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SPECIAL REPORT

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The Avian Flu Challenge in Southeast Asia: The Potential of Public-Private Partnerships

EDITED BY BHUMIKA MUCHHALA

ABSTRACT This Special Report explores the myriad challenges created by the H5N1 avian flu virus in Southeast Asia, where the numbers of human infections and fatalities have soared in the past few years. Public-private partnerships, which merge the strengths of both public and private sectors, are one effective mechanism through which the agricultural, economic, and social disruptions caused by avian flu can be addressed. Tjandra Yoga Aditama illustrates the key constraints confronting the Indonesian ministry of health and public health sector, offering specific policy recommendations for Indonesian public sector officials. David Reddy exemplifies how Roche pharmaceutical is working with both international agencies and governments to increase the access to and the supply of the antiviral drug, Tamiflu, for developing countries who need the drug most urgently. Peter Gourlay and Maryjane Lacoste provide an overview of the public-private partnership between their non-government organization, JHPIEGO, and the U.S.-ASEAN Business Council, which aims to develop the institutional capacity of Indonesia's public health sector through expanding the awareness and implementation of infection prevention and control practices specific to avian flu.

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INTRODUCTION

BHUMIKA MUCHHALA

The H5N1 avian flu virus has alerted the world to a global crisis in public health and an agricultural calamity in poultry populations. Appearing first in China in 1997, the avian flu virus has mutated into a stronger and more fatal force, killing a wider range of species. In the last three years, more than 228 cases of human infection have been reported across ten countries, of which 130 cases have resulted in fatalities.¹ While the majority of these cases are concentrated in Southeast Asian countries, in particular Indonesia and Vietnam, the virus has spread to Africa, Europe and South and Central Asia, resulting in the culling and killing of over 130 million poultry worldwide. Currently, Indonesia has the highest number of

avian flu fatalities worldwide, with the Indonesian ministry of health recently confirming the country's 56th case of human infection and 44th fatality.² Vietnam has reported 93 human infections and follows Indonesia with 42 fatalities. The National Academy of Science's Institute for Medicine states that the current epidemic of avian flu in Asia is "unprecedented in its scale, in its spread, and in the economic losses it has caused."³

A pandemic, which refers to a human epidemic that spreads over a wide geographic area, is a threat looming large on the global agenda. Although the H5N1 virus is defined as an animal virus, since it can only be contracted from animals, there is a pervasive fear in the international scientific community that H5N1 could mutate into a human virus capable of human-to-human transmission.

However, scientists state that when and if this will occur is not predictable. If a human flu pandemic emerges millions of people could be killed worldwide, as cross-border commerce and human travel rapidly facilitates the spread of disease today. If nations close their airports, seaports, bridges, and borders, global trade and economic performance would be affected to the tune of \$800 billion in losses.⁴ An extra blow would be suffered by regions ravaged by HIV/AIDS, where immunity levels are already low.

The vast majority of Southeast Asia is rural and agricultural, where smallholder farmers keep backyard poultry farms. For example, in the Sa Kaeo region of Thailand, two out of every three households keep chickens within the premises of their homes.⁵ With chickens roaming freely in and out of homes, the lack of bio-security measures results in an extremely high exposure level to infection. Furthermore, traditional Asian practices of poultry trading, slaughtering and cooking pose a serious challenge to monitoring and containing the spread of an influenza virus. Given the regional custom of buying live chickens in markets and slaughtering them in home kitchens, the constant human exposure to birds is endemic to the rural and semi-rural communities of Asia.

In contrast to the 1997 avian flu outbreak in Hong Kong, where the government had the capacity to exterminate all infected birds, many of the Southeast Asian countries affected today do not have enough institutional capacity for effective surveillance and response systems. Although the Association of Southeast Asian Nations (ASEAN) has endorsed an avian flu strategy comprising emergency preparedness, vaccination, and information sharing, most Southeast Asian governments need additional funding and augmented institutional capacity in order to implement the ASEAN strategy.

Similarly, the public health sector capacity is also under stress, as hospital facilities, protective equipment, and trained personnel are in shortage. In the wake of a human flu pandemic, the financially squeezed public health sector across Southeast Asia is certain to be overwhelmed. Thus, resource and funding support from international agencies, as well as from the private sector, is extremely salient for an effective avian flu response across Southeast Asia.

The anti-viral drug Tamiflu, manufactured by the Swiss pharmaceutical Roche, is in high global demand as health experts have identified it as the best defense against a possible human flu pandemic. The drug treats the symptoms as well as reduces the mortality rate of the H5N1 virus. The WHO has advised all nations to build stockpiles of Tamiflu, or its generic versions, with a national aim to provide for at least a fifth of their populations in the case of a pandemic.⁶ However, building stockpiles requires funds that many developing countries do not have. Thus, Roche is under pressure from government and health officials worldwide to increase the production and supply of Tamiflu and to implement differential pricing mechanisms for developing countries.

The lack of adequate economic compensation to farmers for the loss of their poultry is a primary constraint in Southeast Asia. Poultry is an investment that yields significant returns for rural households as well as a source of food security, as it provides the chief protein source in local diets. Without compensation farmers are driven by economic necessity to conceal evidence of their sick poultry. The avian influenza coordinator for the World Organization for Animal Health stated at a global conference on avian flu in May 2006 that “the lack of adequate compensation to poultry farmers is the major factor” in containing the spread and ferocity of avian flu.⁷ Indonesia’s agricultural minister has acknowledged this problem by

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stating that payments to poultry farmers need to be doubled to 80 cents per pound of poultry.⁸

Public-private partnerships are an effective mechanism through which the challenges confronting avian flu-affected countries can be addressed. A public-private partnership is a partnership of a public entity, such as a local authority or central government, and private sector outfits, such as multi-national corporations, large hospitals and global pharmaceutical companies. When public and private sectors join forces, they can merge three key elements: industry expertise, public interest, and financing. Public health crises such as malaria and HIV/AIDS have engaged such partnerships to deliver services, drugs and resources to affected communities. Some examples of well-known public-private partnerships in public health are the Global Fund to Fight AIDS, Tuberculosis and Malaria, and the Roll Back Malaria program.

With the purpose of exploring the avian flu challenges in Southeast Asia, as well as the potential of public-private partnerships to alleviate these challenges, the Woodrow Wilson Center's Asia Program hosted a symposium on April 11, 2006. The Asia Pro-

“When public and private sectors join forces, they can merge three key elements: industry expertise, public interest, and financing.”

gram follows up with this compilation of essays by three of the participants in the hope of contributing to a better understanding of the avian flu challenge in Southeast Asia.

In the first essay, Tjandra Yoga Aditama, a pulmonologist in Jakarta and the secretary of the Patient Care Management team in the Indonesian ministry of health, provides an overview of the ministry's avian flu strategy in Indonesia. Aditama states that the key challenge across Southeast Asian countries such as Indonesia is the practice of backyard poultry farming. With national statistics showing that there is only one hospital bed for every 1,680 people in the country, another obstacle is the inability of the public health

sector to meet the needs of a potential avian flu pandemic. According to Aditama, the Indonesian Ministry of Health has formulated an action plan on avian flu which focuses on human epidemic control and animal infection prevention, prioritizing transparency and public access to information. To combat human infection, the ministry is increasing access to anti-viral drugs, safety equipment and insurance protection.

Aditama illustrates the three response stages to avian flu: “inter-pandemic,” where the virus is confined to poultry; the formation of a new human virus capable of human-to-human transmission; and finally, a pandemic. The most important role for the ministry of health will be in the second stage, where substantial preparations will be necessary to combat a pandemic virus that can rapidly spread across borders. However, several limitations encumber Indonesia's health ministry: the lack of financial capacity; limited hospital supplies; insufficient stockpiles of the anti-viral drug Tamiflu, and a lack of strategy in communicating with the local media. Aditama addresses these limitations by proposing specific policy recommendations for Indonesian officials, such as pursuing a preparedness plan in accordance with the three avian flu response stages; drafting feasible budgets; technically training the ministry of health administration; and facilitating collaboration between the health and veterinary sectors in a process that involves authority figures, mobilizes health services, and secures the participation of external stakeholders.

As leader of Roche Pharmaceutical's Tamiflu Pandemic Taskforce, David Reddy demonstrates how Roche works in partnership with both national governments and international agencies such as the WHO to change the accessibility and supply of Tamiflu. According to Reddy, it alarmed both Roche as well as the WHO when requests for Tamiflu stockpiles arrived predominantly from developed countries, when it is developing countries that need stockpiles most urgently. In order to address this paradox, Roche and the WHO collaborated to create a rapid-response stockpile where Roche donated a total of 5 million Tamiflu treatments in 2005 and 2006 to the WHO, which will reserve these supplies exclusively for developing countries. When countries are struck by sudden human infections, Roche works with the WHO to make urgent deliveries, as exemplified in a next-day shipment of Tamiflu stockpiles to Indonesia in 2005.

