

Chapter 9

Lessons Learned from the Control of Pandemic (H1N1) 2009 in Thailand

1. Introduction

Pandemic (H1N1) 2009, or pandemic influenza H1N1, 2009, [initially called influenza A(H1N1)] is caused by the H1N1(2009) virus (or H1N1 2009 virus), in the group of A(H1N1) viruses, first reported in April 2009. The genetic composition of the virus is a combination of those found in avian, swine and human viruses. It is unknown as to how and where the virus originated and how/when the virus was transmitted to humans. As the virus can rapidly spread from human to human, the influenza is regarded as an important emerging disease.

The disease control involves the following measures and strategies:

1.1 Early detection. Emphasis is placed on disease surveillance, research and laboratory testing so as to detect the virus as quickly as possible. As an emerging disease, 60% of the cases occur in animals and then spread to humans, it is necessary to conduct surveillance programmes in both animals and humans in the same linked system. This is to ensure that as soon as an outbreak occurs in animals, which may be transmitted to humans, disease control efforts can be made immediately so that the disease will not widely spread from human to human. The H1N1 2009 virus was first detected in humans before being detected in animals, which was too late as the virus had already spread widely in the U.S.A. and Mexico at about the same time.

1.2 Containment. In theory, for an outbreak of a new kind of influenza with human-to-human transmission, in the beginning stage of the outbreak, say within 3 weeks, there would not be so many patients, there is an opportunity to prevent the spread of the outbreak using all strict measures such as screening and isolation of symptomatic cases, quarantine of contacts or travellers from an infected region until it is certain that such persons do not have the disease and can be allowed to live a normal life, or giving antiviral prophylaxis to all contacts or targeting antiviral prophylaxis for the entire community, or geographical antiviral prophylaxis for the entire district or province. The containment measure to stop the outbreak will affect the freedom of people as well as domestic and international travel and trade. So, it should be used only during the beginning stage of disease control. As it was rather late when pandemic (H1N1) 2009 was detected, the transboundary transmission had already occurred, the disease containment could not be undertaken and it was



not worth while compared with the disease severity. That was why the U.S. did not use this measure despite being a country with technical strength and preparedness in almost all aspects.

1.3 Mitigation. After the disease has spread widely, the disease control will focus only on essential measures including treatment of symptomatic cases, prevention of new infections through non-pharmaceutical interventions, behavioural changes (hand-washing, use of face masks when ill, avoidance of social activities by staying at home, not going to school, school closing, stop working or stopping all social activities for a certain period of time. For instance, in Mexico, the Mexican president announced an emergency situation and closed all schools across the country and cancelled all social gatherings between 25 April and 6 May 2009. Meanwhile, research has to be carried out to seek pharmaceutical interventions such as medicines or vaccines to minimize morbidity and mortality to the extent acceptable.

1.4 Elimination and Eradication. If the infectious agent has its life cycle relying on and multiplying only in humans and most patients have clear clinical symptoms, chances are high to eliminate and eradicate the disease with various measures. But for the H1N1 virus, its life cycle is in birds, domestic poultry and many kinds of mammals such as pigs and humans. About one-third of the patients may be infected with mild symptoms. So, it is impossible to eliminate or eradicate influenza. There will be already a new strain of H1N1 influenza caused by a new virus which is close to the old virus against which humans have some immunity, or totally different from the old strain. In the latter case, the outbreak will occur and rapidly become a pandemic.

2. Chronology in Thailand and Abroad

The major events related to pandemic (H1N1) 2009 in a chronological order are briefly as follows:

2.1 Mar 2009	(1) 18 March: Mexican authorities began picking up cases of “influenza-like illness” but understood as seasonal influenza.
2.2 Apr 2009	(1) 12–21 April: Cases of atypical pneumonia with 2 deaths were reported in Oaxaca, Mexico. (2) 23 April: The U.S. Centers for Disease Control and Prevention (CDC) announced the identification of a new influenza virus strain, untypable influenza A, in California. (3) 24 April: The Mexican Ministry of Health issued an epidemic alert for severe influenza. WHO warned of the pandemic potential through the International Health Regulations focal points in Member States. (4) 25 April: The Ministry of Public Health (MoPH) through the Department of Disease Control, Thailand, set up an operations centre to cope with the epidemic in Mexico. The media began covering news of “swine flu” from CNN.

