

# H1N1 pandemic: The situation in Brunei Darussalam

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## INTRODUCTION

In the last century, there were three well documented influenza pandemics; the 'Spanish flu caused by H1N1 (1918-19), the 'Asian flu caused by H2N2 (1957-58)' and the 'Hong Kong flu caused by H3N2 (1968-69)'. The Spanish flu was reported to have caused between 20-50 million deaths, whereas the later two pandemics caused approximately one to four million deaths worldwide.<sup>1</sup> All these pandemics were reported to have lasted approximately two years with multiple waves that were four to six months apart. Given that the last pandemic had occurred more than three decades ago, the next pandemic was expected to occur and at the beginning of the 21<sup>st</sup> century, the Avian (H5N1) influenza virus was thought to be a possible candidate for the cause of the next Influenza pandemic.<sup>3</sup> Therefore, even before the actual H1N1 2009 pandemic had started, preparations were already in place in many countries for the impending Influenza Pandemic following the outbreaks of the Severe Acute Respiratory Distress syndrome (SARS) and later the Avian (H5N1) flu. Similarly, Brunei Darussalam had also made preparations that were

initiated after the 2003 SARS outbreak.<sup>2</sup>

The World Health Organisation (WHO) declared on the 24<sup>th</sup> April 2009 a 'Public Health Emergency of International Concern (PHEIC)' event following reports of influenza like illness (ILI) in Mexico that had started in mid-March 2009.<sup>3</sup> This ILI was caused by an untypeable influenza H1N1 virus that had never been previously encountered. This was later subtype to be a novel assorted H1N1 influenza virus that contained genetic make-up of both swine and human influenza H1N1 virus and was referred to as the Swine Influenza/H1N1 virus. The WHO subsequently raised the pandemic alert levels to Phase 4 on the 27<sup>th</sup> April 2009 due to sustained community transmission in Mexico. This was quickly followed by elevation to Phase 5 on the 29<sup>th</sup> April 2009 and subsequently Phase 6 on the 11<sup>th</sup> Jun 2009 when the WHO declared officially that the H1N1 pandemic had started.

The rapidity of the spread of the virus can be largely attributed to overall increased population size, population movements and ease of travels. Unlike previous pandemics, this virus spread rapidly and within nine weeks of the first reported outbreak, had already spread globally and a pandemic was declared by the WHO. However, also thanks

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to the advancements made in technologies such as telecommunications and healthcare facilities, it was possible to identify and study this novel virus and appropriate measures to be taken very quickly as shown by the rapid responses by the WHO and relevant agencies. Brunei Darussalam raised its Pandemic phase from PHASE 6a (Brunei not affected) to PHASE 6b when its first case was detected locally on the 20<sup>th</sup> June 2009. Given the size of the population and the standard of living, it was very likely that the first index cases were going to be imported cases. Therefore, distinctions were made from the WHO pandemic phases with suffixes (a) or (b) to indicate whether Brunei Darussalam was affected or not.

The main scope of this report is to report the actions and steps taken by the

surveillance, prevention and control sub-committee in their contribution to the handling and control of the pandemic in Brunei Darussalam.

### ACTIONS/STEPS IMPLEMENTED

The MOH along with other government and non-government agencies implemented several measures to ensure that the impact of H1N1 outbreak would be minimised.

Efforts and actions taken by the Ministry of Health (MOH) were based on the MOH Brunei Darussalam's National Influenza Pandemic Preparedness Plan (NIPPP) 2005, drafted following the SARS epidemic in 2003 and adapted for the H5N1 Avian flu outbreak in 2005. The NIPPP was planned, formulated and implemented in line with the WHO pandemic influenza phase alert levels (Table 1).

**Table 1: Pandemic Phases for Brunei Darussalam (adapted from the WHO Pandemic Phase<sup>1</sup>).**

Phase	Definition	
<b>PHASE 1</b>	Interpandemic Phase No new influenza virus subtypes have been detected in humans. An influenza virus subtype that has caused human infection may be present in animals. If present in animals, the risk of human infection or disease is considered low.	
<b>PHASE 2</b>	No new influenza virus subtype has been detected in humans. However, a circulating animal influenza virus subtype poses a substantial risk of human disease.	
<b>PHASE 3</b>	Human infections with a new subtype, but no human-to-human spread, or at most rare instances of spread to a close contact	a: Brunei not affected b: Brunei affected
<b>PHASE 4</b>	Small clusters with limited human-to-human transmission but spread is highly localised, suggesting that the virus is not well adapted to humans	a: Brunei not affected b: Brunei affected
<b>PHASE 5</b>	Large clusters with limited human-to-human transmission but spread still localised, suggesting that the virus is becoming increasingly better adapted to humans, but may not yet be fully transmissible (substantial pandemic risk) Spread of the virus into at least two countries in one WHO region.	a: Brunei not affected b: Brunei affected
<b>PHASE 6</b>	Pandemic Period Increased and sustained transmission in general population Designation of this phase will indicate that a global pandemic is under way.	a: Brunei not affected b: Brunei affected