Reddy demonstrates how Roche is implementing four key measures to increase the access to and supply of Tamiflu. First, a tiered pricing system for low and

lower middle income countries has been established, reducing the commercial price from 20–51 Euros to 12–15 Euros. The second measure attempts to ensure that intellectual property rights will not pose an obstacle to developing countries that are unable to afford the cost of patents, by granting sub-licenses to three generic manufacturers in India and China and allowing them to manufacture cheaper versions of Tamiflu. Reddy points out that Roche has withdrawn its Tamiflu patent in the African continent as well as in the United Nations defined list of Least Developed Countries (LDCs), allowing these countries to produce and procure cheaper generic versions of Tamiflu.

The third measure is Roche's substantial increase in manufacturing capacity, from 28 million treatment courses in 2004 to 55 million in 2005. Reddy notes that 190 million courses will be produced this year, and that by 2007 Roche aims to multiply Tamiflu production by 14 times to 400 million courses. Allowing other companies to join the Tamiflu production network is Roche's fourth measure. In 2005, upon Roche's invitation to apply for a manufacturing role in its network, 16 contractors across ten countries joined Roche's production and distribution supply chain.

Peter Gourlay, senior advisor for corporate relations at JHPIEGO, a global non-governmental organization for women and family health development, and Maryjane Lacoste, director of JHPIEGO's Indonesia office, illustrate the public-private partnership between JHPIEGO and the U.S.-ASEAN Business Council. This partnership facilitates an infection prevention and control (IPC) strategy for Indonesia's avian flu preparedness plan. IPC practices in health facilities – routine procedures such as hand hygiene, use of protective equipment and safe waste disposal – have been recognized by the WHO as a critical component of avian flu response strategies. Gourlay and Lacoste state that IPC practices are the “weakest link in the chain to high-quality health care services,” referring to the low IPC compliance rate of 18.3 percent across Jakarta in 2003. JHPIEGO's partnership with the U.S.-ASEAN Business Council channels the human resources, financial capacity, and service expertise of the American private sector to the Indonesian public health sector. The Council, recognizing that an avian flu outbreak would affect business investments, operations and human personnel across the region, is motivated to offer its resources.

JHPIEGO's IPC capacity-building training and resource project for health care workers is being carried out across 30 government-selected hospitals. In

addition, IPC resource libraries are being established in district health offices nationwide, where the manual, *IP Guidelines for Health Facilities with Limited Resources*, is distributed in both Bahasa Indonesia and English. As an international leader in IPC training in over 40 countries, JHPIEGO's initiatives in Indonesia support the national avian flu strategy and bolster the nation's public health capacity.

Although she did not author an essay for this report, Tracy DuVernoy, emergency veterinarian for the U.S. Department of Agriculture, made a substantial presentation on traditional agricultural practices in Southeast Asia and the challenges of economic compensation to smallholder poultry farmers at the Wilson Center's April workshop. DuVernoy asserted that agricultural practices across Southeast Asia should be better understood in avian flu strategy building, emphasizing that despite the media's focus on human infections, avian flu is principally a poultry disease. The rural and agricultural sector comprises the vast majority in Cambodia, Indonesia, Laos, Thailand and Vietnam. Southeast Asia is characterized by high poultry densities ranging from a high of 5.3 birds per human in Thailand to a low of 2.1 birds per human in Cambodia.

While developed countries employ industrial and commercial poultry production systems, in Southeast Asia the majority of poultry production takes place in small commercial and backyard farming systems where diverse species of birds roam freely in the areas behind or adjacent to homes. Consequently, the absence of biosecurity measures poses a high risk of bird-to-human infection. DuVernoy agrees with Aditama that traditional backyard farming practices are a key challenge in combating avian flu. Bird trading practices, where wheelbarrow carts are used to transport birds between villages and where birds are bought, sold or

“As poultry trading comprises a key source of farmer livelihoods, as well as a principal protein source in local diets, both economic well-being and food security are significantly affected by avian flu.”

killed in live markets, also present high contamination risks. Buyers and sellers in the market do not tend to use safety equipment such as gloves, face masks, or in some cases shoes.

DuVerney argued that the lack of economic compensation from the government to smallholder poultry farmers for the loss of their poultry is a significant social and economic problem. As poultry trading comprises a key source of farmer livelihoods, as well as a principal protein source in local diets, both economic well-being and food security are significantly affected by avian flu. Women, often the primary caretakers of backyard poultry farms in Southeast Asia, are disproportionately affected. Furthermore, without economic compensation, WHO-mandated surveillance measures face obstacles when farmers do not have the incentive to report sick birds to local authorities. DuVerney urged that national governments work closely with international organizations such as the World Health Organization, the Food and Agricultural Organization and the World Organization for Animal Health. She concluded by stating that the success and sustainability of avian flu programs requires country-specific strategies that can adapt to the particularities of local contexts.

What is the outlook for avian flu in Southeast Asia? Will Southeast Asian nations be able to overcome their challenges, in the lack of institutional and financial capacity as well as with traditionally embedded poultry practices? Can the private sector efforts of pharmaceuticals such as Roche and business coalitions such as the U.S.-ASEAN Business Council alleviate the problems confronting Southeast Asian countries in purchasing stockpiles of anti-viral drugs and mainstreaming IPC practices?

Each of the three essays presented here outlines various challenges, from Aditama's analysis of the Indonesian public health sector's capacity and constraints, to Reddy's description of how Roche is ensuring developing country access to Tamiflu, to Gourlay and Lacoste's demonstration of how the JHPIEGO-Council partnership addresses the investment void in public health care worker training in Indonesia. However, one element that proves consistent is the necessity to collaborate between and across the public, private, and civil society sectors, and to tap into the core competencies of each sector. A human flu pandemic could intensify divisions among high,

middle, and low-income nations, as wealthier countries would be able to access limited supplies of anti-viral drugs while poorer countries would not be able to afford the necessary quantities of urgent treatment supplies.⁹ It is therefore important that multi-sector partnerships produce effective initiatives that can respond to, control the spread of, and prevent future outbreaks of avian flu in both animals and humans.

This report highlights the need for more work on several issues, three of which are particularly important to the agricultural populations of Southeast Asia. First, the impact of avian flu on the livelihoods of smallholder poultry farmers, and the issue of compensation to farmers is not yet adequately addressed by the public sector. Second, the gendered impact of avian flu needs to be better understood by examining how avian flu is affecting women's economic security and health and safety. Third, the threat to rural food security that may occur as a result of avian flu preparedness measures deserves more analysis.

ENDNOTES

1. World Health Organization, "Avian flu updates," August 2006, http://www.who.int/csr/disease/avian_influenza/en/index.html.
2. World Health Organization, "Avian influenza – situation in Indonesia – update 25," August 9, 2006, http://www.who.int/csr/don/2006_08_09/en/index.html.
3. Laurie Garrett, "The Next Pandemic?" *Foreign Affairs* (July/August 2005): 84.
4. Tom Wright, "World Bank to offer bird-flu loans," *International Herald Tribune*, November 8, 2005, http://www.ihf.com/bin/print_ipub.php?file=/articles/2005/11/07/news/flu.php.
5. "Sitting ducks. Bird flu is now endemic in Asia," in *Economist*, April 16, 2005.
6. World Health Organization, "WHO pandemic influenza draft protocol for rapid response and containment," May 2006, http://www.who.int/csr/disease/avian_influenza/guidelines/protocolfinal30_05_06a.pdf.
7. See BBC, "Nations under-report bird flu," May 31, 2006, <http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/5034276.stm>.
8. "Poor nations need cash now to help avert a global flu calamity," *Jakarta Post*, November 9, 2005, <http://www.thejakartapost.com/detailatestnews.asp?fileid=20051108174146&irec=1>.
9. YaleGlobal Online, "Avian Flu Special Report," June 2006, <http://www.yaleglobal.yale.edu/reports/avianflu.jsp>.

AVIAN FLU IN INDONESIA

TJANDRA YOGA ADITAMA



Avian flu, or “bird flu,” is a contagious disease of animals caused by viruses that normally infect birds and, less commonly, other kinds of animals. Avian flu viruses are highly species-specific; however, on rare occasions

these viruses have crossed the species barrier to infect humans. This has had a critical impact on global public health since 2004, especially due to the threat of a human pandemic.

Avian flu is caused by the type A/H5N1 virus strain. The disease is global and follows an unusually aggressive clinical course with rapid deterioration and high human fatality. Primary viral pneumonia and multi-organ failure are common. In the present human outbreak, more than half of those infected with the virus have died. Most cases have occurred in previously healthy children and young adults. A greater concern is that the virus, if given the opportunity, will change into a form that is highly infectious for humans and can easily spread from person to person. Such a change could mark the start of a global human pandemic.