	<ul style="list-style-type: none"> (5) 27 April: WHO raised its alert level from 3 to 4 (on a scale of 6), indicating human-to-human transmission in a locality. (6) 27 April: MoPH of Thailand proposed that the disease be called “Mexico influenza” rather than “swine flu” to avoid confusion among members of the public and an impact from non-consumption of pork; the suggestion was informally sent to WHO. (7) 29 April: The National Influenza Control Committee held a meeting to review the measures for disease control in the country. (8) 29 April: WHO raised the alert level from 4 to 5, indicating transmission from one area to another but no more than 2 regions.
<p>2.3 May 2009</p>	<ul style="list-style-type: none"> (1) 7–8 May: ASEAN+3 Health Minister’s special meeting on influenza A (H1N1) was held in Bangkok to review measures for the region. (2) 12 May: Thailand reported the 2 cases of influenza A(H1N1), both were Thai nationals who just returned from Mexico. The media had an observation that MoPH was not transparent as no information was disclosed regarding the patients’ age, address and hospital providing treatment; MoPH responded that the non-disclosure was done at the request of the patients and their relatives who feared social discrimination. (3) 30 May: The date of illness onset of the first case who got infected within the country was reported from the family whose parents had just returned from the U.S.A. and spread the virus to their son who did not travel overseas with them.
<p>2.4 June 2009</p>	<ul style="list-style-type: none"> (1) 9 June: MoPH confirmed human-to-human transmission in the country among workers at an entertainment place in Pattaya City, initially with the notification from the Taiwanese disease control agency of a Taiwanese getting infection while travelling in Thailand. (2) 10 June: Confirmation of an outbreak in a private school in Bangkok. (3) 11 June: WHO raised the pandemic alert level from 5 to 6, the highest level, indicating that there had been outbreaks throughout the world with infected persons in 74 countries and the transmission could no longer be controlled and contained, resulting in unavoidable widespread. (4) 13 June: Confirmation of an outbreak in a state-run school in Pathum Thani province. Newspapers reported widespread transmission of the illness. (5) 21 June: MoPH officials and professors of medical schools informed the public on TV not to panic.

- (6) 20 June: The first death occurred but was reported to MoPH on 26 June as the private hospital treating the patient did not notify MoPH. A press briefing was held on 27 June and there was a suspicion that MoPH concealed the information.
- (7) 23 June: As notified, an outbreak investigation was conducted at a naval base in Sattahip district, Chon Buri province; later, one private died on 29 June.
- (8) At the end of June, there were cases reported from 39 provinces and 3 deaths (cumulative number).

2.5 July 2009

- (1) 4–8 July: A long weekend during the Buddhist lent, many people went upcountry, resulting in a widespread of the disease throughout the country.
- (2) 7 July: The Cabinet passed a resolution to close down all tutorial schools for 2 weeks as they were the places where students from many provinces gathered. The schools' operators met with the minister and administrators of MoPH to express their disagreement.
- (3) Patients were crowding all public and private hospitals in Bangkok; private rooms had to be booked in advance.
- (4) MoPH was strongly criticized for the errors in situation assessment, resulting in the people being careless in self-protection and a large number of illnesses and deaths.
- (5) 14 July: The Cabinet passed 3 major resolutions: allowing H1N1 patients to stop work without counting non-workdays as leave-days; providing an additional 10 million tablets of antiviral drug (worth 250 million baht); and placing an order for 2 million doses of vaccine (worth 600 million baht).
- (6) 14 July: The administrator of the Bangkok Metropolitan Administration announced the closure of all 436 BMA schools for 1 week.
- (7) Many secondary school students from other provinces went to a concert played by a band of teenage Korean singers in Bangkok; many of them returned and spread the virus in such provinces as Ubon Ratchathani, Nakhon Ratchasima and Khon Kaen; and some died in Maha Sarakham.
- (8) A meditation at Wat Dhammakaya in Pathum Thani provinces was attended by more than 100,000 students; some of them returned home with the infection and transmitted the virus to others, causing further outbreaks in their localities.

	<p>(9) 17 July: Clinical Practice Guidelines, third edition, was launched for patient care across the country.</p> <p>(10) 17 July: The prime minister, as chairperson of the Thai Health Promotion Fund Committee appointed a Subcommittee on Support for the Prevention and Control of Pandemic (H1N1) 2009 to take part in campaigns for the participation of the public and all sectors against the pandemic influenza.</p> <p>(11) As of the end of July, there were reports of H1N1 patients in 76 provinces with the cumulative death toll of 65.</p>
2.6 Aug 2009	<ul style="list-style-type: none"> ■ For H1N1 patients to receive antiviral drug “oseltamivir” sooner, MoPH requested that private clinics join the pandemic influenza treatment programme, but a small number of them (about 10%) agreed to participate. ■ MoPH in collaboration with WHO undertake a review of the pandemic influenza control programme in Thailand. ■ As of the end of August, there were reports of H1N1 patients in all provinces, from 85% of the districts throughout the country, with the cumulative death toll of 130.
2.7 Sept 2009	<ul style="list-style-type: none"> ■ The outbreak situation became less severe. As of the end of September, there were reports of 165 deaths cumulatively.
2.8 Oct – Nov 2009	<ul style="list-style-type: none"> ■ The first wave of outbreak became less severe and the incidence was lowest in November.
2.9 Dec 2009	<ul style="list-style-type: none"> ■ MoPH began warning of a second wave of outbreak.
2.10 Jan 2010	<ul style="list-style-type: none"> ■ The second wave of outbreak began. ■ 11 Jan: vaccination campaign was launched with 2 million doses of inactivated vaccine.
2.11 Feb 2010	<ul style="list-style-type: none"> ■ Newspapers reported on the foetal death in a pregnant women vaccinated with H1N1 vaccine; as a result, many in the target populations did not come to get vaccination ■ An expert committee was set up to investigate and confirm whether the foetal death and mother’s illness were associated with the vaccine.
2.12 Apr 2010	<p>As of 2 April 2010, MoPH could get 28,674 pregnant women vaccinated with 31 cases of adverse drug reactions, among them, 15 were non-severe and 16 were severe (9 foetal deaths, 4 abortions, 1 head accident, 1 severe allergy and 1 pulmonary hypertension). Of all ADR cases, only one was considered by the committee as related to the vaccination, i.e. the case with pulmonary hypertension; the rest were unrelated.</p>

