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Health System and Pandemic Influenza Preparedness: Results from Rapid Situation Analysis (RSA) in Jakarta and Bali

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Introduction

Avian influenza H5N1 (AI) has posed a great public health emergency and prompted a great concern at international level to several countries in Asia including Indonesia. The countries have to respond adequately to mitigate the emergency. As of 10 Jul 2009, Indonesia had 161 confirmed cases of infection with AI, 134 of whom died[1]. This experience had offered an opportunity to evaluate resource demands and governance arrangements in practice as well as to form a theoretical perspective and to compare and contrast different experiences and responses.

The AsiaFluCap project aims to determine and map resources and governance arrangements for surveillance, case investigation, case management and community control of an influenza pandemic. It is also aimed at overarching administration of the health system in six Southeast Asian countries: Cambodia, Indonesia, Lao People's Democratic Republic, Taiwan and Thailand in order to wholly respond to the potential of an influenza pandemic.

The AsiaFluCap project conducted a Rapid Situation Analysis (RSA) for each country. The objective of the RSA is to form a contextual understanding of the pandemic preparedness program, the health systems context, in which these programs have been established to face challenges in the territories.

Methods

This study relies on the Systemic Rapid Assessment (SYSRA) toolkit, which is a systematic approach for gathering information about structures and modes of operation from complex health systems. It builds on the SYSRA[2], a conceptual and analytical framework initially developed by Atun RA, et al, to evaluate health systems and communicable disease control program[3] that take into account disease programs, general health system, and the wider socio-cultural and political context. This framework was adapted to pandemic influenza as the purpose of this study.

The SYSRA toolkit comprises two core elements: the 'health systems element' which focuses on structures and functionality of an overall health system (horizontal level), and the 'pandemic preparedness program element' which assesses specific pandemic influenza program components embedded within a health system (vertical level) (Figure 1).

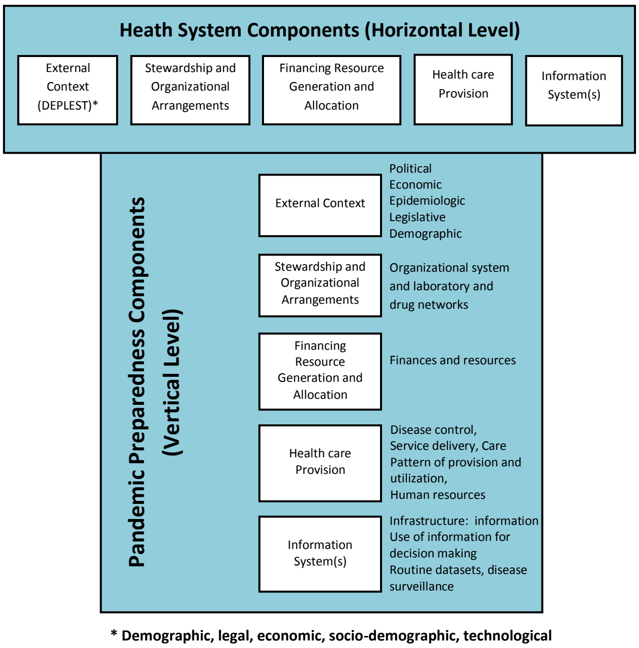

Figure 1. Components of the Systemic Rapid Assessment (SYSRA) toolkit

For each element, the components under review are external context; stewardship and organisational arrangements; financing, resource generation and allocation; health care provision; and information systems.

For each of these modules, qualitative and quantitative data were collected based on a review of published data documentation and interviews with key informants in each country. Articles in English and Bahasa Indonesia were retrieved from electronic databases of government and other official websites.

Search keywords used were topics addressed in the modules which had been reviewed by research panels, i.e., avian influenza, pandemic, surveillance, health system, policy, regulation, financing, politics, socio-economic, poverty, demography, health information, health care provision and resources.

Articles were also collected from unpublished data from the government offices, hospitals and health centers. As a first step, secondary data and documentation were reviewed by researchers and summarized in order to determine what data were available.

The inputs from the literature reviews were transformed into list of issues to be further explored in the interview. The interview used a predefined semi-structured questionnaire, focusing especially on gaps identified in the initial literature reviews.

The questions explored past and current patterns of health program responses, changes in pandemic responses and other historical information about outbreak management. The six-step procedure for data collection and analysis ranges from developing modules to data analysis (Figure 2).

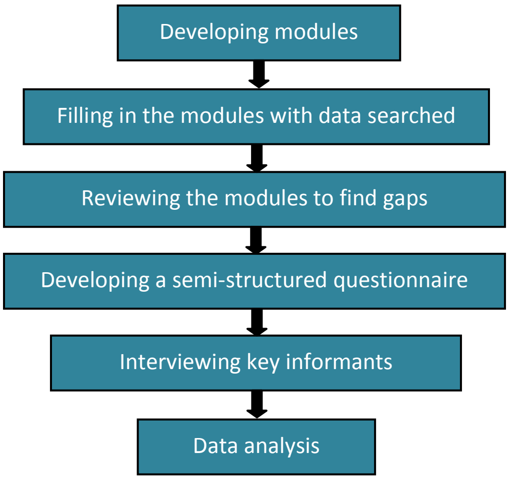

Figure 2. Data collection and analysis procedure

Key informants were an officer of Directorate General Pharmaceutical Services and Medical Devices, an officer of surveillance sub-directorate under the Ministry of Health, an officer from the national health laboratory, an officer from the provincial health office, an internist, a pulmonologist and a general practitioner of AI referral hospital. All of them had been selected in accordance to their roles and understanding in a broad range of health system and pandemic program components. They were chosen from the national and local government levels representing different institutions to provide a perspective of the health system and of the pandemic management program.