The main route of human infection is presently considered to be direct contact with infected poultry, or surfaces and objects contaminated by their feces. To date, most human cases have occurred in rural or peri-urban areas where many households keep small poultry flocks, which often roam freely, sometimes entering homes or sharing outdoor areas where children play. As infected birds shed large quantities of virus in their feces, opportunities for exposure to infected droppings or to environments contaminated by the virus are abundant under such conditions. Moreover, because many households in Asia, including Indonesia, depend on poultry for income and food, families sell, or slaughter and consume, birds when signs of illness appear in a flock. Such practices have proved difficult to change.

PANDEMIC RISK

A flu pandemic is a rare event. However, it has occurred throughout history. In the previous century the Spanish flu occurred in 1918, the Asian flu in 1957, the Hong Kong flu in 1957, and yet another Hong Kong flu in 1968. The Spanish flu pandemic of 1918 remains the most ominous warning to global public health and security. A pandemic can start when three conditions have been met. First, a new flu virus subtype emerges; second, this new virus starts to infect humans, causing serious and/or fatal illness; and third, it spreads easily and consistently among humans. The H5N1 virus currently meets the first two conditions: it is a new virus in humans and it has infected more than 200 humans, causing fatalities in over half of the human infections. No human population will have immunity should an H5N1-like pandemic virus emerge and spread globally. Except for the manifestation of sustained human-to-human transmission of the H5N1 virus, all the prerequisites for the start of a pandemic have been met. The risk that the H5N1 virus will acquire a human contagion will persist as long as there are opportunities for human infections to occur. These opportunities, in turn, will persist as long as the virus continues to circulate in birds.

With the H5N1 virus now firmly entrenched in large swathes of the world, the risk that more human cases will occur persists. Each additional human case gives the virus an opportunity to strengthen its transmission in humans, and thus develop into a pandemic strain. The recent spread of the virus to poultry and wild birds in new areas of the world further expands opportunities for human cases to occur. While neither the timing nor the severity of the next pandemic can be predicted, the probability that a pandemic will occur has increased.

The risk of a pandemic flu is serious. Historically, the number of fatalities during a pandemic has varied greatly. Death rates are largely determined by

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Table 1. Chicken and duck populations in Indonesia between 2004 and 2005

	2004	2005
Broiler	970 million	1.0 – 1.1 billion
Layer	59 million	60 – 65 million
Native chicken	272 million	NA
Duck	35.5 million	NA

four factors: one, the number of people who become infected; two, the virulence of the virus; three, the underlying characteristics and vulnerability of affected populations; and four, the efficacy of preventive measures. Accurate predictions of mortality cannot be made before the pandemic virus emerges and begins to spread, and thus, all estimates of the number of possible deaths resulting from a human pandemic are purely speculative. Based on the comparatively mild 1957 Hong Kong pandemic, the World Health Organization has used a relatively conservative estimate of between 2.0 million and 7.4 million human fatalities for an avian flu pandemic. This range provides a useful and plausible planning target. Estimates based on a more virulent virus closer to the one seen in 1918 have also been made and are much higher. However, it is important to note that the 1918 pandemic is considered exceptional.

INDONESIA

Indonesia is the largest archipelago in the world. There are five major islands: Sumatra, Kalimantan, Java, Sulawesi and Papua, and approximately 30 smaller island groups. Indonesia has a total of 17,504 islands strategically located on the crossroads of two oceans, the Pacific and the Indian, and bridging two continents, Asia and Australia. Among the islands, only 7,870 have names; the remaining 9,634 are nameless. The capital city is Jakarta and Bahasa Indonesia is the national language. The predominant religions are Islam, Christianity, Buddhism, and Hinduism.

Indonesia is the fourth most populous country in the world. The country population in 2004 was 215,960,000. The infant mortality rate per 1,000 births is 42.0. Expectation of life at birth is 65.6

years for males and 70.4 years for females. Migration to urban areas is a significant trend which has resulted in more than 42 percent of the nation's population residing in urban areas. Population distribution is thus uneven. Despite transmigration programs that aim to ease population congestion in Java, Bali and Madura, more than 60 percent of the population lives in these three particular islands, which constitute only 7 percent of the total land area of Indonesia.

Indonesia has 7,500 public health centers nationwide. There are 1,145 hospitals with 125,000 beds available, which amounts to one bed for every 1,680 people. Indonesia has approximately 30,000 medical doctors, amounting to a ratio of 0.061 doctors for every 1,000 people. In comparison, Thailand has a ratio of 0.119 doctors for every 1,000 people; India has 0.238 doctors for every 1,000 people; and the United States has 1.629 doctors for every 1,000 people. Indonesia has a considerable public health burden, as it has the third largest number of tuberculosis cases worldwide and is fifth in the world for cigarette consumption. Malaria, dengue fever and HIV/AIDS are also significant health problems. In December 2004, Indonesia was struck by an enormous tsunami and endured a devastating human death toll into the hundreds of thousands. Avian flu is now threatening Indonesia. Indonesia experienced its first cluster of human avian flu cases, caused by the novel strain (H5N1), in July 2005. The zoonotic disease has been prevalent among poultry, manifesting as a highly pathogenic avian flu (HPAI) in more than half the provinces in the country since August 2003. The country is currently considered to be in pandemic phase three as defined by World Health Organization criteria and as determined by Indonesia.

Table II. Laboratory confirmed avian flu cases in the world – 24 March 2006

Country	Cases	Deaths	Fatality rates
Vietnam	93	42	45.16 %
Indonesia	29	22	75.86 %
Thailand	22	14	63.63 %
China	16	11	68.75 %
Turkey	12	4	33.33 %
Azerbaijan	7	5	71.42 %
Cambodia	5	5	100.00 %
Iraq	2	2	100.00 %

EPIDEMIOLOGICAL DATA

Avian flu was first widely reported across Southeast Asia in December 2003. It has since become well established in the region's poultry populations. As of March 24, 2006, there were 186 confirmed human cases, including 105 deaths in Vietnam, Thailand, Cambodia, Turkey, Iraq, Azerbaijan and Indonesia. A limited occurrence of human-to-human transmission is thought to have taken place in rare instances. As the possibility of the H5N1 virus re-assorting with a human flu strain or mutating on its own to transmit efficiently between humans continues to exist, so too does the threat of a human pandemic. Despite the inability to predict the onset of a pandemic with any certainty, Indonesia, like the rest of the world, must be prepared to deal with the enormous health and economic consequences as well as the social displacement and trauma that would inevitably accompany such a global health emergency.

As of March 24, 2006, laboratory-confirmed human cases have been reported in eight countries: Cambodia, Indonesia, Thailand, Vietnam, China, Iraq, Turkey and Azerbaijan (table 2).

Based on previous cases, the symptoms of avian flu include:

- Fever (temperature >38°C)
- Cough
- Headache
- Sputum

- Myalgia
- Sore throat
- Diarrhea
- Rhinorrhea
- Abdominal pain
- Vomiting
- Shortness of breath

Until March 24, 2006, Indonesia had 29 confirmed cases, resulting in 22 fatalities and a case fatality rate of 75.86 percent. Data from the first 24 Indonesian avian flu cases, until early February 2006, as reported by the director general of the Center for Disease Control within the Indonesian ministry of health (MoH), show that the symptoms in Indonesian avian flu patients include:

- Fever (100 percent)
- Dyspnoe (91.7 percent)
- Cough (95.8 percent)
- Sore Throat (20.8 percent)

These 24 Indonesian avian flu cases were comprised of 15 males (62.5 percent of the total cases) and nine females (37.5 percent). Of the 15 males, eight passed away (53.33 percent of the total cases); and among nine females, eight passed away (88.89 percent). All of the patients who died had a fever, 93.75 percent of the patients had severe coughs, and 25 percent had sore throats.

The first human fatality from avian flu in Indonesia was a father whose two daughters also died due to a severe respiratory disease. The father became ill on July 2, 2005, with a fever, mild cold, and then cough; he was taken to the hospital on July 7, where he passed away ten days after. Blood samples from the 38-year-old father tested positive for the H5N1 virus. On June 24, his eight-year-old daughter became ill with fever, diarrhea, and cough. She was thereafter brought to Siloam Gleneagles Hospital, Tangerang, where she died with respiratory distress 20 days after the onset. Thereafter, his one-year-old daughter fell ill on June 28 with symptoms of fever, diarrhea, then cough, and finally respiratory distress. She died 10 days after the onset.

AVIAN FLU CONTROL PROGRAM

In order to tackle avian flu across the nation the Indonesian MoH has formulated six long-term strategies. They are:

1. Epidemic control through preventing new poultry infections
2. Protection for high-risk animal groups
3. Surveillance and monitoring
4. Communication, information, and education
5. Patient management and human infection control
6. National research programs

All of the above mentioned activities require thorough and accessible public information and transparency. The Indonesian MoH has outlined an avian flu strategy which focuses on epidemic control and prevention of animal infection, as well as public information and transparency. Key aspects of its initiative include: research and information dissemination; active surveillance and protection of high-risk groups; and patient management, which involves the preparation of a wide range of referral hospitals. To combat human infection, the MoH is trying to increase access to anti-viral drugs, safety equipment and insurance protection. However, not all of these activities are working in the field, due to various challenges. Some of these difficulties include: the lack of financial capacity; limited hospital supplies; insufficient stockpiles of the anti-viral drug, Tamiflu; weak surveillance capacity at the district level; and a lack of strategy in dealing with the local media.