<p>2.13 June – July 2010</p>	<p>The committee recommended that vaccination for pregnant women be continued as the rate of irregularities during pregnancy among pregnant women was not higher than that among pregnant women in Thailand before the vaccination campaign.</p>
<p>2.14 Dec 2010</p>	<p>MoPH warned of the outbreaks of new and old strains of H1N1 influenza, i.e. seasonal influenza and mostly H1N1 influenza 2009.</p> <p>As of 11 December, there were 110,815 reported cases of all stains of influenza with 168 deaths, of whom 143 were due to H1N1 2009 influenza and 25 due to unknown strains.</p>

3. Strategy for Morbidity Reduction

As pandemic (H1N1) 2009 is transmitted from human to human, detecting many cases of the illness at about the same time and the same place is a preliminary indicator of an epidemic at the particular place. In practice, the Department of Disease Control has proposed that if more than 5 cases are detected during a one-week period, it is regarded that an outbreak has occurred in that place. Major measures for outbreak control are as follows:

- 1) Self-isolation. Any patient with respiratory or influenza-like symptoms is to get medical treatment at home for 7 days (in case of severe symptoms or at high risk of serious illness, he/she should see a doctor immediately).
- 2) School or public place closure. Activities are suspended at places with public gathering such as school classes or the entire school or entire factory, etc. If the morbidity rate is greater than 15%, a joint decision should be made in this regard by school administrators and others concerned such as the parents association and public health officials, taking into account the impacts in all aspects.
- 3) Hand hygiene. Campaign on hand-washing for every body.
- 4) Clean touching-surface. Cleaning all materials, supplies and equipment normally or commonly touched by many people such as telephone, keyboards, door knobs, etc.
- 5) Face mask. One with symptoms of cold/influenza is advised to wear a surgical mask.
- 6) Screening. Screening of people so that those with influenza-like symptoms will not participate in any group activity.

After the outbreak in Thailand was confirmed in June 2009, outbreaks occurred in many places; some interesting events are briefly described below:

3.1 Schools

In Thailand, there are schools under the Ministry of Education in all subdistricts, districts and provinces throughout the country with a total of approximately 12 million pupils (in primary and secondary

schools) and 2 million college/university students. As of 19 October 2009, there were reports on outbreaks and closures of 476 schools. According to disease investigation reports, the important features of the outbreaks are the following:

- 1) Overall morbidity rate: approximately 9.2%-65.1%, depending as the characteristics of schools and activities.
- 2) Epidemic-inducing activities: new student reception (hazing) parties, camping with shared room and board, inter-institutional sports events, army reserve force training, marching band practice camping, concert attendance, and meditation retreats.
- 3) Physical conditions inducing epidemic: a large air-conditioned school classroom with too many students numbering more than the specified standard, resulting in students having to sit too close to one another.
- 4) Obstacles to control measures: the students who were sick did not stop going school for fear of being unable to catch up with class or there was no caregiver. Some schools were closed when the epidemic was not so widespread, but after the school was reopened, the re-outbreak occurred. The screening measures could not be undertaken in practice such as temperature taking, students had no regular classroom (having to move to different classrooms), and there was no isolation room for a sick student while waiting for the parent until the time to go home.

3.2 Entertainment places

There are a lot of entertainment places in Thailand, but those with reported outbreaks were such places as night clubs (with singing and dancing) in the provinces with tourist destinations. Besides, viral transmission was found at concerts, music festivals and movie theatres with the following interesting characteristics:

- 1) The overall morbidity rate among workers: 33%
- 2) Epidemic-inducing activities: crowded places with singing and dancing, having no separate water-drinking utensils for workers.
- 3) Physical conditions inducing epidemic: a tightly closed place, air-conditioned with no ventilation and too many revellers exceeding the specified standard.
- 4) Obstacles to control measure: closing of a business would result in a loss of income and workers' unemployment; not being able to thoroughly educate all the revellers, and screening all revellers could not be done in practice.

3.3 Military barracks

Outbreaks in barracks were reported only during the training of new conscripts in June 2009 such as at the Sattahip Naval Training Camp, the Phetchabun Army training Camp and the Nakhon Ratchasima Army Training Camp (personal communication, Major Kritin Silanan).

- 1) Morbidity rate: 16.8%–29.5%



2) Epidemic-inducing activities: having to live closely together for weeks or months during the training; being conscripts from various provinces; and arduous training.

3) Physical characters inducing epidemic: using some utensils together such as glasses.

4) Obstacles to control measure: screening of first cases of illness and preventing them from taking the training.