**Table 2: Ministry of Health NIPPP Subcommittees Terms of References (TORs).**

Number	Subcommittee	Term of Reference (TORs)
1	Surveillance, Control and Prevention	Continuously monitors pandemic influenza cases inside and outside the country Health screening at entry points Implement control and prevention measures Routine seasonal influenza immunisation for target groups Collection and analysis of influenza like illness surveillance data at sentinel sites
2	Technical support and Logistics	Drugs and related medications Laboratory diagnostic requirements Medical equipments Sundries Provide technical training to health/medical personnel Provide 'Healthcare technology' advisory service
3	Infection Control	Ensure full implementation of control and preventive measures Ensure practice of proper and safe procedures in management of: Case/ Contact/ Clinical samples/ Clinical waste/ Dead body
4	Case Management	Outlines Clinical Management protocol Preparation of PMMPMHAMB Hospital as an isolation hospital Ensures hospitals preparedness Stockpiles related medicines Ensures adequate medical facilities including equipments
5	Media and Public Relation	Strengthen and maintain public confidence Educate and increase awareness amongst healthcare workers and public Encourage public vigilance and adopt socially responsible behaviour in disease prevention
6	Laboratory Support	Develop Guidelines and SOPs in safe and proper handling of specimens Ensure availability of appropriate equipments and adequate reagents for analysis and diagnosis Establish regional and international laboratory networks and cooperation
7	Manpower	Identify, mobilise and redeploy manpower to areas of needs Manpower surge capacity including use of volunteers

PMMPMHAMB Hospital: Pengiran Muda Mahkota Pengiran Muda Haji Al-Muhtadee Billah Hospital

The NIPPP consists of seven subcommittees that involved the various departments within the MOH (Table 2). The main strategies of the NIPPP were: a) Prevention of the importation of H1N1 into the country and containment of transmission of influenza pandemic within Brunei Darussalam once affected; b) Effective surveillance (detection, notification and immediate action plans); c) Ensure adequate supplies of medicines, medical and personal protective equipments and human resources; d) Stockpiling of adequate supply of influenza vaccines and antivirals;

and e) Strengthening the capability and capacity of laboratory services.

In the initial period (PHASES 4 and 5) when the H1N1 Influenza outbreak had just started in the Americas, the main actions taken were mainly in the preparation, ensuring readiness, monitoring of situations internationally and regionally and tabletop exercises and discussions to identify weakness. When the outbreak became pandemic, these measures were further strengthened and further measures were taken. During PHASE 6b,

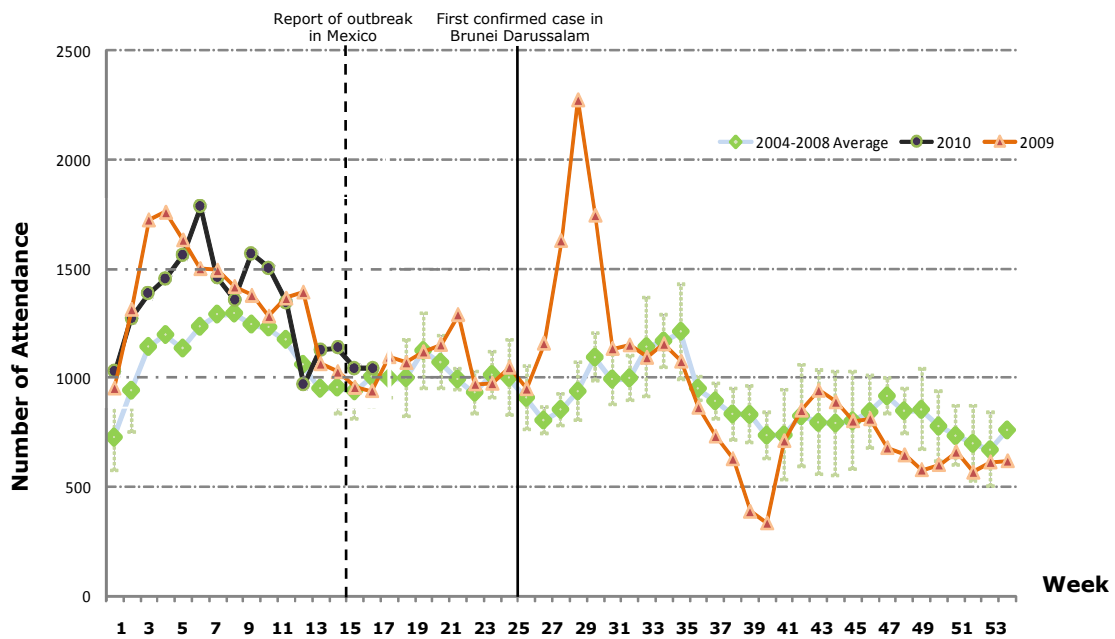


Figure 1 shows the pattern of Influenza like illness (ILI) attendance at the BSB Health Center; week 15 was when Mexico (dashed line) first reported of an ILI outbreak while Brunei Darussalam reported its first case in week 25 (solid line). Interestingly, a significant increase of more than 2x fold from the 2004-2008 mean were seen in the following weeks, peaking at week 27 coinciding with the peak in confirmed Influenza A (H1N1) cases.

