapid access to laboratory testing led to earlier diagnosis. The decision to hospitalize all confirmed cases, even asymptomatic and mild cases, reduced local transmission, helped keep mortality rates low, and decreased stigma. A rapid increase in the number of isolation units, including triage tents in facilities that lacked negative pressure rooms, proved crucial. The availability of “Hospitels”, (hotels adapted to provide basic care and observation for recuperating patients after hospital discharge), ensured the availability of beds for severe cases.

Cooperation between private and public medical facilities, including military, and university hospitals, enabled more efficient use of resources and better patient care.

Active communication and collaboration between government and private sector hospitals were achieved via formal committees at national and provincial levels. Professional societies, the university hospital network (UHOSNET), and private hospital societies also contributed to an effective referral system and resource sharing that helped optimize patient care. University hospitals also made significant contributions to the development of national guidelines for clinical

management and in setting up ‘hospitels’. Finally, the Royal Thai Government provided free medical care for both Thai citizens and non-Thai residents. This encouraged patients to seek care early and likely contributed to lower mortality rates.

Challenges

Numbers of specialists trained in infectious diseases and critical care are insufficient.

Effective care for COVID-19 patients requires trained and experienced health care teams. A range of specialties and appropriate allocation of human resources to provide 24-hour care and hospital infection prevention are needed. Limited numbers of critical care physicians and nurses, pulmonologists, and infectious disease physicians resulted in overworked staff during the peak of the first wave of the epidemic. This can lead to poor patient outcomes with increased nosocomial and healthcare worker infections and would be worsened in a larger outbreak.

Some healthcare workers were fearful and reluctant to care for COVID-19 patients.

Some healthcare providers had a limited understanding of disease transmission and infection control practices. This can make them fearful and reluctant to engage in the care of COVID-19 patients. It can also shift the burden of care to other healthcare workers (HCWs), causing staffing challenges, increased stress and reduced morale.

Insufficient training led to overuse or misuse of personal protective equipment (PPE).

Correct use of PPE is essential to prevent patient to HCW transmission. There are international and national guidelines for the appropriate use of PPE. However, Thai HCWs that have not received sufficient training and practice using PPE tend to use it improperly, causing both waste of scarce resources and increasing the risk of nosocomial infection.

Recommendations

Dedicate resources and create incentive programmes to ensure sufficient numbers of infectious disease and critical care specialists are available.

A national human resource mapping effort will help accurately measure and match resources with needs in every province. Close collaboration with educational institutions is needed to address human resource shortfalls and strengthen capacity.

Develop and require completion by concerned healthcare workers of a comprehensive online training programme for COVID-19.

A web-based training platform should be established to improve healthcare worker knowledge of COVID-19 pathophysiology, epidemiology, infection control and treatment. Successful completion of each module would allow issuance of a certificate of completion, and tracking of performance metrics to understand who has completed the programme by discipline, healthcare facility and province. Such a web-based training platform could later be adapted to other topics and become a valuable long-term asset.

Establish a consultation committee to assess and plan for critical healthcare workforce needs; provide cross-training (near term) and advanced university training (long term).

Dedicated resources will be necessary for cross-training of specialists, and for advanced university training in the longer term. Incentive packages to encourage generalists to advance their training in subspecialty programmes should be developed. Global experts should be identified for exchange programmes or sponsored activities to allow major hospitals to learn from visiting subject matter experts.

Pillar 8 — Operational Support and Logistics in Supply Chain and Workforce Management

Introduction

Supply chain and workforce management are the basis for the operational response in complex emergencies. In a pandemic, this includes surge staff deployment, procurement and forecasting of essential supplies, creating back-up systems that can be quickly activated, and achieving efficiencies in stockpiling and distribution. Building on the strengths of structures put in place before and during the early phases of the COVID-19 pandemic, Thailand developed systems to promote logistical coordination and cooperation.

Strengths

Critical personnel (epidemiologists, laboratory technicians, logisticians, etc.) were rapidly deployed to respond to COVID-19 clusters.