5) Good example: as it had a good command and support system, symptomatic cases could be isolated to live together in a cohort ward for 7 days.

3.4 Prisons

MoPH received outbreak reports from at least two prisons (Saraburi and Ayutthaya).

1) Morbidity rate: approx. 18.9%–20.51%

2) Epidemic-inducing activities: good-behaviour prisoners who did community services might have contacted with an H1N1 patient; then he/she might carry the virus and then transmit it to other prisoners or to relatives on a “meeting-relatives day”.

3) Physical activities inducing epidemic: overcrowding; sleeping in a room closely together with many other prisoners; and using the same drinking utensils.

4) Obstacles to control measure: inability to reduce overcrowding in prison cells; lack of water for hand washing; lack of face masks.

5) Good example: modifying a prison cell as a cohort ward.

3.5 Hospitals

There are community, general and regional hospitals in all districts and provinces as well as private hospitals with a total workforce of approximately 450,000. Outbreaks were reported among personnel of many hospitals such as those at radiology departments of two hospitals, operating room staff of a general hospital in the South, and a medical school in the central region. And there could be some patients who came for treatment of other illnesses but might get infected with the H1N1 virus in the hospital.

1) Morbidity rate: as there was disease investigation that could confirm H1N1 infection, the immunological study could be used to determine how many health-care providers were actually infected. However, the infection could possibly be within or from the community.

2) Epidemic-inducing activities: relatives with H1N1 infection visiting patients with H1N1 influenza and other diseases staying in the same ward.

3) Physical activities inducing epidemic: common examination room; central air-conditioning of the common room.

4) Obstacles to control measure: screening of relatives visiting the patients; it was difficult to do as the hospital had several entrances and exits.

5) Good examples: setting up a special clinic (flu clinic) for H1N1 patients; requiring the patients and relatives to wear surgical masks when coming into the hospital; having cleansing gel at various places in the hospital.

4. Strategies for Morbidity Reduction

As of 20 January 2009, MoPH had received reports of 198 deaths (97 males and 101 females) since the beginning of the outbreak. Of all deaths, 11 were children under 5 years old, 10 were school-age and teenage children (5–14 years), 27 were teenagers and young adults (15–24 years), 127 were working-age adults (25–59 years), and 23 were elderly persons (60 years and over); and among them, 129 (65%) had a history of co-morbidity including overweight or obesity (22 cases) and pregnancy (12 cases), etc. To reduce mortality, MoPH undertook two major measures as follows:

4.1 Rapid Diagnosis and Retroviral Therapy

Even though there are guidelines for the antiviral therapy for H1N1 patients with serious illness and probably with any chronic disease, and the H1N1 influenza outbreak just occurred from June to July, there was confusion about how to care for the patients by the people and the attending physicians. Among the people who had been keeping themselves abreast of the situation, when getting sick with the disease, they would see a doctor immediately even though the condition was not serious. On the contrary, a number of patients who were seriously ill or at risk of being seriously ill did not quickly seek medical treatment. Besides, the physician still provided medical care as if the patients had seasonal influenza without giving any antiviral drug oseltamivir. So, it was found that among the fatal cases, there were those who had seen the doctor more than 48 hours after onset or those also given antiviral drugs. Thus, in mid-July 2009, MoPH together with experts from various universities developed the **Clinical Practice Guidelines** for Care of Patients Infected or Possibly Infected with Pandemic H1N1 2009, which covers the guide for diagnosis, treatment and self-care when ill. The guidelines helped ensure that the services were rendered according to the established standards and lessen the confusion in this regard; however, a number of physicians were unaware of such guidance, indicating the problem of communication in the medical system.

4.2 Vaccination for Vulnerable Groups. The Cabinet approved the purchase of 2 million doses of vaccine against pandemic H1N1 2009, worth 600 million baht, for vulnerable groups at risk of severe illness or death. The vaccine purchase order was placed in August 2009 and the vaccines were actually received in late December 2009. The vaccination of vulnerable groups was started on 11 January 2010, especially for approximately 500,000 pregnant women, 180,000 obese persons (weighing >100 kg), 70,000 persons with mental disabilities or self-care inabilities, 840,000 patients aged 6 months to 65 years with chronic illnesses (lung, heart, liver, kidney, blood, immunity, diabetes, etc.), and 370,000 health personnel directly involved with patient care.

5. Major Lessons Learned from Emergency and Crisis Management

Overall, Thailand was able to control the disease in the same manner as other developed countries. In the beginning stage of the outbreak, it was estimated that there might be as many as 1,200 deaths due to H1N1 influenza. A situation review revealed that the estimate might be too high and could be adjusted downwards to 900. However, based on the data as of January 2010 with the death toll of 198, the total number



of deaths might be only 300 to 400. Thus, MoPH's operations might be able to save almost 500 lives. And obviously, the morbidity could be delayed, i.e. rather than having only one wave of outbreak, there were actually several waves. However, many important lessons were learned during the first three months of the outbreak as follows:

5.1 Coordination and Command

In the beginning of the outbreak, there were only patients infected from aboard (April – May 2009). The coordination and command were undertaken by the Emergency Response Operations Centre at the Department of Disease Control. Meetings were held every day (even on Saturdays and Sundays), twice a day during the initial stage in the morning and afternoon, for central-level officials and those at 12 regional offices for disease control, using the teleconference technology. When the outbreak was initially reported in the country, WHO announced that the disease had become a pandemic. As a result, the coordination and command was raised to the ministerial level. However, some problems in this regard were noted as follows:

a) Lack of unity and powers in making assignments and directives. Compared with the SARS outbreak control, which had a smaller scale and less complexity, a war room was established and full authority was delegated to one of the deputy permanent secretaries with full support in all aspects. But during the outbreak of pandemic H1N1 2009, which had a larger scale and more complexity, the unity of command was lacking; reports submitted to high-level administrators were not systematically distributed to all concerned. As a result, the operating units could receive the outbreak information (such as the numbers of infected persons and deaths) chiefly from the press briefings.

b) Communications from the central level to the provincial and district levels, especially on technical guidelines and ministry's announcements, were done via the Internet when such information was posted on the ministry's websites, which were designed for easy follow-up as to which items were new or old and what the changes were. No other channels were used to inform all operating officials at the provincial level to see the details on the websites. However, short messages were sent via mobile phone to all physicians later.

5.2 Risk and Crisis Communication

In the beginning, MoPH could effectively communicate with the public with the message that the outbreak was caused by human-to-human transmission; so, it should not be called "swine flu" as some people would not want to eat pork. Thus, the name of the disease was changed initially to "Mexican influenza" and later to "pandemic H1N1 2009", which was generally accepted by the media and the public. But later on, there was a failure in risk communication, beginning with the media's observation that MoPH had concealed certain details. At the first press briefing, no information was given about the patients' age, the country they had travelled to, and where they were being hospitalized. The ministry did not disclose such information at the request of the patients' parents for fear that the patients would be discriminated by their friends. Later on, a major turning point occurred on around 10 June 2009 when there were outbreaks at an entertainment place in Chon Buri province and a private school in Bangkok as well as many other schools in neighbouring

provinces. Knowing of such outbreaks, many parents took their children, both with symptomatic and a symptomatic illness, to get tested to see whether they were infected H1N1 virus; the number of clients was so large that the health facilities could not cope with the people's needs. MoPH were trying to inform the public that pandemic H1N1 2009 was not as virulent as initially reported (saying the case-fatality rate in Mexico was as high as 5%). So the people should not panic and not every case had to seek medical care at hospital. But it turned out that there were some reported deaths and MoPH did not receive any notification of such a death at a private hospital in Bangkok, when the press had some clues about that and asked for details from MoPH after the incident had occurred for 8 days. After an investigation, it was found that the death had actually occurred and MoPH held a press briefing. With such delayed and incomplete communication, the media began to feel unconfident in MoPH's transparency; thus, they started probing for more information at various hospitals and reporting on the number of suspected deaths on a daily and hourly basis. Since then, MoPH had to play a defensive role in informing the public about each case reported by the press as to whether or not the case was infected with H1N1 virus. Such public communication was done unsystematically without proper preparation; rather, it was done on a case by case basis by many informants. In many instances, the information was not in the same direction, especially for sensitive matters, for example the death of a pregnant woman, a patient not receiving antiviral drugs, or delayed diagnosis or misdiagnosis, etc. The level of public dissatisfaction was so high and critical that the government's stability was affected as it was unable to deal with various problems.

However, the situation eased later by using the following approaches:

- a) Changing the press briefing schedule from daily to weekly beginning in late July, with a better analysis of public sentiments and preparation of the issues.
- b) Asking the third persons who were respected by the public to participate in the press briefings such as university professors and representatives from the World Health Organization and the U.S. Centers for Disease Control and Prevention.
- c) Lessening the self-protection attitude and listening to as well as expressing regrets for unexpected dissatisfactions such as delays in getting medication.