The Indonesia health system comprises of human resources, health care delivery, health management, health financing, drugs and medical supplies and health information system. Each region has its own public health characteristics and risk profiles which in turn will affect on how the entire health system works.

Selection criteria included as a given province with AI prevention experience and its influential political positioning had offered opportunities for us to learn from while they also later influenced the national policy. As the geographical nature of Indonesia is an archipelagic country, socio-cultural and other differences in the upcountry from the metropolitan area as well as the differences of health system governance arrangements and risk profiles had been also taken into consideration.

The scope of this study was limited to health system and health service response that related to preparation for pandemic influenza. The RSA visit in Indonesia took place on 10–14 Nov 2008. Faculty of Public Health, University of Indonesia and London School of Hygiene and Tropical Medicine, supported by the European Commission, had conducted a sixth RSA as part of AsiaFluCap project to form a contextual understanding of the pandemic preparedness program and the health systems context. These programs have been established and challenged in the territories by relying on the SYSRA as a systematic approach for subsequently collecting data through literature review and interviews of key informants.

Results

The scope of the study was limited to two of 33 provinces: Jakarta and Bali. Jakarta, the capital city of Indonesia, was selected because of its high number of AI confirmed cases and related deaths (34 and 30 respectively).

Bali was selected as another site due to its famous tourism. Many domestic and foreign tourists come to this island every year. In 2008, there were 2,898,794 domestic tourists[4]. While during January to August 2009 only, there were 1,538,048 foreign tourists[5]. With the presence of AI in this tourist destination, it poses concern over possibility of disease spreading globally.

General Settings

Figure 3. Map of Indonesia

Economic

Jakarta is the center of Indonesia's economy. Data of Bureau of National Statistics (Biro Pusat Statistik), Province Daerah Khusus Ibukota (DKI) Jakarta shows the Gross Regional Domestic Product (GRDP) in 2006 was 501,584,808 million rupiahs[6]. Unemployment rate was 11.06% in February 2008; down from 13.27% reported a year earlier[7].

In Bali, main contributors to the economy are tourism and agriculture. The GRDP in 2006 was 37,388,485 million rupiahs[6]. After terrorists attacked a nightclub in Bali in 2002, there was decrease in tourism. Inflation rate in 2007 was 5.91% with an unemployment rate at 4.56% in 2008[8].

Demography

DKI Jakarta is one of the most populated cities in the world with population density at 13,499/km^2. With only 740.29 km^2 in total area, the projection of Jakarta's population should be no more than 9,223 thousands in 2009. Bali's population density was lower than Jakarta, and at 609/km^2. Area of Bali is 5,449.37 km^2 with population projection to be 3,551 thousands in 2009[6].

Geography

DKI Jakarta is a province consisting of five municipalities (West, East, South, North and Central Jakarta) and one district of Seribu Islands. Bali Province consists of eight districts (Jembrana, Tabanan, Badung, Gianyar, Klungkung, Bangli, Karangasem, and Buleleng) and one municipality of Denpasar, the capital city.

Health Indicator

The total fertility rate of Jakarta in 2007 was 1.54 while that of Bali was 1.69. The infant mortality rate of Jakarta in 2007 was 10.95 while that of Bali was 15.49. The life expectancy of Jakarta in 2006 was 72.6 years while that of Bali was 70.5 years[6].

Politics/Governance

Bali's Governor, I Made Mangku Pastika, with his strong commitment to health care, has increased the provincial health care expenditure to 127 billion rupiahs in 2010, which represents 13.5% of the provincial fiscal budget where the ideal health care expenditure should be least 5% of the fiscal budget. His term of service will end in next five years.

The governor has also committed to refurbishing new health centers (*Puskesmas*), as well as mandating provincial staff to go to 500 villages every month to provide basic health care. The former Jakarta Governor (Sutiyoso), who was then succeeded by his vice governor (Fauzi Bowo), subsidized free health care for all poor citizens of Jakarta. Sutiyoso's governorship and his policy over free health care will continue for at least next three years. This commitment has been supported by relatively high revenue from Jakarta's good economy.

Socio-cultural Context

Raising poultry in neighbourhood has been a common practice in Indonesia for a long time. Bali is a unique area where Hindu culture uses poultry as part of religious practices, whereas Jakarta, as a metropolitan, demand of chicken for consumption is supplied by neighbouring provinces. Both areas consume poultry as main protein input. After the AI outbreak, the Jakarta government has prohibited poultry slaughtering in the capital city.

Health System

Organization of Health Service

Under the Indonesian policy of decentralization, authorities in providing health care and working out health policy have been devolved to the district level. The provincial authorities have a role in policy making for the island and a particular responsibility for disaster preparedness, but the main authority is devolved to district level. In three districts of Bali (Denpasar, Badung and Jembrana), free health care is provided for all, which is made possible due to good economy in the first two districts and political commitment in the latter.