Critical staff were quickly deployed to respond to local outbreaks. Staffing rosters were updated, and mechanisms put in place to move people to where they were needed most. The FETP alumni network proved to be a valuable resource to meet demands for cluster investigations, contact tracing, and epidemiological data analysis.

Steps were taken to implement Business Continuity Planning (BCP) in health care facilities.

Many health institutions made an effort to apply individualized contingency plans to address funding and staffing, demonstrating the value of a business-oriented approach to continuity planning to help maintain critical functions and accelerate recovery. This was made possible under the CCSA, and the EOC under the Office of the Permanent Secretary.

Thailand quickly established and empowered the Centre for COVID Situation Administration.

The CCSA was given the authority to ensure that various government ministries coordinated and cooperated with each other. It also engaged the private sector to encourage innovations such as converting local manufacturing capacity to produce PPE. The existence of the CCSA at the highest level of government contributed to business confidence. This led to prompt and extensive participation of the private sector in the production of PPE and support for transport and telecommunications.

Challenges

There were shortages and uneven distribution of staff in critical disciplines needed to support the COVID-19 response.

There were shortages of epidemiologists, infectious disease physicians, critical care nurses, IT/programmers, and other specialists. Further, the lack of a national professional staffing roster made it difficult to measure capacity versus demand. Limited human resources posed a significant challenge to ICU care and the rapid expansion of laboratory testing capabilities. The absence of an online management system made tracking and meeting critical human resource needs more difficult.

There are insufficient mechanisms for pre-deployment orientation and post-deployment performance evaluation.

There was no system in place to provide orientation prior to deployment or to assess performance during and following field operations. The absence of such a system made it more difficult for national human resources to effectively respond to local needs.

Business Continuity Planning systems were not in place in many district and provincial hospitals.

Because planned contingency funding was not available, many hospitals were forced to use programme budgets to increase capacity to rapidly deal with large numbers of COVID-19 cases. Moreover, the absence of individualized BCPs in many provincial and district health facilities contributed to interruptions in the supply chain and inventory management.

Recommendations

Map existing human resources to identify gaps and plan to meet national and local demands; establish a system to ensure staffing needs are met during subsequent waves.

A national human resource mapping effort should involve other government ministries to optimally measure and match resources and needs. A system is needed to quickly assess human resource needs and match them with up-to-date rosters of staff eligible for deployment. Orientation programmes and methods to assess performance are also important considerations. Long-term collaboration with educational institutions is needed to address human resource shortfalls and strengthen capacity with incentivized programmes.

Review and revise management systems with a focus on localized adoption of BCP strategies.

Business continuity practices will help local health facilities to quickly adapt and manage surge capacity demands. This will also help to ensure timely emergency funding for COVID-19 contingency costs. A BCP approach can also help ensure the continuation of routine services such as

immunizations and Non-Communicable Disease (NCD) screening. Emphasis on supply chain continuity and distribution, fiduciary oversight, and communications is recommended.

Pillar 9 — Maintaining Essential Services during the COVID-19 Outbreak

Introduction

When health system capacity is exceeded due to the demands of the COVID-19 outbreak, the provision of routine healthcare for communicable and noncommunicable disease will suffer. This can result in excess disease and deaths. In Thailand, early evidence suggests that non-COVID-19 services were not significantly disrupted in the initial wave of the pandemic, while other services such as research and policy initiatives were affected.

Strengths

The National Health Security Office (NHSO) played a vital role in responding to the COVID-19 outbreak in communities.

The NHSO funds preventive and screening services for all Thai citizens. At the outset of the COVID-19 outbreak, the NHSO reallocated Community Health Funds to support Village Health Volunteers.

There were minimal funding disruptions of routine public health services such as immunizations and NCD services and acute facility-based care of selected conditions.

Services for antenatal visits, child immunization coverage, treatment of NCDs including diabetes and hypertension, end-stage renal disease on hemodialysis or peritoneal dialysis, TB treatment coverage, support for patients on ART for HIV/AIDS, and management of acute myocardial infarction were all delivered during the peak of the outbreak at similar rates as compared with 2019. Tele-medicine capacities were implemented in some areas, and mail services were used to deliver routine pharmaceuticals.