actions and steps implemented took into consideration what the main objectives were, keeping in mind amongst other things, the severity of the disease, the intensity and the resource requirements of the response. PHASE 6b was divided in two distinct phases: the earlier “containment phase” and the later “protect and treat phase”. This strategy will allow for containment to be done for as long as possible to mitigate the effects of the pandemic.

### PHASE 6b: CONTAINMENT PHASE

The objectives of actions and steps taken during this phase were to detect suspected cases early amongst travellers at all ports of entry or any cases seeking treatment at any health facilities so that isolation and treatment actions can be implemented at the earliest possible to prevent further spread in the country. The main focus was case finding activities and complemented by rigorous and thoro-

ugh contact tracing, treatment and/or quarantine of contacts if a case was identified.

Actions implemented and approaches taken in the management of the pandemic during this phase is shown in Table 3.

### PHASE 6b: PROTECT AND TREAT

Once the disease was in the country and there was evidence of community spread, containment became difficult as it was already transmitted well beyond a delimited area. Reviews and evaluations of the actions or steps implemented by the MOH along with further information obtained on the disease itself both locally and internationally showed that further containment measures were both manpower and resource intensive. Hence, following the recommendations of the WHO as well as actions taken by other affected countries in the region particularly Australia<sup>4</sup> and Singapore<sup>5</sup>, the MOH made the decision to

**Table 3: Actions and steps taken during the Containment phase of PHASE 6b.**

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**Actions and Steps taken**

- Intensifying and strengthening of border surveillance (ports of entry such as air, land and sea). This included temperature assessment of incoming passengers using "Thermal Scanning"/ear thermometer. Health Declaration Forms (HDF) that were introduced during the SARS outbreak and briefly discontinued early 2009 was reintroduced on 28<sup>th</sup> April 2009. These HDF forms requires passengers to declare their travel history particularly from countries reporting the disease, any recent medical history of respiratory or significant illnesses as well as their travel plans (e.g. seating number in the aircraft) and contact details for the purpose of contact tracing.
  - Similarly, temperature screenings at health facilities in the country were also implemented. Those with fever with or without symptoms of "Influenza-like Illness (ILI)" were segregated and redirected to the appropriate screening areas and to prevent further entry into hospital premises. ILI surveillance was stepped up and expanded to all health centers from the initial two health centers was implemented on 27<sup>th</sup> April 2009 to monitor the pattern and trend of respiratory illnesses in the community. Atypical pneumonia surveillance was also initiated in all health facilities (see Fig 1). All suspected cases of influenza were tested for Influenza A (H1N1).
  - Information sharing and collaboration were extended to the private health sector on 27<sup>th</sup> April 2009.
  - "Flu desks" for triaging patients prior to consultations was initiated on the 29<sup>th</sup> April 2009 in all health centers and hospitals to identify patients with symptoms of ILI. Suspected cases were segregated to allocated areas.
  - In the management, all cases were initially treated with antivirals at the PMMPMHAMB Hospital, which was the designated isolation hospital. Re-testing was carried out after the completion of treatment prior to discharge. Active contact tracing was also implemented with close contacts given prophylaxis with antivirals as well as ordered to undergo quarantine for at least a week. During their period of quarantine, all were monitored daily. Quarantine was either in their own homes (if their homes and social conditions were favourable) or at several designated quarantine centers throughout the country (particularly for transit passengers).
  - Infection control measures were tightened in all health facilities. Training on the proper use of respirators was enhanced to ensure that frontline healthcare workers were protected while carrying out their duties. The number of visitors in hospital settings was also limited to two per patient.
  - Cognizant of the fact that any infectious disease can spread easily in institutional settings such as schools, cooperation from the Ministry of Education was quickly sought and temperature screening prior to entering the school premises were implemented. Procedures on actions to be taken such as students contact tracing and class closures were drawn up.
  - Close cooperation with relevant agencies was also enhanced and strengthened. Implementation of procedures and activities were also accomplished, particularly with the National Disaster Management Center (NDMC) whose role was mainly to facilitate with regards to non-health matters. With the NDMC, early in the pandemic, a 24 hour operation room was established at the Brunei International Airport to manage passengers who were highly suspected of having Influenza A (H1N1). Management includes baggage handling, connecting flights, food and quarantine of the other passengers. Similarly, collaboration with relevant authorities and agencies at various ports of entry i.e. the initial focus of surveillance was also strengthened and procedures streamlined including with airlines and travel operators.
  - Cooperation at the international level was also crucial. Situational updates and the exchange of information including assistance and clarification on technical issues were regularly done with the WHO through the International Health Regulations (IHR) National Focal Point Network as well as at bilateral level such as with Malaysia and other international level such as ASEAN expert groups.
  - The provisions under the Infectious Diseases Order 2003 were also reviewed and amended to support the actions and activities taken to prevent and control the pandemic particularly the necessity for detection of disease, quarantining of cases and notifying the health authorities.
  - Active dissemination of information and advisories to the public was done to increase the public's awareness, educate and empower them on the disease and pandemic and its prevention particularly stressing on the issue of personal hygiene through media briefings, press releases, website of the MOH as well as through a dedicated Health-line. Travel advisories particularly to countries reporting cases were issued to the public as well as cooperation with relevant agencies on the issuance of guidelines for government related travel were done. Social gatherings were also discouraged.
  - Vaccination with seasonal influenza vaccine was continued with the rationale that seasonal influenza viruses continue to circulate in the midst of the pandemic particularly to high risk groups.
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move to the next steps of actions to be taken in controlling and preventing the further spread of disease (mitigation) called 'The protect and treat phase' on 25<sup>th</sup> July 2009.