In Jakarta, there is one provincial health office and one district health office in each municipality and district. There are *Puskesmas*, or community health centers in subdistricts and villages. Each village may have several *Puskesmas* under the village *Puskesmas*. Besides *Puskesmas*, there is also *Posyandu* as an informal health care service in Jakarta.

In 2006, there are 122 hospitals in Jakarta, with 16,289 beds - at the ratio of 539 inhabitants per one bed. There are 44 health facilities and district health units, and 297 units of subdistrict community health centers (*Puskesmas*).

The organization of the health system in Bali is divided into the provincial and district levels. Bali is divided into eight districts and one municipality. At the provincial level, there is a provincial health office situated in the capital, Denpasar, which directly reports to the governor. There are four departments under the provincial office -- Communicable Disease, Community Health, Health Planning and Health Services, in addition to the secretariat.

At the district level, there is a district health office in each district and in Denpasar. In terms of health care provision, Bali relies on a referral system. Within the public health system, people would first seek health care at local *Puskesmas* or public health center. These typically provide health care to five to six villages with a total population of around 30,000. They are staffed by one to two doctors, six to seven nurses and often midwives and dentists. The *Puskesmas* are also supported by an informal health care system. Each village is divided into around five *Banjar* consisting of around 100 families. These *Banjar* have a *Posyandu*, or informal health center which also have five community health volunteers who are trained by the district staff bi-annually, but are met in the field by staff from the *Puskesmas* on a monthly basis. The *Posyandu* reports on activities monthly in conjunction with animal health colleagues in the Participatory Disease Surveillance and Response teams (PDSR) at the district level. Bali has around 5,000 community volunteers. Besides, *Posyandu*'s main objective is to maintain child health in its area such as weighing, height measurement and giving supplementary foods.

Health Utilization

Total number of visits to a health clinic in Jakarta during 2006 was 6,157,512, consisting of 97,116 inpatient visits and 6,060,396 outpatient visits.

Thus, the percentage of the population utilizing *Puskesmas* in Province DKI Jakarta during 2006 was 68.71% lower than that of the previous year which was 84.69%.

In 2007, Bali had 46 hospitals consisting of 35 general hospitals, one mental health hospital and 10 special hospitals. The total number of beds in the province was 2,881 beds, and 1,634 (56.72%) were in Denpasar. The number of outpatients reported in hospitals during 2006 was 35,513 per 100,000 population, decreasing from 38,334 per 100,000 population in 2005. Bed occupancy rate (BOR) in Bali in 2006 was 47.43%, lower than the ideal BOR rate of 60-80%[9].

Human Resource

Pandemic influenza "socialization", e.g., educating and training on subject have been given to heads of primary health centers. For physicians, there were symposiums and trainings, during which the Centers for Disease Control (CDC) had trained all physicians in AI case management. Besides that, referral hospitals also conducted internal socialization for their health workers.

Since at the heart of the CDC AI activities is the 'Command Post', number of staff have currently increased by recruitment of retired senior officials from CDC. The Command Post receives reports on outbreaks and even mere rumors through emails, faxes and phone calls. Daily logs of all AI related activities including confirmed and suspected cases are made and directly reported to the minister.

At this Command Post, the CDC can decide if it needs to dispatch a central investigation team to respond to events, or verify outbreaks in other ways. The central team may consist of epidemiologists, veterinarians, virologists and physicians, if available. The CDC can also communicate with the Ministry of Internal Affairs to contact the National Committee on AI to exert extra pressure on the provincial governors to take part in the response. Although health officers at the district or provincial levels might have already involved, the governor's influence is very useful, and it is a working culture that the governor should be in charge of the response.

Pandemic Preparedness

Policy and Governance

National plan and political commitment

Highly pathogenic avian influenza and pandemic influenza preparedness are under the list of the main priorities of the Indonesian government. A national commission[10] was formed in 2006 by a presidential regulation to set policies and plan national strategic actions for the disease[11].

There was a national strategic plan for AI control and pandemic preparedness from 2006 to 2008[10]. The plan was developed by State Ministry for National Development Planning (BAPPENAS), Ministry of Health and Ministry of Agriculture in December 2005.

The Plan was based on five basic principles: (1) prioritizing human safety; (2) considering economic factors; (3) emphasizing integrated efforts; (4) compliance with national and international agreements and standards; and (5) preparedness and alertness in anticipating human pandemic influenza must be maintained and sustainable.

Management, coordination and control

The national committee for AI control and pandemic influenza preparedness, known as Komnas FBPI, coordinates the Indonesian government's response to the AI virus, and identifies the most effective ways to implement the national strategic plan for AI control and preparedness for human pandemic influenza 2006-2008[12].

It is a minister-level committee created in 2006 by a decree of the President. The committee has 14 members, including all ministers involved in measures to control Avian Human Influenza (AHI), army and police chiefs, and the chairman of the Indonesian Red Cross.

Instruction of President Number 1 in year 2006 describes roles and responsibilities for each organization according to their scope and authorities. The Minister of Coordination and People's Welfare serves as the head of Komnas.

The state of pandemic was announced by the Minister of Health and control in the region was held by the head of the region. If the pandemic spreads and the country is in the state of emergency as a result, the President will take the lead to control.