There was a strong response by Thailand's primary health care system, particularly through the Village Health Volunteers.

With some patients unable or unwilling to visit health facilities for routine care for chronic medical conditions, the VHVs were an essential link to secondary care providers, identifying and referring patients as needed.

Challenges

There were delays in policy initiatives and research for non-COVID-19 issues.

Several NCD research studies and surveys, such as the National Health Examination Survey, were postponed. The sodium taxation policy development stalled because final negotiations with the food industry were paused. Multi-stakeholder consultations on restriction of marketing to children of unhealthy foods and beverages and on front-of-pack labeling were postponed. Repurposing of staff for COVID work contributed to a loss of momentum on policy and research work.

There were challenges maintaining the pre-pandemic intensity of preventive (including screening) measures and case management programming with respect to NCDs, most notably among the elderly and those with comorbidities that increase the risk from COVID-19.

Prior to the pandemic, Thailand did not have a list of essential services that should remain open and operational at all times, and some of these services are provided by the private sector. Screening programmes for early detection of NCDs were slowed by limitations on mobility and reassignment of workers to COVID-19 related tasks. Many elderly persons missed appointments because they were reluctant to visit hospitals due to fear of infection.

There were challenges in realizing the full potential of local health professionals.

The added burden associated with containment and mitigation measures at the community level has forced Village Health Volunteers and other community health staff to assume greater roles, often beyond their training and level of compensation. Biases in the medical establishment were cited for the failure to recognize the value of local healthcare workers who have taken on additional responsibilities such as contact tracing and information sharing.

Recommendations

Implement research findings on maintaining essential preventive and case management services; study how to bring these services closer to the intended beneficiaries.

Alternative methods to deliver essential services that supplement hospital services will be needed in the event of a larger second wave. For example, fewer scheduled visits for noncommunicable disease case management and expanded use of tele-medicine services and postal services. Building on current initiatives to expand service provision at the community level, empower local health staff to conduct routine consultations using technological innovations such as online scheduled conferencing and smart phone applications. This would reduce the need to travel to hospitals challenged by COVID-19.

Designate a unit to monitor the provision of essential (non-COVID-19) services.

Indicators such as rates of immunization coverage, the incidence of vaccine preventable disease outbreaks, and routine screening data for conditions like hypertension and diabetes can be used to

monitor essential services. A retrospective baseline should be established to facilitate monitoring and allow forecasting based on discernable trends.

Annex 1

List of informants

Pillar 1. Country-level coordination, planning and monitoring Pillar 2. Risk communication and community engagement			
SN	Informant	Designation	Affiliated organization
1	Clinical Professor Emeritus Dr. Piyasakol Sakolsatayadorn	Former Minister of Public Health	
2	Dr. Suwit Wibulpolprasert	Advisor, Foreign Affairs	Office of the Permanent Secretary
3	Mr. Natpanu Noppakun	Deputy Director-General of the Department of Information / Deputy Spokesman of the Ministry of Foreign Affairs	Ministry of Foreign Affairs
4	Ms. Tasanee Phonchanico	Deputy Director General	Public Relations Department
5	Dr. Tanarak Plipat	Deputy Director-General	Department of Disease Control
6	Dr. Viroj Tangcharoensathien	Secretary	International Health Policy Program Foundation
7	Mr. Suksan Jittimanee	Deputy Director	Institute for Urban Disease Control and Prevention, Department of Disease Control
8	Dr. John McArthur	Director	Thailand MoPH-US CDC Collaboration
9	Dr. Pairoj Saonueam	Fund Assistant Manager	Thai Health Promotion Foundation
10	Dr. Witoon Anankul	Director	Public Health Emergency Division
11	Dr. Naiyana Phraesrisakun	Advisor	Bureau of Information, Office of the Permanent Secretary