This phase involved changes particularly to how cases were managed, use of antivirals and laboratory investigations. All laboratories confirmed cases that were experiencing the mild forms of the disease were only be given sick leave, treated symptomatically (i.e. no antivirals given) and advised to stay at home. No quarantine orders were issued for both patients and contacts. Only severe cases were treated in hospitals. The practice of repeat test prior to discharge from the hospital was also discontinued with the exception of certain patients groups. This includes pregnant patients, patients with significant chronic co-morbid conditions, healthcare workers and those who were living or caring for people considered at risk of complications.

Antivirals were only given to high risk groups as well as to those who were treated in the hospital. Prophylaxis for close contacts

was also abandoned. This approach was adopted as the majority of cases were mild and did not require treatment with antivirals.

Laboratory investigations were only done to those who either; a) fell into the high risk groups (the very young, pregnant mothers or those having chronic conditions); b) undergoing treatment in the hospital or c) for the purpose of sentinel surveillance.

Travel advisories were lifted and social gatherings allowed, with the advice to maintain the highest level of hygiene at all times and stay at home if not well. Otherwise, other actions remain the same.

### CASE ANALYSIS

Similar to the seasonal influenza, the clinical spectrum of infection with Influenza A (H1N1) (2009) showed that the majority of cases have uncomplicated influenza illness that resolved without antiviral treatment. There were also more complaints of gastrointestinal symptoms (e.g. emesis, diarrhoea) compared to seasonal influenza. Globally, the hospitali-

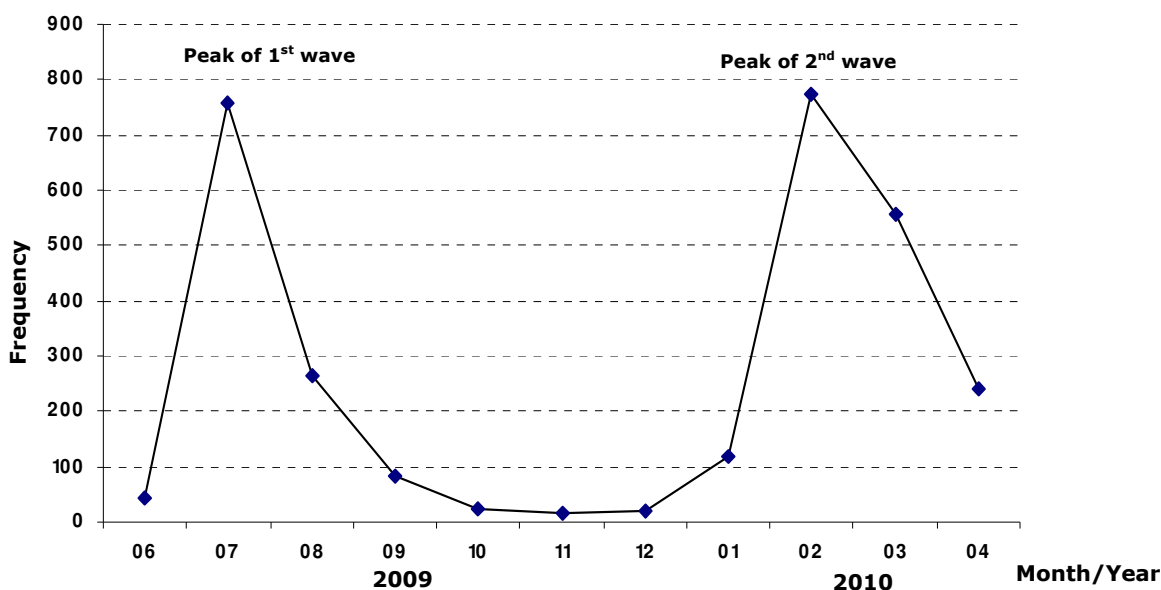


Figure 2: Trend in confirmed Influenza A (H1N1) cases from June 2009 to April 2010.