Inter-sectoral collaboration

There is collaboration between staff of Ministry of Health and staff of Ministry of Agriculture. In surveillance, there are good networking systems and good personal relationships between staff working on surveillance of human and animals.

The head of surveillance sub-directorate of the Ministry of Health contacts with the head of animal surveillance of Ministry of Agriculture, and could initiate telephone contact any time if needed. There are also regular meetings and exchanges of emails, and short messages (SMS) about public health events between the two ministries.

Simulations and table-top exercises

Simulation exercises for AHI and pandemic preparedness are the joint responsibility of the Ministry of Health and Ministry of Agriculture. The exercises were conducted in Bali in April 2008.

Surveillance System

The surveillance system comprises routine surveillance, event-based surveillance and laboratory surveillance. In the decentralization era, surveillance activities were under the responsibility of local governments.

For routine surveillance covering both public and private sectors, there are weekly and monthly reports from health facilities. These reports are sent to district health offices, then delivered to provincial health offices, and reported up to the national level. The weekly report focuses on potential epidemic diseases including influenza-like illnesses and acute respiratory illnesses. The monthly report covers all activities in each program that exist at the health facility level.

As for event-based surveillance, there are both human and animal case reports. There is a W1 Form (24-hour or daily outbreak report) for 'outbreak' reporting which is distributed instantly when health workers are notified of mass animal deaths, a disaster, or a suspected AHI case. This is done through various channels including telephone, internet and SMS.

The SMS reporting system is currently under a pilot project in nine provinces. It is called the SMS Gateway. The CDC also provides Global Positioning System (GPS) machines to track Geographic Information System (GIS) to provide coordinates of each case to be reported by SMS. Each SMS message reports details of cases, such as age, sex and time of onset. There is a team at central level monitoring inputs from these channels on a 24/7 basis. The central level conducts field visits only when requested by local level staff.

The ministry developed a laboratory surveillance system where 50 laboratories submit data on AHI cases to the CDC. There are a number of specific surveillance projects related to AHI. Influenza-like Illness surveillance and Severe Acute Respiratory Illness surveillance have been conducted by National Institute of Health Research and Development (NIHRD) in conjunction with Naval Medical Research Unit (NAMRU) to estimate subtypes of influenza at 48 sites in 10 provinces, including both hospitals and health centers.

The current surveillance system was set up for pandemic influenza in Jakarta and Bali, with history of AHI focuses on poultry-related cases. When there are suspicious cases of AI in the neighborhood, patients with influenza-like illnesses with history of poultry contacts will be specially monitored. In these territories, collaboration between human and animal health sectors to conduct joint surveillance is activated. In addition, Surveillance and Rapid Response Teams (SRRTs) have been set up at both the central level and local level based on existing capacity to be readily available for field investigation when there are suspected cases.

In Jakarta, the provincial health office initiates the hospital active surveillance system to receive regular reports on potential epidemic diseases from hospitals in the provinces, including AI, dengue, etc.

In Bali, active surveillance is performed by teams from health centers, who coordinate with district surveillance officers and PDSR teams. They go for field works each month and talk to community volunteers to find out anyone with suspicious symptoms or any poultry outbreak.

Case Investigation

Case investigation as part of the outbreak investigation is generally performed by the district surveillance officers and PDSR in conjunction with national teams, at the request of local health authorities with approval from central government health authorities. According to the Head of surveillance sub-directorate, each district has one SRRT; each of which comprises a medical doctor, an epidemiologist and a laboratory technician, optionally with an animal surveillance officer participating. Also in each province, there are one to two SRRT teams and at the central level, there are six SRRT teams to support district level staff when requested.

In Bali, there are two mobile clinics in addition to a 'flu burung' vehicle to help in conducting the screening and health promotion. The official responsible for communicable disease control is constantly updated with latest situation, and may ask for additional resources if necessary.

There is an investigation protocol for case diagnosis and laboratory investigation. Nurses and triage doctors are involved in the diagnosis of AHI infection. Diagnosis of clinical illnesses is usually conducted through history taking, physical examination, laboratory tests and chest X-ray. All suspected cases undergo nasal swabs and throat swabs which are submitted to the national laboratory in Jakarta.

The epidemiological data is stored in the surveillance unit in CDC. The data is collected through surveillance system as mentioned above.

Diagnostic Capacity

Laboratory

There are two national reference laboratories (NIHRD and Eijkman), eight regional laboratories, eight health laboratories (*Balai Besar Laboratorium Kesehatan* - BBLK), three environmental health laboratories (*Balai Teknik Kesehatan Lingkungan*), and 23 hospital laboratories mostly in big cities of Indonesia (Jakarta, Medan, Palembang, Makasar, Semarang, Bali, etc). Provision of resources for these units is under the responsibility of Directorate General of Medical Services and funded by the central government and donors, with contributions from local governments. There is also another biosafety level 3 (BSL3) laboratory at University of Indonesia's Institute of Human Virology and Cancer Biology (IHVCB), but its focus is research on AI, human papilloma virus (HPV) and human immunodeficiency virus (HIV).