5.3 Intelligence and Assessment

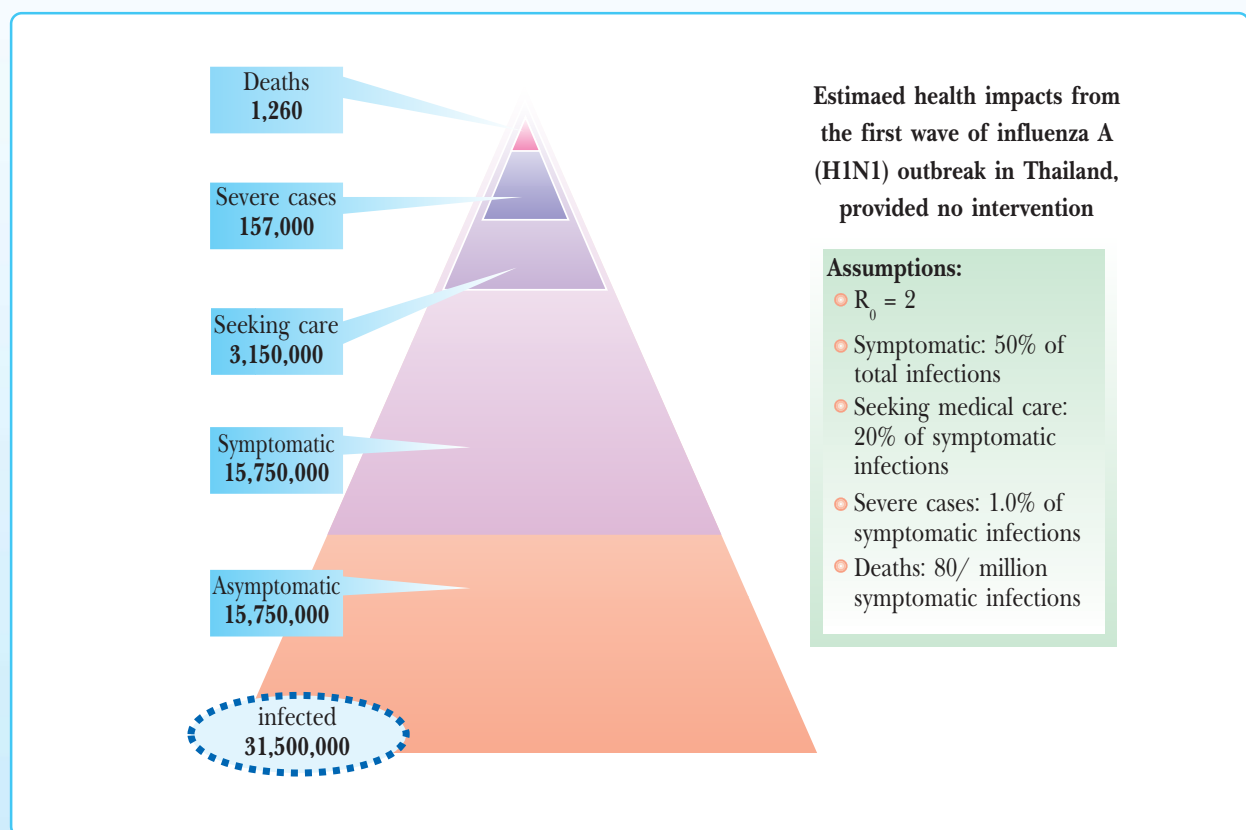
Technical staff concerned had assessed the outbreak situation and agreed that Thailand was unable to avoid pandemic H1N1 2009. So, what could be done was to delay the outbreak and take the mitigation measure, allowing it to spread slowly in a controllable manner. Then the public health system including hospitals would have sufficient time to get prepared and appropriately cope with the patients. A draft paper on situation review and a strategic plan was prepared describing the numbers of cases and deaths as well as measures for reducing morbidity and mortality, but it was not accepted by the administrators and others concerned at least in the following matters:

- a) Cancelling the screening measure at airports. Screening for returning Thais had led the general public to understand that it was an important measure and could prevent disease transmission in the

country. Thailand had to seriously undertake strict measures, similar to those for SARS, like other countries such as Japan, Hong Kong, Singapore, China, etc. Screening for immigrants had to be done thoroughly with measures for quarantine or repatriation; so, it was the key measure requiring a lot of workforce and efforts. However, it was found that screening was unable to prevent the spread into the country. Other countries (such as Japan, Australia, New Zealand, Singapore, Hong Kong and China) using this measure was unable to stop the spreading either.

b) Informing the public to clearly understand what would be happening in the country. During the outbreak, at least 20 million people would be infected and as a result, there would be approximately 15 million patients and 1,200 deaths if the pandemic H1N1 2009 was let to naturally take its course like that for seasonal influenza (Figure 9.1). It was thus proposed that measures for mobility/mortality reduction be undertaken, gradually from less stringent to more stringent depending on the severity of the outbreak. But the estimation that had to be based on various assumptions yielded the figures for the period after many deaths had occurred rather than the overall picture before the outbreak to be communicated with the public. So, that proposition was rejected for fear of causing more panic among members of the public. Until the peak of the outbreak, such figures were mentioned again and the advisory committee on disease control strategy was asked to give a press briefing. Later on, the prime minister also used the figures when addressing the public on radio.

Figure 9.1 Estimated numbers of infected persons, patients and deaths due to pandemic H1N1 2009, Thailand, July 2009



Source: Working Group on Technical Matters and Strategy, Department of Disease Control, MoPH, 2009.

5.4 Surge Capacity Mobilization

Even though the situation had become a serious emergency, due to the lack of unity for outbreak management and surge capacity, the officials responsible disease surveillance, investigation and control, both central and provincial levels, were limited to only a small number of people. So, they could not cope with the situation that required continuous efforts (with no holidays) from May through September (approximately 150 days). Moreover, there were problems related to the use of emergency funds; there were efforts to use the funds within the provincial governor's authority without declaring a disaster zone. But such an attempt was rejected by the Comptroller-General's Department as the situation was actually part of a strategic plan with regular budget. So, it was not a disaster and the ministry to make a request for budget from the government central funds, which had to be approved by the Cabinet, for allocation to other ministries on a case-by-case basis. In resolving this situation, an emergency situation or disease transmission zone should be declared according to the Infectious Disease Act. Besides, amendments should be made to relevant laws, including the Infectious Disease Act, so that a certain amount of reserve would be made available as the central level and could be expended immediately and replenished later, with a paper audit system.