Meanwhile, the Indonesian ministry of agriculture has also announced its national strategy, consisting of the following nine components: biosecurity; vaccination; depopulation in affected areas; poultry traffic control; surveillance; restocking; stamping out avian flu in newly infected areas; public awareness; and monitoring and evaluation. These efforts have the potential to effectively reduce the number of poultry infections and deaths. However, outbreaks are rapidly spreading throughout Indonesia and human infections and resulting fatalities continue to occur. There is also a real need for further research in order to understand why poultry cases often decrease while human cases increase.

PANDEMIC PREPAREDNESS IN INDONESIA

There are three distinct response stages for which various agencies need to be prepared. The first stage is comprised of the interpandemic alert; the second stage involves the pandemic alert; and the third stage is the pandemic itself. In Indonesia, the pandemic preparedness program needs to be active within each stage in different capacities.

In the first stage, during what is described as the “interpandemic” period by the WHO, novel strains of flu virus for which humans have no immunity will exist only in animal, primarily bird, populations. The primary responsibility will be with the ministry of agriculture and veterinary sectors, and response activities will focus on surveillance of bird populations and

“The Indonesian MoH has outlined an avian flu strategy which focuses on epidemic control and prevention of animal infection, as well as public information and transparency.”

further action if infected animals are detected. The role of the MoH and public health sectors during this stage is to closely monitor the emergence of human cases of avian flu by strengthening surveillance and by working with both the agriculture and the veterinarian sectors.

Essentially, there should be close collaboration between public health and veterinary health personnel.

Although the Indonesian MoH and national public health sectors will be involved in each stage, the most critical point will be during the second stage, when the new pandemic virus first begins to circulate among humans. Second stage preparations are required in order to respond to the emergence of the pandemic virus among humans. These activities are critical to strengthening various health sub-sectors in order to prepare for a pandemic. In the last stage, during the actual pandemic, the role of the MoH is to support specific health-related activities in response to massive flu outbreaks.

At all public health levels, there is a recognition of the need for collaboration both within and outside the health and veterinary sectors in order to strengthen response strategies. Due to the decentralization of many sectors in Indonesia, including health, the responsibility and authority of decentralized areas is crucial in the implementation of pandemic response stages. Full mobilization of health services and enforcement of epidemic law during the pandemic will only be successful if these efforts are based on the active participation of all decentralized levels from districts and municipalities down to the grassroots level.

CONCLUSION

A pandemic could strike tomorrow, next year, or in another ten years. Due to this unpredictability and the grave consequences of such an event on all aspects of social and economic life, there is a regional and global imperative to move forward with a pandemic preparation program. For the Indonesian MoH and national public health sectors, the preparedness strategy should be primarily centered on curbing human fatality rates from avian flu infections.

Financial and technical constraints are the key obstacles to implementing an avian flu preparedness program. The principal challenge is that the government of Indonesia cannot fully finance an effective preparedness program. For instance, the adequate stockpiling of necessary anti-viral drugs and access to vaccines does not currently exist. Additionally, necessary laboratory equipment and hospital materials are not yet available. Simply put, resources must be identified. The most effective time at which to raise these necessary funds, by mobilizing donor agencies, for example, is when avian flu is still in the pre-pandemic phase.

“Full mobilization of health services and enforcement of epidemic law during the pandemic will only be successful if these efforts are based on the active participation of all decentralized levels from districts and municipalities down to the grassroots level.”

In conclusion, there are several important steps that the Indonesian MoH as well as the public health sector should take:

- The pandemic preparedness plan must be implemented according to the specific phases outlined despite the fact that the timing of a pandemic emergence is unpredictable.
- An agenda and budget for each activity must be outlined with specific reference to the person(s) responsible for oversight and management, implementation timeline, and indicators for evaluating progress.
- The process should be described with detailed reference to the key responsible agencies and individuals, as well as provide benchmarks and timelines for measuring progress.
- The preparedness plan should be carried out in a transparent process which includes all stakeholders in avian flu control. Identification of government resources that can be made available for flu preparedness, as well as of the resource gaps that remain, are necessary in order to mobilize resources.
- Socialization, advocacy, and training at all levels of public health administration, and regarding all aspects of the preparedness plan, must be continuously addressed.

- Appropriate “table top” exercises of a pandemic emergency need to be conducted in order to prepare for subsequent phases. Such exercises are an important component of health sector capacity-building, as well as of improving emergency coordination and response. Such scenario simulations will identify the gaps and weaknesses of the national preparedness strategy, as well as the strategies that could improve elements of the plan.

Public access to information is critical, as every health personnel as well as the general community, including

politicians, should be able to acquire a basic knowledge of avian flu and steps towards prevention and control. The avian flu control and preparedness program will be collectively managed by participating stakeholders, who are comprised of the government, the private sector, the poultry community, medical and veterinarian doctors, the media, and other key stakeholders from the religious community and the public. The roles and responsibilities of these various stakeholders should be outlined in an organized fashion, so that every relevant group understands what its role is in the national avian flu pandemic preparedness strategy.

THE ROLE OF ROCHE PHARMACEUTICALS IN SUPPORTING INTERNATIONAL PANDEMIC PREPAREDNESS EFFORTS

DAVID A. REDDY



By the end of March 2006, 39 countries had reported outbreaks of avian influenza in wild birds or domestic poultry. Nine countries had reported a total of 186 confirmed cases of human infection resulting in 105 deaths.

The continuing spread of the H5N1 strain of influenza in wild and domestic poultry in Southeast Asia, and more recently in Europe, the Middle East and Africa, represents the most serious risk of a human influenza pandemic in decades. The World Health Organization (WHO) has declared that the current avian influenza virus strain meets two of the three key criteria needed for a pandemic. The final WHO criteria of easy human-to-human transmission has not been observed to date.¹ However, most experts believe that a future influenza pandemic is inevitable.

Preparedness for pandemic influenza requires close collaboration between international organizations, such as the WHO and the United Nations, national governments and the relevant members of the pharmaceutical industry as partners in planning and decision-making processes. Since 1997, when Roche had the first discussions on pandemic preparedness with Canada, the company has been actively engaged in a series of collaborations aimed at increasing the availability of its influenza antiviral Tamiflu (oseltamivir). The company has put measures in place that include a tiered pricing system; increasing manufacturing capacity, initially at its own risk; involvement of more than 15 other companies in the Tamiflu production network to accelerate the pace of capacity expansion; as well as the granting of sub-licenses to three generic manufacturers in China and India. Roche has also donated large amounts of the antiviral medicine to the WHO. Working with the WHO

and governments around the world, Roche continues to support strengthening international, regional and national pandemic response capabilities.

THE ROLE FOR ANTI-VIRALS AND VACCINES IN PANDEMICS

Vaccines are regarded as the most important medical intervention for preventing influenza and reducing its health consequences during a pandemic.² In the past, however, vaccines have never been available early enough during a pandemic, nor in sufficient quantities, to have an impact on the levels of illness or death. Vaccine manufacturers are fully engaged in pandemic vaccine development and various strategies are being pursued. However, as the vaccine must closely match the specific strain of the pandemic virus, and therefore by definition must await its emergence, advance stockpiling of a true vaccine is essentially not possible.

Another challenge is that the utility of vaccines will be dictated by the ceiling capacity of the manufacturing facilities over the “surge demand” duration. Under such pandemic conditions, it is anticipated that demand will exceed available supply.³ In addition, the logistical impact of a pandemic may compromise the ability to manufacture and distribute products. As a consequence of these limitations, the use of antiviral stockpiles are an essential adjunct to vaccines in the effective management of an influenza pandemic.⁴

Recent reports have drawn attention to the potential for using antiviral agents combined with personal distancing to contain a pandemic at its source.⁵ In such a situation, antiviral agents would be used in both the management of infected individuals and for geographically targeted prophylaxis, which refers to the administration of the antiviral medicine to an uninfected person who is in contact with infected individuals with the aim of preventing them from becoming infected.

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This is aimed at stemming the spread of the virus. However, should the pandemic strain spread further, antiviral agents will be essential for the treatment of infected individuals and for prophylaxis of essential services workers. Once vaccines are available, antiviral agents will still maintain their unique role for the treatment of individuals. Such agents will also continue to be useful in the prophylaxis setting, as vaccine supplies would be expected to fall short of the quantities required to fully manage a pandemic situation.

As a result, the WHO has recommended that national governments should consider the stockpiling of antiviral agents in advance of an influenza pandemic, as one component of their pandemic preparedness plans.