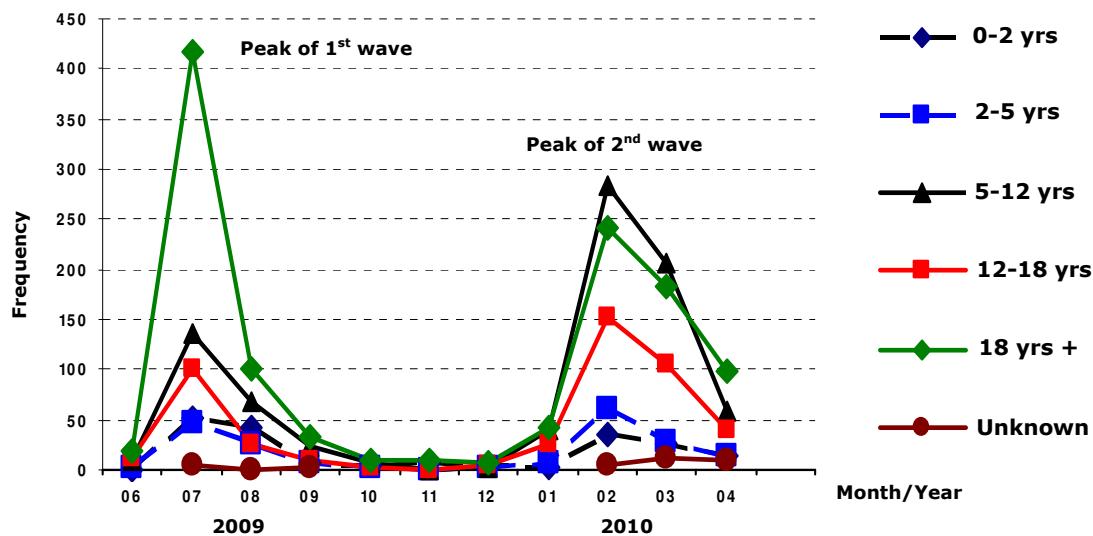


Figure 3: H1N1 frequency trend by age group.

sation rates were up to ten percent in confirmed cases with a Case Fatality Ratio (CFR) of <1%.<sup>6</sup> The majority of deaths were caused by severe viral pneumonia. 50-80% of severe cases also had underlying predisposing conditions (i.e. pregnancy, asthma or other chronic lung disorders, cardiovascular, diabetes mellitus, immunosuppressed and neurological disorders).<sup>7</sup> Obesity also appeared to be a newly recognised risk factor.<sup>8</sup> In our local setting, end stage renal failure requiring dialysis was also an important risk factor.

Generally, the number of cases tends to peak and then falls during a disease outbreak. This is referred to as a “wave” and there may be several waves in a disease outbreak or pandemic. Previous pandemics have been characterised by waves of activity spread over months. Pandemic waves can be separated by months and an immediate “at-ease” signal may be premature. Therefore, there is a need to be vigilant and prepared even after numbers have reduced. It is also uncertain whether each pandemic wave will

be less severe or more severe than the preceding ones. In our local setting, the first wave peaked in July 2009 when 758 cases were confirmed positive in that single month. This was followed by a decline in the trend from August 2009 to December 2009, before the number started to increase and peaking in February with 775 cases corresponding to the second wave of the pandemic (Fig. 2).

At the start of the pandemic, the majority of cases had a history of travel. This later becomes less significant when community transmission was established.

The most common age group affected was in the above 18 year age group at the start of the pandemic. This can be explained by the fact that at the start of the pandemic, the positive cases were mainly amongst travelers which tend to be in the older age group. Those below five years of age were least affected. However, once community transmissions occurred, the 5-12 years and 12-18 years group were affected more (Fig. 3).