As for suspected AHI cases, samples of virus are sent to both regional laboratories and NIHRD. If NIHRD gets a positive result by real-time polymerase chain reaction (RT-PCR), a sample will be sent to Eijkman Institute for confirmation by RT-PCR. If the result is positive from both institutions, then the CDC command center is informed about it. The process takes around 24 to 48 hours upon arrival of sample at NIHRD. NIHRD laboratory is functional on a 24/7 basis. It is ultimately the responsibility of the CDC to inform relevant parties including World Health Organization (WHO) about positive cases. The virus strain analysis is usually conducted by NIHRD on a selective basis. A network of collaborations has been established by NIHRD with faculty of medicine from a respected university in Indonesia although the results are only for research purpose.

Case Management

There are national protocols for AI care as well as treatment guidelines. According to the protocol, all AHI cases will be referred to 100 selected AI referral hospitals in Indonesia. Isolation rooms and laboratories are still being prepared in AI referral hospitals. The list of AI referral hospitals visited during the RSA exercise, their equipments and facilities are shown in Table 1.

Table 1. List of selected AI referral hospitals in Jakarta and Bali

Hospitals	Types	Facilities	AHI Cases
Sulianto Saroso Infection Center Hospital	CDC referral center for AI in North Jakarta	137 beds, 35 negative pressure rooms, ICU with 10 individual negative pressure rooms, 4 field hospitals of 24 beds each	35 confirmed AI cases with 30 deaths. Last case in 06/08
Persahabatan Hospital	General hospital and referral center for respiratory diseases in Jakarta and teaching hospital for UI	555 beds, a dedicated wing for AI with two 2-bed ICU isolation rooms and six 2-bed rooms, 4 dedicated ventilators and 1 bronchoscope	150 suspected, 22 confirmed and 18 deaths. Last case in 07/08
Tangerang Hospital	General hospital and AI referral hospital for Banten	390 beds, 1 isolation ward of 4 beds (non-negative pressure)	207 suspected, 8 confirmed, 8 deaths
Sanglah Hospital	General hospital and AI referral hospital for Bali	5 isolation rooms with 9 beds and 1 intensive care room with 2 beds, field hospital capacity of 100 beds	25 suspected, 2 confirmed, 2 deaths

Indonesia only uses oseltamivir as the only AI antiviral drug. Antiviral (oseltamivir) therapy is recommended for AI suspected cases as well as anyone with fever or other AI symptoms whom had previous contact with AI patients. Oseltamivir is distributed to all AI referral hospitals, district health offices, and primary health centers in order to facilitate rapid acquisition.

All AI related cases, either suspected or confirmed, are treated with oseltamivir. The current policy is to prescribe oseltamivir immediately to all suspected cases, and there is a policy to provide oseltamivir to medical staff with symptoms or those who contacted patients without using personal protective equipment (PPE). All treatments for AI cases are currently provided for free.

Antiviral Stockpiling

The Ministry of Health is responsible for oseltamivir procurement. The Directorate General of Pharmaceutical Services of the Ministry of Health has obtained around 15 million capsules of oseltamivir from different sources. The initial batch came from Hetero-India, the second (two million capsules) from Roche and the final and largest supply was imported by Indofarma from Hetero-India.

The Ministry of Health uses a centralized distribution system to distribute drugs to each provincial health office and each referral hospital and also to other hospitals at their request. The provincial health offices then further distribute them to district health offices and subsequently to health centers in areas under their responsibilities. Each sub-district health center is expected to have at least 100 capsules of oseltamivir in its stock. Additionally, the Ministry of Health holds a stockpile of 12 million doses of oseltamivir and 7,000 sets of PPE at the central level.

Seven million oseltamivir capsules have already been distributed through normal distribution channels down to health center level according to a guideline given by CDC. Field visits to selected public health facilities in Bali, Jakarta and nearby provinces have also found that most hospitals and health centers have a stockpile of oseltamivir supplied by the Ministry of Health (Table 2).

Table 2. Stockpiles of oseltamivir and personal protective equipment (PPE) at various hospitals identified during field visits

Hospitals	Oseltamivir	PPEs
Sulianti Saroso, Jakarta	200 doses	500 kits
Persahabatan, Jakarta	50,000 capsules	Adequate
Tangerang, Banten	22,500 capsules	Not enough
Sanglah, Bali	2,000 capsules	700 kits
Duren Sawit health center, Jakarta	2,000 capsules	5 kits
Sukawati health center, Bali	200 capsules	4 kits

Jakarta and Bali have stockpiles of antiviral and personal protective equipment (PPE), however, the size of the stockpiles varies across territories. The antiviral stockpiles are located at central level, hospitals and local health authorities. There is a stockpile of seven million doses in a warehouse in central Jakarta.

The national plan mandates Directorate General for Pharmaceutical Services and Medical Devices under the Ministry of Health to hold a stockpile sufficient for 0.5-1% of the population, or around 11 million doses.

Community Control

Rapid containment

When there is a suspected AI patient, a surveillance team from responsible district health office together with a team from district livestock office carries out enhanced surveillance and contact tracing in the neighborhood. The health and agricultural authorities built a joint team to conduct surveillance and take joint actions. Blood samples and throat swabs are taken from all contact cases. The cases with AI symptoms and history of poultry contact are given antiviral drugs for prophylaxis and sent to the nearby health center for further investigation. All contact persons will be monitored for 10 days, and environment and localities will be monitored for one month after the last case is found positive.