TAMIFLU AND PANDEMIC INFLUENZA

Tamiflu is an orally administered neuraminidase inhibitor discovered by Gilead Sciences Inc. Roche acquired a license from Gilead Sciences to manufacture and market Tamiflu in 1996, when oseltamivir was at the early stage II phase of development. Roche and Gilead partnered to complete the clinical development of the drug, with Roche leading efforts to produce, register and bring the product to the market. Tamiflu was launched in the United States in 1999 and in Europe in 2002. Tamiflu is approved in over 80 countries and the indications in the United States and the European Union cover both treatment and prophylaxis of influenza in patients over one year of age. The clinical development program on which approvals were based included more than 11,000 patients.

No one yet knows which strain of influenza will cause the next influenza pandemic. The current circulating virus, H5N1, is the one most experts are focusing their efforts on. There are currently three publications highlighting Tamiflu's activity against the H5N1 strain.⁶ In addition, new and as yet unpublished data supporting the activity of Tamiflu against H5N1 was presented at the "First Pandemic of the 21st Century – a Central Role for Antivirals" conference in London.⁷ The study evaluated 5 mg per kg of Tamiflu for five days (equivalent to the approved human treatment dose of 75 mg twice daily) in ferrets four hours post-infection with currently circulating H5N1 influenza strain. Tamiflu prevented viral replication in the upper respiratory tract; all infected ferrets survived. All ferrets in the control group died. No Tamiflu resistant mutations were detected in the

treatment group. These results support previous findings that Tamiflu is active against the currently circulating H5N1 avian influenza virus when administered early, and can prevent H5N1 mortality in animals.

Due to the fact that human infection with the current H5N1 strains are rare and geographically dispersed, there are no controlled human clinical trials demonstrating the efficacy of Tamiflu against this strain. Limited clinical information is available regarding the clinical effectiveness of Tamiflu against avian influenza, with the available evidence consisting largely of case reports involving small groups of patients.⁸

Unfortunately, in the majority of cases the administration of Tamiflu to people infected with H5N1 has been associated with significant delays. However, recent reports from Turkey indicate that when administered earlier, Tamiflu has provided benefits. The WHO currently advises that in suspected cases of human infection with H5N1 influenza, Tamiflu should be prescribed as soon as possible (ideally, within 48 hours following symptoms) to maximize its therapeutic benefits. However, given the significant mortality currently associated with H5N1 infection and evidence of prolonged viral replication in this disease, administration of the drug should also be considered in patients presenting later in the course of illness.⁹

There was early recognition that Tamiflu could have a role to play in pandemic preparedness. In 1997 the Canadian government was the first government to give this serious consideration. Their interest was probably triggered by the outbreak of H5N1 in Hong Kong in 1997. It has been suggested that Canada's early consideration to influenza pandemic planning served the country well in the management of the later SARS outbreak. From 2001 onwards, Roche actively began to engage with governments following WHO recommendations that all countries should have pandemic plans in place.

MANUFACTURING CHALLENGES

While it is clear that antiviral agents will have a key role to play in a pandemic situation, their manufacturing is generally geared towards the significantly lower seasonal demand. Contingency planning needs to be in place to cope with a pandemic. The WHO has recommended that national governments should consider the stockpiling of antiviral agents in advance of an influenza pandemic as one component of their pandemic preparedness plans.¹⁰

The manufacturing of Tamiflu is complex. The traditional starting material of the Tamiflu production process, shikimic acid, is extracted from the pods of the star anise flower. The Roche supplier uses a specific type of anise grown in four mountain provinces in southwest China, which provides a much higher purity and yield than those grown elsewhere. The crop requires specific agro climactic conditions (humid, hot weather and high altitude) available only in the mountainous traditional growing area. A total of 30 kilogram (kg) of anise yields 1 kg of shikimic acid.

Whilst the bulk of shikimic acid is currently derived from star anise, Roche and its partners have developed and substantially increased their fermentation capacities to provide an alternative source of this key ingredient. Even after producing the shikimic acid, the manufacturing process is complicated, involving ten main steps and taking approximately six to eight months once all the raw materials have been sourced.

GLOBAL PRODUCTION CAPACITY OF TAMIFLU

The average annual production capacity for Tamiflu over the period 1999–2003 was eight million treatment courses per year. Following reports of animal to human transmission of the H5N1 virus at the end of 2003, Roche re-assessed the production capacity for Tamiflu in the light of possible pandemic requirements and within two months was implementing a plan to increase production capacity for Tamiflu.

In February 2004, in advance of receiving any firm orders from governments for pandemic supplies, Roche began increasing the supply of Tamiflu at its own risk. In 2004 Roche produced 28 million treatment courses and roughly doubled capacity again in 2005, producing 55 million treatment courses during that year. Roche is on track to produce 190 million treatment courses during 2006 and intends to have in place the capacity to produce around 400 million treatment courses per year by the beginning of 2007.

Whilst Roche operates on a first-come-first served basis for fulfilling government pandemic orders, urgent requests receive an urgent response. Roche has worked with the WHO to make urgent deliveries to countries hit by the most recent wave of infections with a clear focus on developing nations. Countries to which emergency shipments have been made include Indonesia, Nigeria, Turkey, Azerbaijan, Egypt and Iraq.

A NOVEL TAMIFLU GLOBAL PRODUCTION NETWORK

In mid-2005, Roche issued an open invitation to third parties interested in becoming involved with the manufacturing process of Tamiflu, to apply to join the global supply network and to assist with specific bottlenecks in the manufacturing process. Over 300 enquiries were received. Roche put in place a system of paper evaluation and funneled the number of possible companies down; next, Roche's production experts initiated detailed discussions with companies that met the defined criteria in terms of quality, technical ability, capacity, and speed of bringing that capacity on stream.

As a result of this initiative, 16 external contractors located in ten countries will soon collaborate with Roche as part of a global network for the manufacture of Tamiflu. The external contractors have been selected primarily on the basis of their ability to produce substantial quantities of intermediates and finished materials in accordance with Roche's quality standards in a relatively short time frame. They include Ampac Fine Chemicals LLC, API Corporation, Clariant, DSM, FIS, SanofiAventis, Martek, Novasep /Dynamit Nobel, PHT Chemical Ltd, Sanofi-Aventis, Shaanxi Jiahe Phytochem Co and Siegfried Holding AG. Roche is still continuing discussions with other potential partners.

In addition, partners can insure against supply disruptions and broaden geographic coverage. Based on current orders Roche has received from governments around the world, Roche's capacity to produce 400 million treatments by 2007 is significantly ahead of global demand.

WORKING IN PARTNERSHIP WITH AGENCIES AND GOVERNMENTS

In early 2005 Roche met with the WHO to apprise them of the status of Tamiflu manufacturing capacity and to review the pandemic orders Roche had received at a regional level. Of concern for both Roche and the WHO was the fact that the vast majority of orders for pandemic stockpiles were from developed countries. There were significant gaps from the developing countries where pandemics were most likely to originate, therefore it was critical that Roche and WHO work together in order to establish mechanisms to address the needs of the world's poorest countries.

Pandemic modeling techniques have suggested that three million courses of treatment would be required

to act as a geographic “fire blanket” to prevent the spread of a potential pandemic strain from the site of outbreak.¹¹ Subsequently, in mid-2005 Roche donated three million treatment courses to the WHO as a rapid-response stockpile, to be immediately shipped to the relevant site. Subsequently, the WHO assumes responsibility, together with the government concerned, over the storage and distribution of treatment stocks.

The WHO has recently published an initial draft protocol for pandemic influenza rapid response and containment. This new initiative is expected to evolve considerably and will be modified and updated as information becomes available and the situation changes. The WHO is aiming, through the protocol, to develop the capacity to rapidly detect, assess, respond to and if possible, contain the earliest emergence of a pandemic virus. It proposes that countries would be responsible for conducting surveillance to monitor for signals which may indicate that a novel influenza virus has begun to spread from person to person. If this is found to be the case, and a decision to initiate containment is made, the WHO will become the coordinating body for all international support. The WHO protocol adds: “WHO and its global partners will work with the country to mobilize the necessary resources and implement necessary actions using pre-trained staff, pre-developed protocols and standard operating procedures, the existing dedicated stockpile of antiviral drugs (oseltamivir) and other supplies.”¹²

In January 2006, Roche made a second donation of two million treatment courses to WHO for them to hold in specific regions for use in human outbreaks of avian influenza, creating a regional framework of supplies of Tamiflu. However, the WHO has clearly highlighted that such regional stockpiles are not a substitute for national preparedness measures.