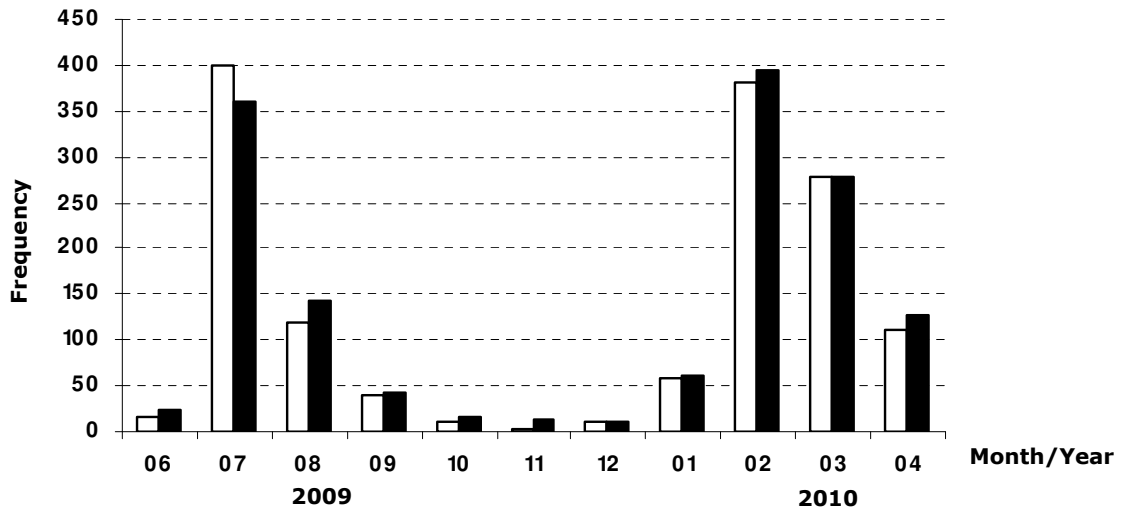


Figure 4: Trend by gender; male  and female

Both male and female genders were equally affected by the Pandemic H1N1 virus. There was no significant difference in gender groups (Fig. 4).

The Brunei-Muara district reported the most number of confirmed cases followed by Kuala Belait, Tutong and Temburong districts respectively (Fig. 5). This can be explained by the higher population density in the Brunei-Muara district.

There were two deaths reported in the country giving a CFR of less than one percent. Both patients had underlying chronic conditions. The first death occurred in a 12-year-old girl who was diagnosed with established end-stage liver failure secondary to autoimmune hepatitis. She was admitted for evaluation of chronic liver failure and she did not exhibit any symptoms of ILI until her second week of admission. It was possible that she had acquired the infection in hospital from

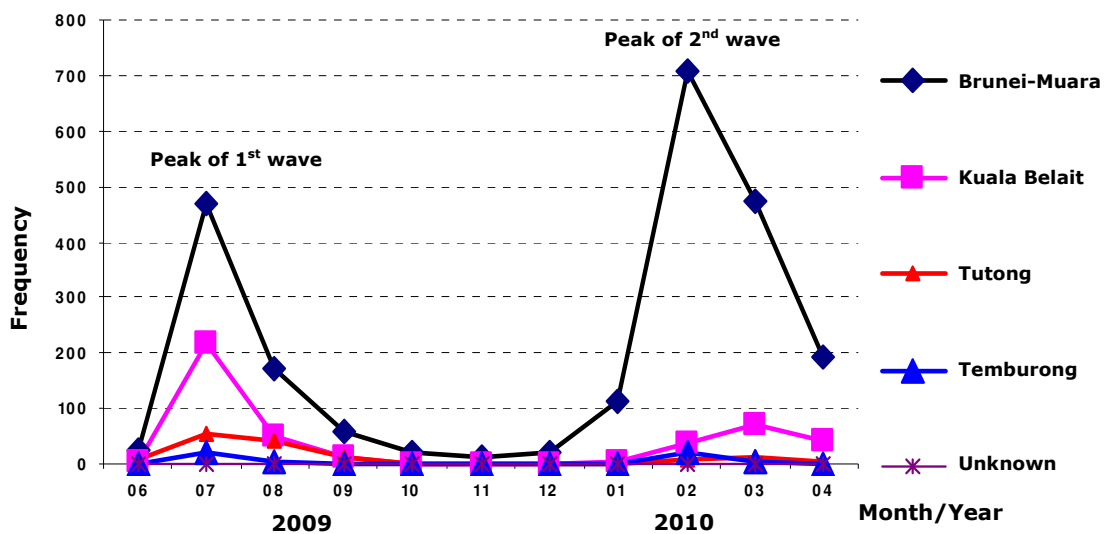


Figure 5: Cases frequency affected in the four districts during the pandemic.



visitors who had symptoms of ILI. She went into respiratory distress syndrome from the viral pneumonia that was further complicated by multi-organ failure. The second death occurred in a 42-year-old foreign worker, who had underlying diabetes mellitus and developed symptoms a week prior to seeking medical treatment.