Currently, there is no regulation requiring quarantine of contact cases. From the RSA field visits, there have not been any quarantine or social isolation measures carried out in Jakarta or Bali as part of case investigation so far. However, in simulation of epicenter containment in Bali, quarantine zones (the radius of the zones) are role-played.

Education and risk communication

There are AI routine datasets collected in each administrative level. These datasets contain information collated from local levels starting from provincial health centers, district health offices and up to central level such as Ministry of Health and National Commission for AI Pandemic Preparedness. At the WHO-regulated level 6 (pandemic), risk communications will be conducted by local governments and local health services, with main responsibility still resting on the Minister of Health in order to limit the panic and infections.

The public health and animal health authorities at central and local levels have been challenged by the AI outbreak. The government program integration in the health system and pandemic preparedness has shown positive and fairly adequate responses to the challenge.

Discussion

Health System

In light of the health system, pandemic preparedness at operational level relies on existing health care workforce in public sector. Hence, human resources available to adopt measures for AHI cases are reflective of health workforce situation in public health system.

Shortage of highly skilled human resource is a major problem in all developing territories, especially physicians and nurses. Jakarta and Bali do not have a plan for surge capacity of health care workers during a pandemic crisis. Moreover, there is a question over potential absenteeism among existing workforce at a time of pandemic when they possibly become ill because of the disease and unable to carry out their tasks.

The SRRT teams performed very well in Bali. The public health authorities and animal health authorities were collaborating not only at the provincial level, but also at district level by maintaining command and control to influenza incidences in human and animal. In Jakarta, as a metropolitan city, role in coordination and collaboration for SRRT teams was also active despite Jakarta's different surroundings compared with Bali. The teamwork mentality of SRRT teams from two provinces was not compatible, thus, possibly causing an impact on effectiveness of the teams to work together.

Since media for information and communication is relatively open, public awareness is also high. However, this situation does not mean that case referral system works as quickly as information and communication system. The case management of AHI has to work with referral system. There might be a delay for cases being managed in referral hospitals since it has to go through hierarchy from primary care facility to secondary care facility. Most of private hospitals diagnose and provide preliminary treatments for influenza-like illnesses. These hospitals usually refer suspected AHI cases to public hospitals and/or AI referral hospitals. Once the cases are admitted by AI referral hospitals, proper and intensive treatments can be immediately given.

Pandemic Preparedness

The level of political commitment at province and district level seems to vary. Since decentralization, responsibility for health planning, management and budgeting is now managed at local level. Each district or province has different levels of interest and commitment towards AHI cases. As an example, Bali has a well developed provincial plan with regular meetings and a big simulation exercise. However, in Jakarta, AHI preparedness does not seem as a high priority.

On operational side, National Commission for AI Pandemic Preparedness has three full-time staff (plus some part-time experts), working specifically on pandemic responses. The team has released a guideline on epicenter pandemic, and conducted simulation exercise in Bali in April 2008.

With Indonesia's experience in influenza preparedness, the CDC insists that the country is well-prepared and has dealt well with previous containments of outbreaks[13]. However, level of preparedness at local level seems to vary. A number of staff interviewed during the field visits in Jakarta reported that they did not have a clear action plan or a protocol to follow if there is a pandemic in the communities. On the contrary, Bali tended to be ready especially after a full-scale simulation exercise.

In inter-sectoral collaboration, there is no formal relationship for laboratory functions. The Ministry of Health and the Ministry of Agriculture do not have good communication links although the situation is improving. There is no parallel laboratory structure within the Ministry of Agriculture, and there is no national reference laboratory in Indonesia.

Under a government policy to stockpile oseltamivir for 0.5-1% of the population, the number designated is however relatively low. And since the unused stockpiles of the antiviral in 2009 have already expired, the government therefore needs to readjust the methods to acquire the sufficient stockpile of the drug, as well as to work out efficient distribution of drugs in the future.

The RSA of health system and AI control and pandemic preparedness in Indonesia revealed that heightened interest, devoted action and resources to respond to threat of AI and pandemic have also contributed to strengthening of health system. The Indonesian health system has received additional resources in terms of infrastructure investment, purchases of equipment and increased budgets for communicable disease programs and operations, especially in regard to disease surveillance. More staff are trained on control of infectious diseases, and disaster preparedness, while many health facilities become more aware of the importance of policy and planning in advanced before emergencies happen.

Decentralization of public system and health services has created difficulties in management and coordination in health sector with undefined roles and responsibilities. As level of commitment towards health care services varies, budget and support for health program and activities can be very different in different regions. Since there is no direct control from the central level, health information and surveillance report systems are more fragmented. It is more difficult for the central level to monitor and evaluate ongoing activities and performances of local public health authorities.

In conclusion, Indonesia's overall experience to face the influenza epidemic has increased greatly in previous years. The development of public health networks and the communication system have improved their active sharing of information and data on the influenza surveillance. Although it has been challenged by the geographic nature of the country and the decentralization policy, the AI surveillance system, case investigation, case management and community control set by the human health and animal health authorities have been integrated as part of the health system to function. This integrated system has fairly effective to detect the pandemic.

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Description of the First Pandemic Influenza A (H1N1) Cases in Vietnam, June-July 2009

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Introduction

The first people contracted the pandemic influenza A (H1N1) virus infection were reported by the United States and Mexico in spring 2009[1,2]. Subsequently, this new virus spread rapidly to all countries and regions in the world[3-6]. On 11 Jun 2009, the World Health Organization (WHO) declared the first global influenza pandemic of the century[7].