As of February 2006, Roche has agreed quantities and delivery schedules with approximately 65 countries for the stockpiling of Tamiflu. The magnitude of the orders vary, with some countries stockpiling, or intending to stockpile, adequate quantities of the antiviral to cover between one quarter and one-half of their populations, e.g. Austria, Australia, France, Finland, Iceland, Ireland, Luxembourg, Netherlands, New Zealand, Norway, Switzerland and the UK. It has been calculated that a stockpile covering between 25 percent to 50 percent of the population could significantly reduce and delay hospitalizations,¹³ while the Infectious Disease Society of America

recommends stockpiling for 50 percent of the population.¹⁴ A coverage of 25 percent of the population may be adequate for the treatment of individuals, but consideration should also be given to the amount of antiviral needed for the prophylaxis of key health and other essential services workers required to maintain the minimum required level of social functioning.

TIERED PRICING STRUCTURES

Roche offers a tiered pricing system for the purchase of Tamiflu for pandemic use, and these lower prices are further reduced for Low and Lower-Middle Income Countries, as defined by the World Bank. The price from Roche (ex-factory price) for Tamiflu is 20-51 euros per treatment course when purchased for the treatment of seasonal influenza, but for pandemic use the price drops to 15 euros for Developed Countries and 12 euros for Low and Lower-Middle Income Countries. The pandemic prices offered to governments by Roche are similar to the prices offered by a number of generic manufacturers, which have recently been cited in international media reports.

INTELLECTUAL PROPERTY

Roche believes in the importance of intellectual property as society’s incentive and reward for innovation. Without patents and the promise of respect of patents, drugs such as Tamiflu would never have been developed. Clearly we have to consider our social responsibility alongside the responsibility we have to our patent holders, customers and shareholders. With this in mind, Roche has implemented a policy whereby the company will not apply for patent protection on any of its products in the United Nations-defined list of Least Developed Countries (LDCs).

Tamiflu is patent protected until 2016. Gilead owns the patent and Roche has an exclusive worldwide license to promote and distribute Tamiflu. While Tamiflu is patent-protected in over 30 countries worldwide, it is not patented in the following areas sub-Saharan African countries; those countries included on the United Nations’ list of LDCs; and in a number of Southeast Asian countries such as Indonesia, Philippines and Thailand. Therefore, the governments of these countries do not depend on a license from Roche to manufacture the drug or purchase it from non-patent protected countries that are legally producing it. Roche has

offered technical information to such governments to assist with this process

Roche and Gilead have taken additional actions to ensure that intellectual property rights do not present a barrier to the global availability of Tamiflu. A key step taken by Roche and Gilead was to state their willingness to cooperate with companies which are able to produce Tamiflu in a given timeframe and in quantities and quality specifications that will contribute to the

Roche has implemented a policy whereby the company will not apply for patent protection on any of its products in the United Nations-defined list of Least Developed Countries (LDCs).

global scale-up effort. Roche and Gilead have offered sub-licensing agreements to Shanghai Pharmaceuticals and to the HEC Group to manufacture generic forms of oseltamivir for pandemic use in China, and to Hetero Pharmaceuticals in India to supply generic oseltamivir for use in India. Sub-licensing agreements have also been offered for pandemic use to governments of other specified developing countries.

IMPROVING TAMIFLU FOR PANDEMIC USE

Since late 2000, several steps have been taken to ensure a maximum possible shelf life for Tamiflu capsules. Originally the shelf life for the product was limited to 18 months, but further research has established that the capsules have a shelf life of five years when stored at room temperature.

Roche is working to ensure that there is appropriate safety and efficacy information to support the use of Tamiflu in the broadest possible range of individuals. Roche has recently filed and received approval to reduce the age range for prophylaxis treatment; whereas the old standard prescribed treatment for those over 13 years of age, this standard has dropped to include anyone over the age of one. The company is currently evaluating the use of Tamiflu in younger infants, but currently no data is

available to support the use of the product in children less than one year of age. Studies to explore the use of Tamiflu in immunocompromised patients are also planned.

Roche has recently taken steps to broaden its scientific and medical collaborations aimed at better understanding the evolving nature of avian influenza viruses with a focus on H5N1 and to obtain information regarding the activity and efficacy of Tamiflu against such viruses. It is hoped that through such collaborations we will be able to provide better predictions regarding the most appropriate use of Tamiflu against a novel pandemic virus when it does arise.

CONCLUSION

A human pandemic does not yet exist. However, a very aggressive animal strain of the influenza virus is currently circulating, which must further mutate to develop effective human-to-human transmission before becoming a pandemic strain. Tamiflu is likely to play a key role in the management of pandemic influenza. Roche has shown a socially responsible attitude in its policies and in the actions the company has undertaken to meet the pandemic preparedness plans of the WHO and various national governments.

In order to increase the availability of Tamiflu to meet the growing demand as pandemic planning continues, Roche has implemented significant steps to increase manufacturing capacity, such as doubling production capacity in 2004 and 2005, and aiming to reach an annual production capacity of over 400 million treatments of Tamiflu by 2007. This is more than a 14-fold increase over capacity in 2004 and has been achieved through the expansion of manufacturing capacity for Tamiflu at Roche sites, as well as through the involvement of multiple external suppliers and contract manufacturers who will contribute to Roche's global Tamiflu production and supply network.

Roche and Gilead hold no patents on Tamiflu in Africa and the United Nations-defined list of LDCs, allowing the governments of these countries to produce their own generic versions of the drug. Furthermore, Roche has granted sublicenses to manufacture oseltamivir to two Chinese and one Indian pharmaceutical manufacturer, allowing them to supply generic forms of oseltamivir for pandemic stockpiling by governments primarily in developing nations.

In order to further support governments in their pandemic preparedness efforts, Roche is providing

Tamiflu to governments at a reduced price for pandemic stockpiling. In addition, in August 2005, Roche announced that it would hold a reserve of three million courses of Tamiflu treatment as a “rapid response stockpile” to be donated for use exclusively at the site of a pandemic outbreak in an attempt to contain or slow its spread. Roche has also announced the donation of a further two million courses of Tamiflu to the WHO, which will be stored at regional locations and used to establish regional stockpiles (e.g. in South East Asia) to further assist developing countries. The regional stockpiles of Tamiflu will be used to reduce morbidity and mortality in the case of an outbreak of avian influenza in humans and to prevent the further spread of such an outbreak.

Looking towards the future, our efforts to ensure that the global community is as ready as it can be for a human pandemic will carry on unabated as the international situation on avian flu continues to evolve.

ENDNOTES

1. World Health Organization (WHO), “Avian influenza: assessing the pandemic threat,” January 2005, http://www.who.int/csr/disease/influenza/WHO_CDS_2005_29/en/index.html.
2. World Health Organization (WHO), “Vaccine research and development: current status,” November 2005, http://www.who.int/csr/disease/avian_influenza/vaccineresearch2005_11_3/en/index.html; and World Health Organization (WHO), “WHO checklist for influenza pandemic preparedness planning,” 2005, http://www.who.int/csr/resources/publications/influenza/CDS_CSR_GIP_2005_4.pdf.
3. World Health Organization (WHO), “Vaccine research and development: current status,” November 2005, http://www.who.int/csr/disease/avian_influenza/vaccineresearch2005_11_3/en/index.html.
4. J.S. Oxford, “Preparing for the first influenza pandemic of the 21st century,” *The Lancet Infectious Diseases* 5 (March 2005), and J.S. Oxford, et. al., “Treatment of epidemic and pandemic influenza with neuraminidase and M2 proton channel inhibitors,” *Clinical Microbiology & Infection* 9 (2003): 1, 1-14.
5. World Health Organization (WHO), “WHO checklist for influenza pandemic preparedness planning,” 2005, http://www.who.int/csr/resources/publications/influenza/CDS_CSR_GIP_2005_4.pdf, and World Health Organization (WHO) Department of Communicable Disease, “WHO global influenza preparedness plan: the role of WHO and recommendations for national measures before and during pandemics,” 2005, www.who.int/csr/resources/publications/influenza/WHO_CDS_CSR_GIP_2005_5/en/.
6. E.A. Govorkova, et. al., “Comparison of efficacies of RWJ-270201, zanamivir, and oseltamivir against H5N1, H9N2, and other avian influenza viruses,” *Antimicrobial Agents and Chemotherapy* 45 (2001); L.V. Gubareva, et. al., “Characterization of influenza A/Hong Kong/156/97 (H5N1) virus in a mouse model and protective effect of zanamivir on H5N1 infection in mice,” *Journal of Infectious Diseases* 178 (1998): 1592-1596; and H.L. Yen, et. al., “Virulence May Determine the Necessary Duration and Dosage of Oseltamivir Treatment for Highly Pathogenic A/Vietnam/1203/04 Influenza Virus in Mice,” *Journal of Infectious Diseases* 192 (2005): 665-672.
7. E.A. Govorkova and R.G. Webster, “Evaluation of oseltamivir in lethal H5N1 in vivo model,” presented at conference, *The First Pandemic of the 21st century – A central role for anti-virals*, London, January 20, 2006.
8. Tawee Chotpitayasonondh, et. al., “Human disease from influenza A (H5N1),” *Emerging Infectious Diseases* 11 (2005): 2, 201-209; Le, Q. Mai, et. al., “Avian flu: Isolation of drug-resistant H5N1 virus,” *Nature* 437 (2005): 7062, 1108-1108; and Menno D. De Jong, et. al., “Oseltamivir resistance during treatment of influenza A (H5N1) infection,” *New England Journal of Medicine* 353 (2005): 25, 2667-2672.
9. World Health Organization (WHO), “Avian influenza (“bird flu”) – Fact sheet,” February 2006, http://www.who.int/mediacentre/factsheets/avian_influenza/en/.
10. World Health Organization (WHO), “WHO checklist for influenza pandemic preparedness planning,” 2005, http://www.who.int/csr/resources/publications/influenza/CDS_CSR_GIP_2005_4.pdf; and World Health Organization (WHO) Department of Communicable Disease, “WHO global influenza preparedness plan: the role of WHO and recommendations for national measures before and during pandemics,” 2005, www.who.int/csr/resources/publications/influenza/WHO_CDS_CSR_GIP_2005_5/en/.
11. World Health Organization (WHO), “WHO pandemic influenza draft protocol for rapid response and containment,” January 27, 2006, http://www.who.int/csr/disease/avian_influenza/guidelines/RapidResponse_27%2001.pdf#search=%22WHO%20pandemic%20in%20draft%20protocol%20for%20rapid%20response%20and%20containment%22; Neil M. Ferguson, et. al., “Strategies for containing an emerging influenza pandemic in Southeast Asia,” *Nature* 437 (2005): 7056, 209-214; and Ira M. Longini Jr., et. al., “Containing pandemic influenza at the source,” *Science* 309 (2005): 5737: 1083-1087.
12. World Health Organization (WHO), “WHO Outbreak Communication – Handbook for Journalists: Influenza Pandemic,” December 2005, http://www.who.org.my/LinkFiles/Home_Handbook_influenzaDEC05.pdf#search=%22WHO%20Outbreak%20Communication%22.
13. Raymond Gani, et. al., “Potential impact of antiviral drug use during influenza pandemic,” *Emerging Infectious Diseases* 11 (2005): 9, 1355-1362.
14. Infectious Diseases Society of America (IDSA), “Avian/Pandemic Flu,” 2006, http://www.idsociety.org/Content/NavigationMenu/Resources/Avian_Pandemic_Flu/Avian_Pandemic_Flu.htm.