12	Dr. Sopon Iamsiritavorn	Director	Division of General Communicable Disease, Department of Disease Control
13	Ms. Wirongrong Kaewsomboon	Public Health Specialist	Division of General Communicable Disease, Department of Disease Control
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15	Dr. Phahurat Khongmuang Thaisuwan	Public Health Specialist	Bureau of Risk Communication and Health Behavior Development, Department of Disease Control
16	Dr. Soawapak Hinjoy	Director	Office of International Cooperation, Department of Disease Control
17	Dr. Theerasak Chuxnum	Veterinary officer, Senior Professional level	Division of Epidemiology, Department of Disease Control
18	Mr. Jitphanu Sridet	Public health technical officer	Office of International Cooperation, Department of Disease Control

Pillar 3. Surveillance, case investigation and contact tracing
Pillar 4. Points of entry
Pillar 5. National laboratory system

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1	Dr. Opart Karnkawinpong	Director-General	Department of Medical Sciences
2	Prof. Dr. Yong Poovorawan	Head of the Center Specializing in Virus Science Clinic	Faculty of Medicine, Chulalongkorn University
3	Dr. Walairat Chaifoo	Director	Division of Epidemiology, Department of Disease Control
4	Dr. Kumnuan Ungchusak	Expert Committee	Thai Health Promotion Foundation
5	Mr. Wasurat Homsud	Senior Program Officer	Raks Thai Foundation

6	Dr. Supaporn Wacharapluesadee	Deputy Chief of Thai Red Cross Emerging Infectious. Disease Health Science Centre	King Chulalongkorn Memorial Hospital
7	Dr. Chawetsan Namwat	Medical officer, Senior Professional level	Division of Epidemiology, Department of Disease Control
8	Dr. Pawinee Duangngern	Medical officer, Professional level	Division of Epidemiology, Department of Disease Control
9	Mr. Chawalit Tantinimitkul	International Health Regulation Coordinator	Division of Epidemiology, Department of Disease Control
10	Dr. Sumonman Utyamakun	Chief, Laboratory	Bamrasnaradura Institute of Infectious Diseases, Department of Disease Control
11	Dr. Onphirul Yurachai	Veterinary Officer, Professional level	Division of Communicable Disease, Department of Disease Control
12	Dr. Suwich Thammapalo	Director	Division of International Communicable Diseases Control, DDC
13	Dr. Rome Buathong	Medical Officer, Expert level	Division of International Communicable Diseases Control, DDC
14	Mr. Patikom Wiwatanon	Head of Checkpoints	Division of International Communicable Diseases Control, DDC
15	Dr. Chollasap Sharma	Head of Health Control, Donmueang International Airport	Division of International Communicable Diseases Control, DDC
16	Mr. Wachirapun Chainontee	Team Leader	Division of International Communicable Diseases Control, DDC
17	Mr. Pornchai Kerdsiri	Public Health Technical Officer	Division of International Communicable Diseases Control, DDC

18	Miss Mayurachat Biaklang	Public Health Technical Officer, professional level	Division of International Communicable Diseases Control, DDC
19	Mr. Seksan Seekae	Head of Checkpoints	ODPC 2, Phitsanulok Province, DDC
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21	Mr Thawabhorn Jannok	Public Health Technical Officer	Division of International Communicable Diseases Control, DDC
22	Mr. Kittipat Worachet	Public Health Technical Officer	Division of International Communicable Diseases Control, DDC
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24	Pol.Col. Thanin Intaprot	Superintendent of Arrival Suvarnabhumi Airport	Immigration Division 2
25	Pol.Lt.Gen. Shawn Paulpragit	Inspector of Arrival Office at Suvarnabhumi Airport	Immigration Division 2
26	Mrs. Huttaya Thuncharoon	Medical Technologist, Senior Professional level	Taksin Hospital
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30	Ms. Pajaree Aksonnit	Public Health Technical Officer, Professional level	Division of Disease Control in Emergency Situation, Department of Disease Control