On 30 May 2009, the Ministry of Health Vietnam confirmed the first pandemic A (H1N1) 2009 infection in a 23-year-old student returning from the United States. This report described key epidemiologic characteristics of and public health responses to the first pandemic A (H1N1) 2009 cases in Vietnam from 30 May to 15 Jul 2009, the period before widespread transmission within Vietnam.

Methods

In response to the pandemic, the Ministry of Health alerted public health authorities at national and regional levels to enhance surveillance and to implement strict containment measures. These included screening of all incoming passengers by using of a health declaration card and thermal detector at ports of entry, tracing and following up co-passengers and other close contacts of cases who acquired the infection after arrival, and isolating and treating suspected and confirmed cases in hospitals.

A suspected case was defined as any person with acute respiratory symptoms and history of recent travel to an affected area or contact with a confirmed case; and a confirmed case was an individual that tested positive for the pandemic A (H1N1) 2009 virus by a real-time reverse-transcription-polymerase-chain-reaction (RT-PCR) assay in accordance with the protocol from the U.S. Centers for Disease Control and Prevention. According to the treatment guideline issued by the Ministry of Health, the patients could be discharged from hospital when there is no fever, stable condition and RT-PCR test negative for the pandemic A (H1N1) 2009 virus.

Demographic, epidemiologic and clinical data of persons meeting these criteria for surveillance were reported daily by facsimile to Department of Communicable Disease Control, Ministry of Health by Institutes of Hygiene and Epidemiology, Pasteur Institutes and provincial health departments.

Results

From 30 May to 15 Jul 2009, there were 309 confirmed cases of pandemic A (H1N1) 2009 reported from 29 of 63 provinces and cities across the country. Fifty-one percent were male. Cases ranged in age from one to 75 years; the median age was 23 years, and 55% of the cases were aged 10–29 years (Figure 1).

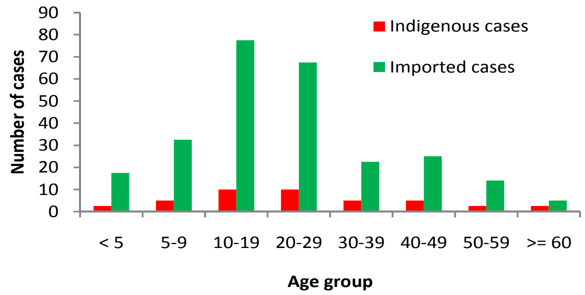

Figure 1. Age distribution of pandemic A (H1N1) cases in Vietnam, 30 May – 15 Jul 2009 (n=309)

Most confirmed cases (86%) were reported from the South as most of incoming air passengers arrived in Ho Chi Minh City (n=266). This southern hub became a pioneer of strict airport screening and subsequent intensive tracing, and laboratory testing of co-passengers and other close contacts in the community. The Central Highland did not report any cases (Figure 2).

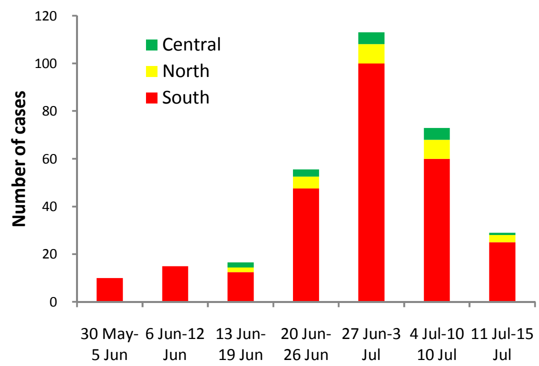

Figure 2. Distribution of pandemic A (H1N1) cases by region in Vietnam, 30 May – 15 Jul 2009 (n=309)

Two hundred and sixty nine (87%) confirmed cases acquired the infection abroad (Table 1). Their travel history showed that most traveled in countries reporting high activity of pandemic A (H1N1) 2009, such as Australia, United States of America, Thailand and Singapore.

Table 1. Country of origin of pandemic A (H1N1) cases imported to Vietnam, 30 May – 15 Jul 2009 (n=269)

Countries	Percent
Australia	49.8
USA	22.3
Thailand	7.1
Singapore	4.5
Germany	1.9
Hong Kong	1.5
New Zealand	1.1
South Korea, Japan, UK, Cambodia, Canada, Taiwan, France, Philippines, China	<1.0

Among 159 cases having data on onset of symptoms, 89 (56%) reported symptoms on the day of arrival in Vietnam, 39 (25%) had onset one to two days after entering the country, and eight of them (5%) had onset of symptoms one to two days before arrival (Figure 3).