6. Opportunity for Development

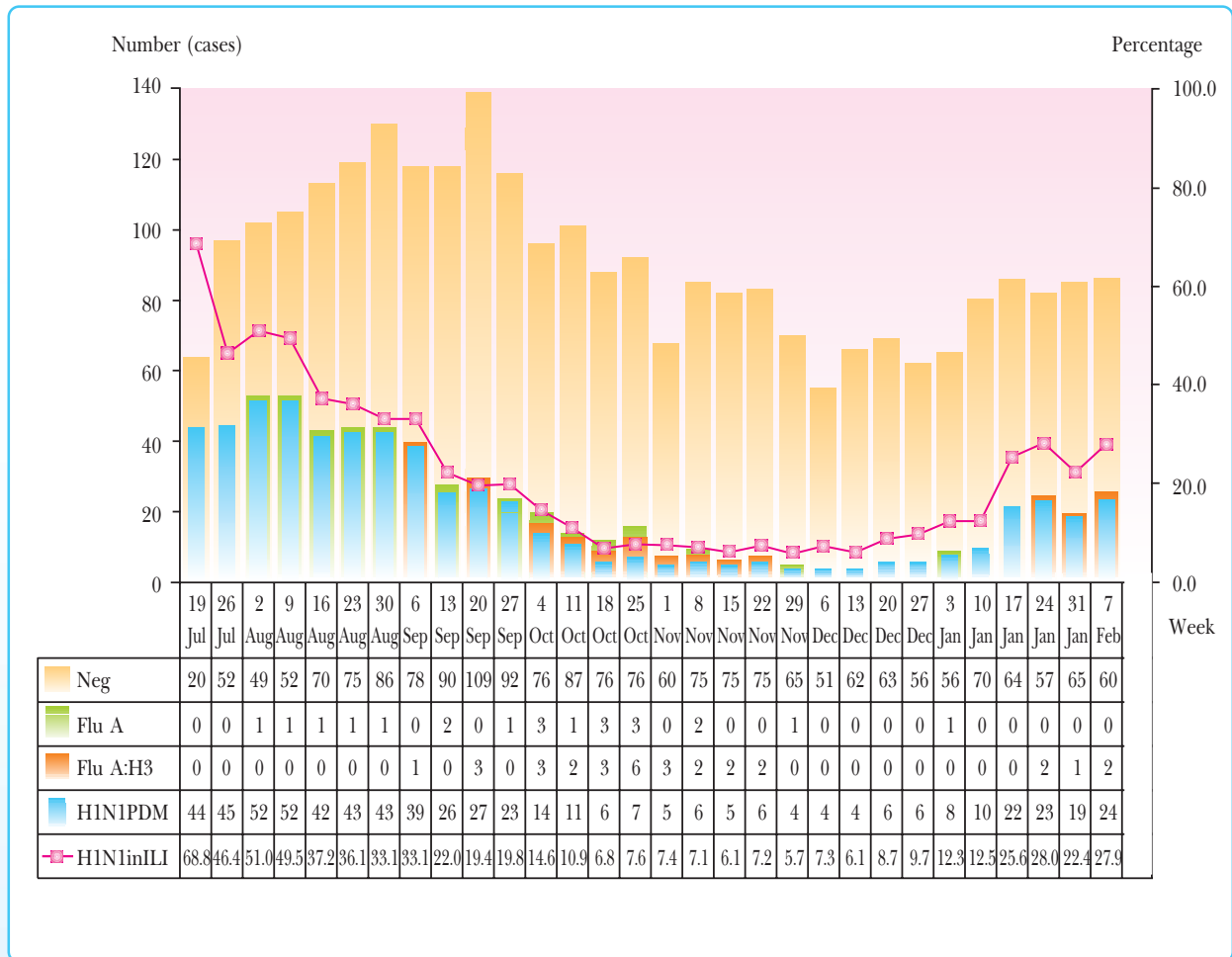
Amidst problems and difficulties, pandemic H1N1 2009 gave an opportunity for developing the Thai public health system in the following aspects:

6.1 Development of disease surveillance and investigation system. In the past, under the influenza surveillance system, there were just morbidity and mortality reports, which were actually much fewer than reality. The H1N1 2009 pandemic has led to improvements in the surveillance system as follows:

- Surveillance of patients with influenza-like infection (ILI). The proportion of ILI patients to all outpatients was monitored on a weekly basis for use as a warning sign for deterring the cause of such occurrence, especially when the proportion was greater than 10.
- Sentinel influenza surveillance by examining randomly selected outpatients and inpatients to see the rate and trend of infections. This tool clearly helped alert the second wave of outbreak (Figure 9.2).
- Outbreak reporting in schools, industries, barracks, prisons and other places. It was found that the large number of reports was unprecedented; surveillance and rapid response teams (SRRTs) were dispatched to take necessary actions and the outbreak control could be accomplished more rapidly.
- Morbidity and mortality monitoring. Every death was investigated to determine the risk factors and weaknesses that needed to be improved. And dead case conferences were held at the hospitals.
- Monitoring of adverse events following immunization (AEFI). As MoPH had purchased 2 million doses of dead influenza vaccine for immunizing the vulnerable groups, the AEFI

monitoring was necessary. Upon receipt of event reports, severe cases would be reviewed thoroughly by the experts committee.