31	Ms. Thanatcha Thaithanasarn	Public Health Technical Officer, Practitioner level	Division of Disease Control in Emergency Situation, Department of Disease Control
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37	Ms. Nusara Khuntree	Administrative Officer	Division of Disease Control in Emergency Situation, Department of Disease Control
38	Dr. Archawin Rojanawiwat	Director	Medical Life Science Institute, Department of Medical Sciences
39	Dr. Noppavan Janejai	Medical scientist, Senior Professional level	National Institute of Health, Department of Medical Sciences
40	Dr. Nusara Satproedprai	Medical Technologist, Professional level	Genomics and Innovation Division, Department of Medical Sciences
41	Dr. Pilailuk Akkapaiboon Okada	Medical Technologist, Senior Professional level	National Institute of Health, Department of Medical Sciences
42	Dr. Supaporn Suparak	Medical Technologist, Senior Professional level	National Institute of Health, Department of Medical Sciences

43	Mr Ratigorn Guntapong	Medical Scientist, Professional level	National Institute of Health, Department of Medical Sciences
44	Ms. Pojaporn Pinrod	Medical Scientist, Practitioner level	National Institute of Health, Department of Medical Sciences
Pillar 6. Infection prevention and control Pillar 7. Case management and knowledge sharing in the latest innovation and research			
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1	Prof. Emeritus Dr. Somwang Danchaiwijit	Academic committee, Communicable Disease Act 2015	
2	Prof. Dr. Anucha Apisarnthanarak	Chief, Infectious Disease unit	Faculty of Medicine Thammasat University
3	Asst. Prof. Dr. Kumthorn Malathum	President	Infectious Disease Association of Thailand
4	Asst. Prof. Dr. Opass Putcharoen	Chief of Medical Center of Excellence, Emerging disease clinic	King Chulalongkorn Memorial Hospital
5	Assoc. Prof. Nitipat Jiarakun	President	Thoracic Society of Thailand
6	Prof. Dr. Somnuek Sungkanuparph	Internist	Faculty of Medicine Ramathibodi Hospital, Mahidol University
7	Assoc. Prof. (Special) Dr. Tawee Chotpitayasunondh	President	Child Infectious Disease Association of Thailand
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12	Ms. Sutthiporn Teruya	Registered Nurse, Senior Professional Level	Bamrasnaradura Institute of Infectious Diseases, Department of Disease Control
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16	Ms. Chutima Wichitranon	ICN nurse	Bumrungrad International
17	Ms. Ratchanee Wongsaen	ICN nurse	Nakornping Hospital
18	Ms. Aree Kunna	ICN nurse	Maharaj Nakorn Chiang Mai Hospital
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Pillar 8. Operational support and logistics in supply chain and workforce management Pillar 9. Maintaining essential health services during the COVID-19 outbreak			
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2	Dr. Sophon Mekthon	Chairman, The Government Pharmaceutical Organization Committee	The Government Pharmaceutical Organization (GPO)
3	Dr. Surachok Tangwiwat	Deputy Secretary General of the Food and Drug Administration	Food and Drug Administration

4	Dr. Phusit Prakongsai	Advisor	Ministry of Public Health
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6	Dr. Alisa Yanasan	Deputy Director	Division of Public Health Emergency, Office of the Permanent Secretary
7	Dr Aphichai Pojlertaroon	Pharmacist, Professional Level	Division of General Communicable Disease, Department of Disease Control
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9	Mr. Kriengsak Pohpoach	Secretary of the Department	Department of Disease Control
10	Mrs. Sarinthorn Sontisirikit	Deputy Director	Institute of Urban Disease Prevention and Control, Department of Disease Control
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12	Ms. La-aied Iamsuwan	Director	Division of Financial Management, Department of Disease Control
13	Ms. Kavalin Chuencharoensuk	Deputy Director	Division of Public Health Administration, Office of the Permanent Secretary
14	Ms. Prai Bunyarit	Pharmacist, Professional Level	Division of Public Health Administration, Office of the Permanent Secretary
15	Ms. Wilailuk Wisasa	Acting Director	National Health Security Office
16	Dr. Suchada Jiamsiri	Director	Division of Vaccine Preventable Diseases, Department of Disease Control

17	Dr. Anchalee Chuthaputti	Advisor	Department of Thai Traditional and Alternative Medicine
18	Dr. Sushera Bunluesin	National Professional Officer (NCD)	WHO Thailand
19	Dr. Renu Garg	Medical Officer (NCD)	WHO Thailand

Remark: The title of the informants reflects their position at the time the interview was undertaken.