PREPARING HEALTH PROFESSIONALS FOR AN AVIAN FLU EPIDEMIC IN ASEAN: AN INFECTION PREVENTION INITIATIVE IN INDONESIA AND THE ROLE OF PUBLIC-PRIVATE PARTNERSHIPS

PETER GOURLAY AND MARYJANE LACOSTE



JHPIEGO, affiliated with Johns Hopkins University in Baltimore, Maryland, is a non-profit global leader in women's and family health. Among its varied expertise areas in health care and disease response, JHPIEGO is an international leader in implementing infection prevention and control (IPC) practices. JHPIEGO has developed successful IPC initiatives, which protect both the client and the health care worker, in more than 40 countries worldwide. These critical IPC procedures are basic practices that, if applied consistently and correctly, can protect communities from continued infection. If human-to-human transmission of avian flu becomes widespread, practices to prevent and control the spread of the virus in the health care setting will become critical.

To help address viable options for the prevention of avian flu in Indonesia, JHPIEGO has developed a capacity-building plan for IPC training in line with Indonesia's national avian flu preparedness strategy. This nationwide infection prevention initiative is being carried out by JHPIEGO in partnership with the U.S.-ASEAN Business Council. The Council understands that an avian flu outbreak would affect all companies with business interests in the Southeast Asian region. Accordingly, the Council is providing both financial and institutional support to JHPIEGO on this prevention initiative and is mobilizing its membership to participate and support it.

AVIAN FLU IN SOUTHEAST ASIA

Across Asia there have been outbreaks of the H5N1 virus since June 2004 in Thailand, Malaysia, Vietnam, Cambodia, Indonesia, China and possibly Laos.

Since August 2004, a number of laboratory-confirmed cases of human infection with H5N1 have been documented in Vietnam, Thailand, Cambodia and Indonesia. Indonesia reported its first case of human infection in July 2005, and has reported additional cases to the World Health Organization (WHO) since August 2005, with a total of 30 cases as of April 4, 2006, of which 23 resulted in fatalities.¹ Thus far, there has been no scientifically documented case of human-to-human transmission in any of these countries.

WHO is currently encouraging countries to reduce opportunities for human infection through improving surveillance, strengthening laboratory testing, building national capacity to investigate cluster cases and addressing issues within the poultry industry that may contribute to increased transmission. WHO has also noted the critical role of health facility-based IPC in minimizing infection risks for health care workers and patients.

IPC AS PART OF THE AVIAN FLU RESPONSE

IPC is the weakest link in the chain to high-quality health care services. This fact was documented in a 2003 study of public health center workers in east Jakarta, which noted that compliance with universal IPC precautions was 18.3 percent. Another study conducted in 2002 found that provider compliance with IPC standards was also very low, where the absence of regular hand-washing is a major issue. This 2002 study recommended that significant improvements should be made to ensure safer clinical services. The sample size for this latter study was 136 facilities in eight provinces.

Appropriate IPC policies and practices are essential to protect health care workers, patients and their communities from facility-based acquisition of avian flu.

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The use of appropriate IPC practices:

- reduces the risk of infection and disease transmission, thereby protecting patients and health care workers at all levels from exposure to life-threatening disease, and
- promotes effective waste management to limit the spread of infection to communities.

Common IPC practices include proper hand hygiene (hand washing), use of personal protective equipment (masks, gowns, gloves and goggles), and safe and appropriate waste disposal. During the 1997 outbreak of H5N1 in Hong Kong, continued spread of the disease at the health facility level was avoided by the use of recommended contact and droplet precautions. The Center for Disease Control and Prevention (CDC) noted that “each human infection represents an important opportunity for avian flu to further adapt to humans and gain the ability to transmit more easily among people,” thus further emphasizing the importance of appropriate IPC practices in minimizing flu transmission.²

Health care workers play a vital role in controlling existing infection and preventing cross-transmission of infection among patients and among themselves at the facility. In general, hospital-acquired infection rates range from as low as 1 percent in a few countries in Europe and the Americas to more than 40 percent in parts of Asia, Latin America and sub-Saharan Africa.³ Therefore, health facilities need to implement practical, symptoms-based isolation guidelines to prevent patients and health care workers at all levels from being inadvertently exposed to serious infectious diseases.

JHPIEGO'S ROLE IN INTERNATIONAL HEALTH

JHPIEGO's expertise has been tapped by ministries of health, NGOs and other key stakeholders to develop IPC policies, guidelines and standards; identify appropriate IPC supplies and materials for use in low-resource settings; develop appropriate and competency-based training packages; train trainers and support subsequent delivery of training for service providers and ancillary staff; and establish national recognition systems to reward facilities that have reached high standards of IPC practices.

For over 30 years, JHPIEGO has worked in 140 countries around the world, building global and local

partnerships to enhance the quality of health care services for women and families. JHPIEGO works closely with the WHO, the CDC, the U.S. Agency for International Development (USAID), ministries of health, other bilateral and multilateral agencies, as well as a multitude of international professional health associations including the International Federation of Gynecology and Obstetrics, the American College of Obstetricians and Gynecologists, the International Confederation of Midwives and the American College of Nurse-Midwives. JHPIEGO also works with local medical, midwifery and nursing associations and NGOs. JHPIEGO is sought out by health care leaders around the world to equip local health professionals with the skills required to save women's lives and improve the welfare of families.

JHPIEGO IN INDONESIA

JHPIEGO has worked in Indonesia since the 1970s, at the invitation of the Indonesian ministry of health (MoH), to establish programs that serve the needs of Indonesia's women and children. Over the years, JHPIEGO has worked closely with the Indonesian MoH, USAID and various Indonesian NGO and health groups. JHPIEGO has partnered with Indonesian public and private sector organizations in order to improve the quality of and the access to maternal and child health, women's health and reproductive health services. To achieve these objectives, JHPIEGO has trained thousands of health professionals across the country, including the islands of Sumatra, Java, Bali, Kalimantan, Sulawesi, Nusa Tenggara, Maluku and Irian Jaya. JHPIEGO's health services strategy has focused on a comprehensive set of interventions encompassing the community, community-based providers, health care facilities, NGOs, and institutional and government policymakers.

Working with professional medical and midwifery societies, JHPIEGO helped the MoH adapt the WHO international guidelines, *Managing Complications in Pregnancy and Childbirth*, into a country-specific, user-friendly document outlining evidence-based practices for physicians and midwives in Indonesia. In 2002, the MoH adopted these guidelines as the official Indonesian standard for maternal and newborn care, and JHPIEGO helped distribute these standards throughout the country. The MoH has also adopted JHPIEGO's manuals for family planning services, newborn care and infection prevention as national guidelines.