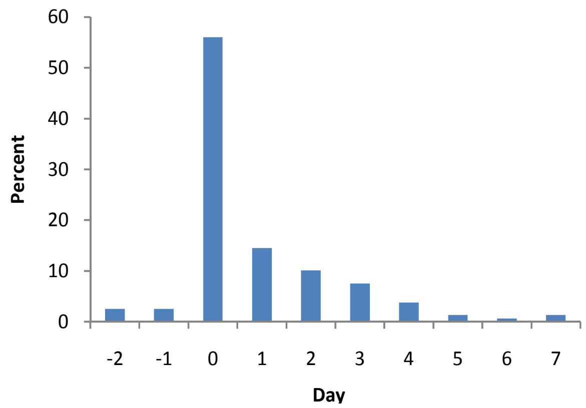

Figure 3. Day of onset of symptoms related to day of arrival (30 May-15 Jul 2009) in Vietnam of pandemic A (H1N1) cases (n=159)

In addition, a few cases did not have any symptoms. They were identified as health staff requested them to be tested when they took their relatives to hospitals for medical attention due to influenza-like illness.

Cases generally presented with the most common typical symptoms of influenza. Virtually, all had fever (98%). A few had cough (27%), fatigue and weakness (9%), and headache, runny nose and sore throat (8%) as their first symptom(s). Two cases reported shortness of breath and one case reported diarrhea.

Among 159 cases having data on hospitalization, 53% (84 cases) were hospitalized immediately on the day of arrival in Vietnam (Figure 4).

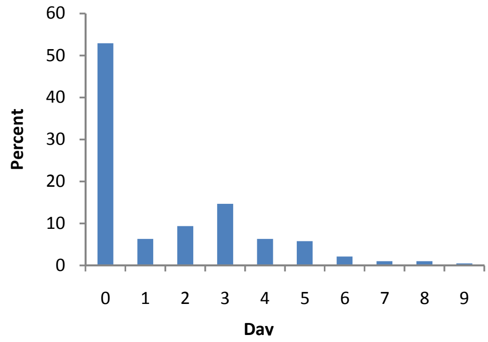

Figure 4. Day between arrival in Vietnam and hospitalization of pandemic A (H1N1) cases, from 30 May-15 Jul 2009 (N=159)

This was because persons screened on arrival as suspected cases were isolated in hospitals while awaiting RT-PCR test results. Seventeen cases (9%) were hospitalized five to nine days after arrival in Vietnam, indicating they were incubating the virus or had mild symptoms and did not seek medical attention immediately after arrival.

All cases received oseltamivir once diagnosed. The mean duration of hospitalization was 6.6 days and 75% were discharged five to eight days after hospitalization (Table 2). This long duration of hospitalization was not due to disease severity but to the strict hospital isolation policy.

Table 2. Duration of hospitalization of pandemic A (H1N1) cases, Vietnam, 30 May-15 Jul 2009 (n=85)

Duration of Hospitalization (Day)	Number of Cases	Percent
3	5	5.9
4	8	9.4
5	13	15.3
6	11	12.9
7	22	25.9
8	18	21.2
9	4	4.7
11	2	2.4
13	2	2.4

Discussion

This report describes the introduction of pandemic influenza A (H1N1) 2009 in Vietnam from 30 May to 15 Jul 2009 while most of the laboratory confirmed cases were travelers (87%) from affected areas and their close contacts. An intensive enhanced surveillance and prompt containment measures made it possible to detect and manage the cases at an early stage of the pandemic and probably delayed the widespread transmission in general community.

Analysis of the first 309 confirmed cases of pandemic A (H1N1) 2009 in Vietnam indicated that symptoms of these cases appeared to be similar to those of seasonal influenza; their clinical presentations were generally mild and all recovered without complications. This is in accordance with early descriptions of cases in other countries[3-5], with an exception that gastrointestinal symptoms including diarrhea and vomiting were rarely reported. The age and sex distributions of cases were similar to those observed in other countries as well[3-6].

Intensive containment measures such as mandatory isolation of cases in a hospital until the case had a negative test for the pandemic virus resulted in 100% treatment of cases at hospital and increased the length of hospitalization. As the pandemic rapidly evolved, it was recognized that these containment measures were too resource intensive and did not stop transmission in the community.

Prior to 15 Jul 2009, the number of laboratory confirmed cases of pandemic (H1N1) 2009 reported daily to Department of Communicable Disease Control of Vietnam was less than 10. From 16 Jul to 15 Sep 2009, a total of 8,738 new cases were reported, resulting in an average of 150 cases per day. Clusters of H1N1 cases were detected increasingly in schools, office buildings and factories, i.e., community clusters without any epidemiological links or sources of transmission.

Since after 1 Oct 2009, the number of reported cases did not reflect the real situation of the pandemic because not all the cases were being reported. Thus, the Ministry of Health decided to revise the surveillance guidelines. In provinces and cities where no H1N1 cases had yet been reported, diagnostic test and case investigation were performed on all suspected cases. In provinces and cities where less than five community clusters of H1N1 had been detected (i.e., restricted community transmission), surveillance activities focused on the first three to five cases of each cluster and selected individual cases. In provinces and cities where at least five community clusters of H1N1 had been detected (i.e. widespread community transmission), surveillance activities had to be further prioritized for early detection of patients with high risk for severe complications (pregnant women, persons with chronic diseases and young children) and patients with severe illness.

The influenza A (H1N1) 2009 appeared to arrive in Vietnam as expected in its pandemic timeline. H1N1 was imported to Vietnam from countries with ongoing transmission and occurred in areas of Vietnam with the most travelers. Vietnam demonstrated the capacity to institute intensive airport screening measures, mandatory hospitalization and case finding among co-passengers and close contacts of cases in the community. These lessons learned will be useful for future preparedness planning.

Suggested Citation

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