## **VACCINATION PROGRAM:**

### **Influenza A (H1N1) Vaccine**

The MOH procured a total of 300,000 Influenza A (H1N1) vaccines for the whole of the country, with the supply of the vaccine delivered in batches. The first batch of the vaccine arrived in early November 2009 totalling 6000 doses (GSK-Pandemrix, from Dresden, Germany). As the supply of the first batch was limited, it was given to priority groups first including Haj pilgrims as well as "frontline workers". Subsequent stocks arrived in December onwards (from Quebec, Canada - GSK, Arepandrix) and the vaccination programme was then rolled out.

In preparation for the administration and deployment of the vaccine, training sessions were conducted to all healthcare workers identified to be included in the delivery of the vaccines in early November as well as in February due to changes in procedures and techniques.

Eight facilities under the MOH were initially identified as vaccination centers and became operational in December 2009; four in Brunei-Muara district (Vaccination Center, BSB Health Center, Berakas A Health Center, PAPRSB Sengkuring Health Center and Sports Complex, RIPAS Hospital), two in Kuala Belait (Suri Seri Begawan Hospital and Sungai Liang

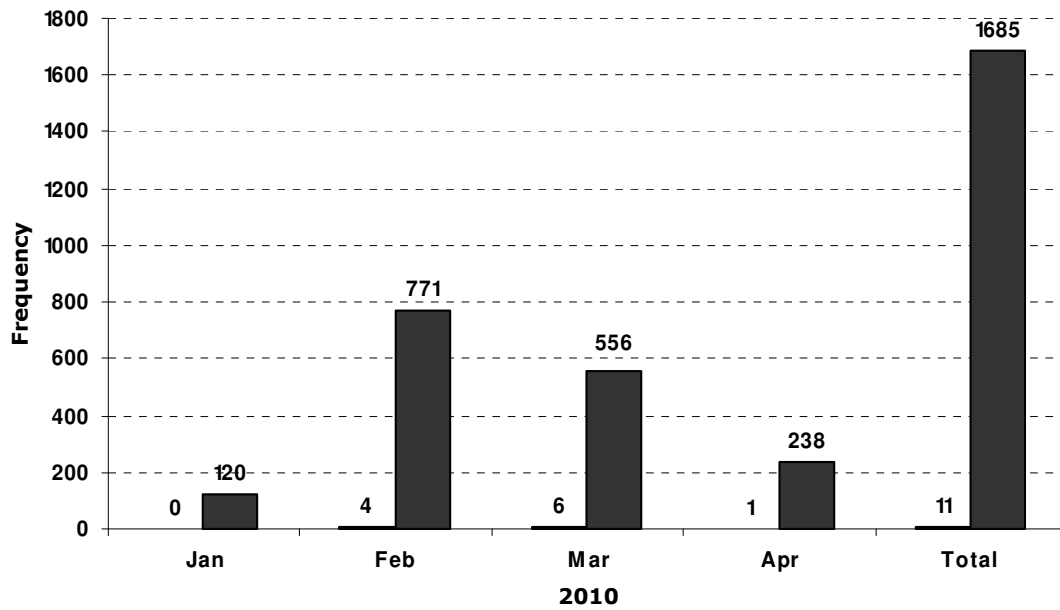
Health Center) and one each in Tutong (PMMPMHAMB Hospital), and Temburong (PIHM Hospital).

For ease of deployment of the vaccines and ensuring higher uptake, other agencies with health facilities were also provided with the vaccines for them to cater for their own population e.g. Ministry of Defence. Additionally, with the initial high demand from the public as well as for increasing accessibility, a temporary vaccination centre was set up at the National Indoor Stadium, Berakas on the 30<sup>th</sup> January 2010, which was operational daily including weekends and public holidays. The Universiti Brunei Darussalam also set up a one day vaccination drive in their premises targeted for their staff and students. As of 1<sup>st</sup> May 2010, 61,784 doses of vaccine have been given with very few reports of serious adverse reactions to the vaccine. These consisted mainly of fever, pain at the injection site and few cases dermatological manifestations as rashes.

Interestingly, confirmed cases were also reported amongst those who previously had been vaccinated. However, the incidence among the vaccinated group is very small ( $n=11$ , Fig. 6). The majority of eleven patients were vaccinated only recently prior to catching the infection. This suggested that they may not have fully seroconverted, which usually takes at least two weeks to occur. Therefore, vaccination is effective in reducing the number of cases affected.

## **CHALLENGES**

One of the important challenges faced was surge in requirements for manpower capacity to handle and manage the pandemic. Staff



**Figure 6: Vaccination status among patients diagnosed with H1N1 between January to April 2010.**  
 ■ Not received vaccination and □ had received vaccination.

leaves had to be frozen, overseas trip rationalised, secondment of staff from one department to assist another department was practised to accommodate the increase in workload as well as to account for absenteeism and requirements of quarantine. Hence, business continuity planning<sup>3</sup> in times of crises are an essential component to ensure that the running of essential core services are maintained.