Figure 9.2 Number and proportion (%) of lab confirmed H1N1 pandemic cases to all ILI patients attending outpatient services at 13 sentinel hospitals from the 29th week of 2009 to the 6th week of 2010 (19 July 2009 – 7 February 2010)



Source: Bureau of Epidemiology, Department of Disease Control, MoPH.

6.2 Development of laboratory services. Because of the outbreak, the laboratories of various agencies had to enhance their capacity to do the PCR testing. Such agencies include all 14 regional medical sciences centres, Bamrasnaradura Institute, medical schools, and some private hospitals and laboratories. MoPH should establish quality assurance measures for such laboratories, which would lead to further development in both quantitative and qualitative aspects, by requiring the reporting of all kinds of influenza. This will also save as a means of disease surveillance. Besides, some laboratories such as those under the Chulalongkorn University’s Faculty of Medicine and the Department of Medical Sciences also conducted drug-resistance tests. The laboratory at Chulalongkorn conducted the test on 850 strains and only 1 strain was found to be antibiotic

resistant (personal communication: Dr. Yong Phoosuwan) and the DMSc laboratories could detect 5 drug-resistant strains out of all 424 strains tested (personal communication: Dr. Rungruang Kitphati). Such results did not indicate any severity of the disease.

6.3 Development of vaccines. During the avian flu outbreak and the preparedness planning to cope with H1N1 pandemic, Thailand's National Health Security Board approved the expansion of the seasonal influenza vaccination programme to cover all vulnerable groups beginning in 2008 resulting in an increase in the annual demand for the seasonal flu vaccine from 300,000 doses to 4 million doses. That is regarded as the demand creation in response to the construction of the vaccine production plant.

Meanwhile, when the outbreak occurred, WHO supported the Government Pharmaceutical Organization (GPO) of Thailand to develop a pilot plant in accordance with the WHO's GMP requirements and carry out a research and development programme for producing pandemic live-attenuated influenza vaccine using pre-master seed of influenza A(H1N1) pandemic strain provided by WHO. The strain had been derived from Leningrad 17 strain from Russia's Institute of Experimental Medicine and used in the country for more than 50 years. After getting the premaster seed, the virus was cultured in fertilized chicken eggs for viral propagation and producing a nasal spray vaccine in May 2001, after the phase II vaccine trial was completed, the results were used for vaccine registration with the Thai Food and Drug Administration; and then GPO will further develop live-attenuated vaccines against H5N1 influenza and seasonal influenza.

At about the same time, GPO received an investment budget of 1,400 million baht for building an industrial plant for producing live-attenuated influenza vaccine. The construction is currently underway and will be opened for operation in 2013. If the production capacity is expanded, the quantities will be sufficient for the country's need with the potential to cope with a large outbreak in the future.

6.4 Development of networks. Controlling an emerging disease or rapidly spreading, severe epidemic, it is extremely essential to have epidemiological networks for disease surveillance, investigation, diagnostic laboratory services and medical treatment. Besides, there must be campaign networks for public education. During this outbreak the Thai Health Promotion Foundation (ThaiHealth), through its networks, provided knowledge and conducted campaigns on desirable behaviours for disease prevention. It is thus extremely important to continue supporting such networks to carry on their operations with a linkage and support for each other, with the policy support from MoPH.

7. Conclusions

The rapid outbreak of pandemic H1N1 2009 throughout the world within two months was a proof of the capacity of the health ministry in each country. For Thailand, the outbreak occurred rapidly in June 2009, initially among school children in primary and secondary schools in Bangkok; and then the disease spread to their family members or parents who in turn spread the virus to their colleagues in the workplaces as well as other people in the communities. As of the end of 2009, there were 10 million infected persons. The



factors contributing to the outbreak in various places or communities include physical factors such as overcrowding of students in a classroom. More important than the physical factors were the group activities of people or students, such as overnight camping, where such people had to carry out activities in close contact with each other or enjoy entertainment activities or concerts. Even though in general Thailand was able to control this outbreak and reduce the number of deaths by half (approximately 500 deaths) and delay the outbreak into several waves, there are several lessons learned. For example, the lack of security in emergency and crisis management, risk communication and inability to make the people understand and cooperate in certain actions and the lack of resource mobilization to systematically respond to such an emergency. Meanwhile, there were opportunities for further development in such fields as surveillance system, extension of lab capacity, in-country vaccine development, and the creation of networks of epidemiology, laboratories, medical treatment, and public education on healthy behaviours. Such lessons and opportunities can be used for improving and preparing to cope with the future outbreaks of seasonal or other strain influenza that will be more and more virulent as well as another emerging disease that would be a threat in the future.