Through its various programs with the government, JHPIEGO has succeeded in increasing the timely use of key maternal and neonatal health and nutrition practices, as well as in developing the national capacity to provide high-quality reproductive health services in Indonesia.

In April 2003, the Indonesian government officially designated Severe Acute Respiratory Syndrome (SARS) a national epidemic. As a leading expert in IPC, and with a strong presence in the country, JHPIEGO was seen as a critically important resource in this crisis. The WHO and the MoH asked JHPIEGO to lead the technical assistance efforts in translating the national plans for SARS-specific IPC into practical and operational guidelines and training plans for health facilities. With support from USAID, experts and trainers under JHPIEGO's programs quickly mobilized a partnership with the WHO, the MoH and other relevant groups, including PERDALIN, the association for infection control at the hospital level, to meet the urgent need for clinical and preventive services. JHPIEGO's efforts in this area included the following:

- Development of SARS-specific IPC service delivery guidelines for hospital-based health care providers, primary care workers and support staff;
- Development of an overall competency-based training strategy and a SARS-specific barrier nursing training course based on the nationally-endorsed Indonesian version of JHPIEGO's *Infection Prevention Guidelines for Healthcare Facilities with Limited Resources* and accompanying training package; and
- Training of trainers and providers in IPC as related to SARS, using the materials described above, and development of IPC job aids for providers

JHPIEGO first trained staff at the National Hospital for Infectious Diseases in Jakarta (the government-designated referral site for all SARS cases) to ensure that they were prepared to protect themselves and their clients from cross-infection. The five-day course included applied knowledge, demonstrations and clinical practice opportunities. At the end of the training, all staff, including managers, providers, cleaners and other support staff were equipped with the relevant knowledge, skills and attitudes for appropriate SARS case management. This hospital served as the clinical training site for all subsequent SARS-

related training for staff from other health facilities. JHPIEGO and WHO supported the MoH in institutionalizing appropriate SARS-related IPC practices in all other designated hospitals in Indonesia.

AVIAN FLU PREVENTION AND IPC IN INDONESIA

JHPIEGO has the support of Indonesia's Coordinating Ministry for People's Welfare, the Ministry of Health and the Indonesia office of the WHO. JHPIEGO commends the pre-pandemic training and preparations that Indonesia is now making. Indonesia's national preparedness strategy for avian flu calls for strengthening infection prevention practices at all referral hospitals. JHPIEGO has therefore been discussing next steps with the Coordinating Ministry for People's Welfare, appointed by the president of Indonesia as the lead agency for the response to avian flu, and is now forming a team with the MoH and the leading infectious disease hospital to strengthen and coordinate all avian flu-related IPC efforts at 30 government-selected hospitals. JHPIEGO's capacity-building plan aims to improve IPC practices in these facilities by improving the IPC skills of health care workers based at the sites, thus minimizing the risk of facility-based infection for other health care workers, patients and their communities. This training program also aims to establish infection prevention resources in every district health office in Indonesia.

"JHPIEGO's capacity building plan in Indonesia aims to improve IPC practices in these facilities by improving the IPC skills of health care workers based at the sites, thus minimizing the risk of facility-based infection for other health care workers, patients and their communities."

THE VALUE OF PUBLIC-PRIVATE PARTNERSHIPS

JHPIEGO's efforts in Indonesia have been funded by multilateral groups including WHO and UNICEF, in addition to bilateral aid funding from USAID and AusAid, the Australian aid agency. More recently, JHPIEGO has developed private partnerships with U.S. companies that have long-term interests in helping the women and families of Indonesia in response to the tragedy of the December 2004 tsunami.

JHPIEGO is motivated by partnerships with both the public and private sectors, as each brings unique advantages in helping to address development needs with regard to the health of women and families. In this context, each public or private donor has its own strategy that it attempts to implement in order to achieve specific development objectives.

JHPIEGO truly believes in the benefits of working with both public and private organizations that are committed to women's and family health. Through these partnerships JHPIEGO can bring together programs and resources from various donors to develop a comprehensive approach to providing services for the country. Since some donors have restrictions on how their funds will be used, the significant advantage of public-private partnerships is that they can deliver a broader spectrum of services to those in need. Indeed, public-private partnerships allow these resources to be truly optimized. Having worked with public and private resources, JHPIEGO brings extensive experience to ensuring sustainability of long-term programs for Indonesia's women and families and building local health service capacity.

JHPIEGO-U.S. ASEAN BUSINESS COUNCIL PARTNERSHIP

JHPIEGO recognizes the long-term commitment that the U.S.-ASEAN Business Council and its membership of American companies have made to Indonesia, and sees great synergy in their willingness to respond to Indonesia's need for avian flu prevention. Many member companies of the Council were eager to ensure that prevention was being addressed in addition to efforts related to vaccine development and contingency planning in the event of an epidemic.

The U.S.-ASEAN Business Council fully supports the role of U.S. companies that not only play such an integral economic and business role in individual

ASEAN countries like Indonesia, but also invest large amounts of human and financial capital towards improving communities in the developing world. The Council is a strong proponent of social program investments that address the education, health, human rights and environmental needs of local communities.

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U.S. companies are playing a major role in disaster relief efforts. Firms are providing record monetary contributions along with the time and effort of employees and in-kind contributions such as food, medical supplies, equipment and transport services. With the ability to tap into expansive human resources, equipment and service expertise, American businesses have the unique capacity to address the needs of the devastated communities expeditiously.

Public-private partnerships bring the capabilities of the American private sector to Indonesia and throughout ASEAN, allowing companies to work with governments and local organizations to address issues that could not otherwise be solved. The recent tsunami disaster is a good example of how public-private partnerships were able to help provide needed resources that exceeded the government's capability to respond. Many American companies partnered with local NGOs and local government authorities to provide necessary funding and equipment for community rehabilitation.

Companies that have been committed to Indonesia recognized the importance of responding to this tragedy to help the Indonesia government and its people. U.S. Ambassador to Indonesia B. Lynn Pascoe recently highlighted Indonesian appreciation for private sector assistance during a U.S.-ASEAN Business Council interview. He noted that prior to the tsunami, Indonesia-U.S. ties had been strong, but there had been ample criticism of the global role of the U.S. with regard to terrorism since 9/11. He further noted that America's response of overwhelming generosity to the tsunami disaster helped to change that impression. There is a genuine appreciation for the immense amount of aid that came from U.S. companies and the membership of the U.S.-ASEAN Business Council.

The U.S. private sector is committed to strong and long-term relationships in Indonesia. Today's American company executives understand the value of committing to the country and its people. To be truly successful globally, American businesses subscribe to the goals of establishing local management and ownership of their enterprises to ensure long-term and sustainable success. American companies that invest in Indonesia employ thousands of local staff and provide opportunities for local employees to become senior managers within the firm. These companies also have significant corporate social responsibility programs to further demonstrate their long-term investment to communities and to their locally-employed staff. Such efforts go a long way to ensuring that local businesses, communities and the country realize the benefits of foreign private sector investment. They demonstrate to the ASEAN governments the virtues of the American development model: open markets,

free trade, capital mobility and relatively easy access to capital. This is important to ASEAN's goals of promoting free market economics and democracy throughout ASEAN member countries, including to the group's newest members.

Both JHPIEGO and the U.S.-ASEAN Business Council are committed to long-term U.S.-Indonesia ties, as well as the welfare of Indonesia and its people. This health initiative is particularly important for a country where over two-thirds of the population reside in the island province of Java, presenting a severe population density. JHPIEGO stands ready to assist the government of Indonesia in its response to avian flu through supporting efforts to strengthen IPC practices at health facilities. JHPIEGO's partnership with the U.S.-ASEAN Business Council enables the leveraging of critical resources to build a public-private partnership that can implement this initiative. This public-private partnership initiative provides a model for other governments and stakeholders to consider as they seek ways to work on the prevention of a potential epidemic.

ENDNOTES

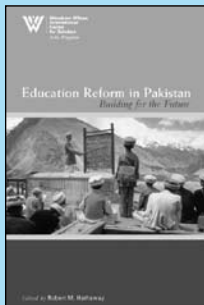
1. World Health Organization (WHO), "Avian flu – situation in Indonesia – update 8," April 4, 2006, http://www.who.int/csr/don/2006_04_04/en/index.html.
2. Center for Disease Control and Prevention (CDC), "Interim Recommendations for Infection Control in Health-Care Facilities Caring for Patients with Known or Suspected Avian Flu," May 21, 2004, <http://www.cdc.gov/flu/avian/professional/infect-control.htm>.
3. P. Lynch, et. al., *Infection Prevention with Limited Resources* (Chicago: ETNA Communications, 1997).

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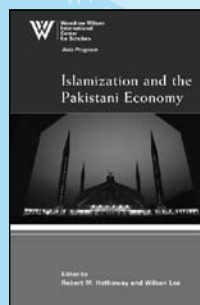


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