Other challenges faced include the awareness and understanding of the public on the disease itself e.g. transmission and prevention strategies (despite education and information dissemination strategies by the MOH as well as cooperation of the public to the authorities e.g. complying to the quarantine orders issued. Public expectation as well as other agencies' expectation of the MOH was very high. Most had expected everything to be done exclusively by the MOH but the public's role and other agencies' role in preventing the spread of the disease is crucial.

However, challenges faced also provide opportunities for the MOH to constantly review, evaluate and upgrade our skills, knowledge and understanding of the evolution of the pandemic and it helps us to foster a closer cooperation, not just within the various departments under the MOH but with all the other relevant agencies as well.

### CONCLUSION

Although the incidence of H1N1 is currently in declining trend, early referral and early treatment is important to prevent from severe complications.

The MOH was well prepared to face the pandemic, thanks to the experience brought on by SARS as well as multiple exercises on managing a pandemic e.g. Avian Influenza. We have to bear in mind that there is no 'silver bullet' for pandemic intervention. It involves a combination of different interventions to minimise the impact of the pandemic. There is no single solution for all settings or

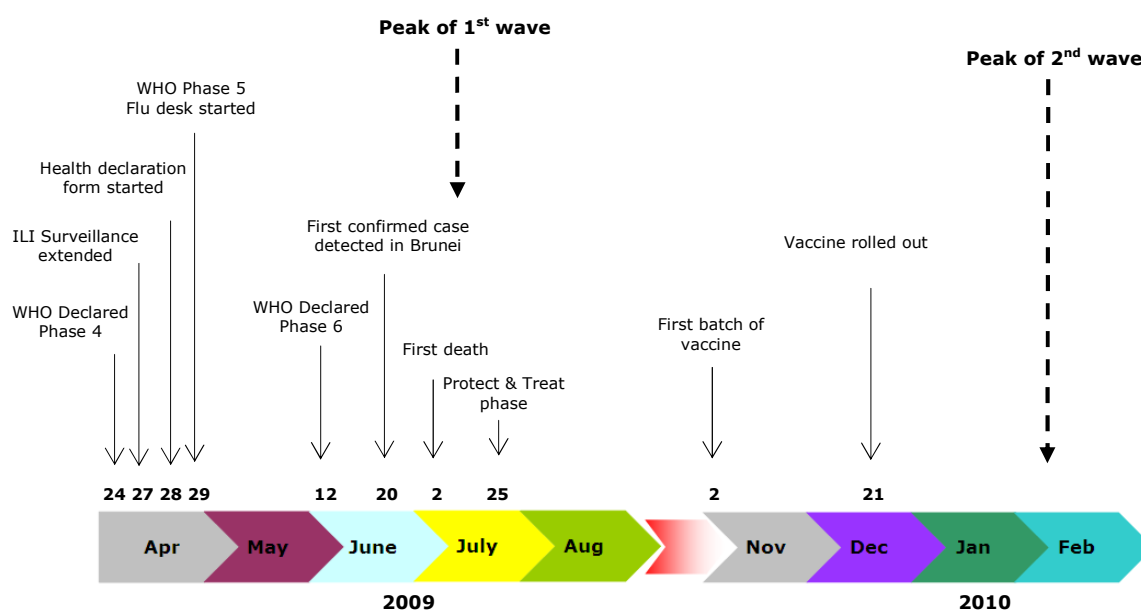


Figure 7: Timeline of events from the time WHO declared the outbreak in Mexico to current situation.

even similar settings e.g. often an approach taken at one port of entry will vary at another port of entry due to structural and organisational differences.

The NIPPP itself serves as a guidance document for the various committees and subcommittees on actions and interventions to be taken; it is a "living document" whereby on numerous occasions the actions and interventions outlined had to be reviewed and revised due to the evolution of the pandemic as well as changing situations.

Further, no single institution or organisation can manage the pandemic on its own; this is reflected and shown by how the pandemic was managed effectively with the smooth running at both health and non-health sectors, no huge outbreaks and minimal loss of lives, thanks to the continuous cooperation extended to the MOH by the various government and non-governmental

organisations as well as guidance from the WHO.

The impact of technological advances has been tremendous and it has allowed us to learn so much of the virus and the pandemic within such a short period of time. This has even allowed vaccines to be developed, manufactured and deployed even before the second wave of the pandemic had started.

This current pandemic had started of as an outbreak in Mexico and had quickly spread to cause a pandemic in less than three months. Compared to previous pandemic, the pace of the current pandemic was fast (Fig. 7). As the pandemic is still on going, it is not certain whether it will follow the pattern of the previous pandemics. It remains uncertain how the current pandemic will progress. Therefore, we should remain vigilant and continue to monitor the situation both locally and internationally.

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