



PACIFIC HEALTH SUMMIT

EMERGING INFECTIONS/PANDEMICS WORKGROUP



An Avian Flu Pandemic: What Would It Mean, and What Can We Do?



June 2006



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Foreword

The media bombards us daily with stories about the possibility of an avian flu pandemic that could kill up to tens of millions of people. We are warned of the massive and traumatic effect a pandemic could have on the lives and livelihoods of people worldwide. But even as these reports drive our anxiety and concern to dangerous levels, we seldom hear discussion of what a pandemic might mean for international politics. For example, what effect would a pandemic have on the increasingly integrated economy of the Asia-Pacific region? What are the implications of a “coordinated” global response for the traditional sovereign rights of states to manage their domestic affairs? In the wake of the Indian Ocean tsunami of 2004–05, how has the military’s role changed with regard to disaster relief? How does this role differ when the military is faced with a natural disaster, a disease outbreak, or a man-made disaster (such as bioterrorism)?

This publication grapples with these questions through a two-part roundtable. Panel #1 features six essays that reconsider the familiar concept of “national security” from the vantage point of public health and the implications of a pandemic on international politics and trade. The five essays contained in Panel #2 compare the private and public sectors and their respective roles and responsibilities in the event of a pandemic crisis.

A growing crescendo of voices from the government and public health sectors suggest the need for better preparedness measures. But how should organizations prepare for a pandemic and, in the event of an actual pandemic, respond? This publication is premised on the belief that we can better prepare for a future crisis by looking back to see how governments and private sector organizations responded to the SARS crisis in 2003. What types of private-public sector communication and collaboration will be necessary for us to survive an avian flu pandemic?

These essays focus on a wide range of issues and challenges related to pandemic preparedness and response that we hope will spark discussion among policymakers, industry leaders, small business owners, public health officials, and a concerned public worldwide. This document also serves as the initial platform for the Emerging Infections/Pandemics Workgroup, a collaborative project proposed and launched at the June 2005 Pacific Health Summit in Seattle.

The Pacific Health Summit (<http://www.pacifichealthsummit.org>) is an annual conference that brings together the best minds in science, policy, medicine, public health, and industry to address global health concerns and develop innovative and effective responses. Co-presented by The National Bureau of Asian Research and the Fred Hutchinson Cancer Research Center, the Summit seeks to build a global health model that better utilizes emerging science and technology to promote health and detect and treat disease early enough to make a real difference. Guided by a senior advisory group co-chaired by George F. Russell, Jr. and William H. Gates, Sr., the inaugural Summit in 2005 welcomed 300 select participants from 16 countries. Sponsors for 2006 include GE Healthcare, Microsoft, Coca-Cola's Beverage Institute for Health and Wellness, Intel, Pfizer, National Cancer Institute, Fujitsu, Roche Diagnostics, Affymetrix, GlaxoSmithKline, Miraca, and the Canary Foundation.

Michael Birt

Executive Director, Pacific Health Summit
Director, Center for Health and Aging
The National Bureau of Asian Research

Claire Topal

Program Manager, Center for Health and Aging
The National Bureau of Asian Research

Avian Flu Pandemic

**Panel #1:
Implications for International Politics**

James Ricci
University of Kent

Andrew S. Erickson
U.S. Naval War College

James R. Campbell
Pacific Northwest National Laboratory

Myo Thant
Asian Development Bank

Melissa Curley
University of Queensland

Ann Marie Kimball
University of Washington

Avian Flu in the Asia-Pacific: Changing the Conception of National Security

James Ricci

JAMES RICCI (PhD candidate, University of Kent) researches national security, infectious diseases, and non-conventional security threats. He holds a M.A. in Public and International Affairs from the University of Pittsburgh, where he examined HIV and security.

Pandemics in the Asia-Pacific

Asia, in particular Southeast Asia, has recently been the epicenter for two deadly outbreaks of naturally occurring diseases. In November 2002 Severe Acute Respiratory Syndrome (SARS) emerged from Hong Kong and quickly spread around the world. According to the World Health Organization (WHO), within a nine-month period SARS infected 8,096 people in 29 countries and resulted in 774 deaths.¹ Most of the infections and deaths occurred in Asia, with China, Taiwan, Hong Kong, Singapore, and Vietnam having been hardest hit. Disconcertingly, the developing patterns in the current avian flu (also known as “Avian Influenza A,” “H5N1,” or “bird flu”) outbreak are similar to those exhibited by SARS. From 2003 to 2006 avian flu infected 170 people and resulted in 92 deaths.² As with SARS, most of the reported cases of avian flu have occurred in Southeast Asia, with China and Vietnam experiencing the highest number of cases. Furthermore, avian flu has begun to spread globally, with human cases in Iraq and Turkey and bird cases in France and Nigeria. Though the current strain of avian flu cannot pass directly between humans, a wide body of scientific evidence strongly supports the notion that avian flu will eventually mutate into a pandemic flu. These reasons all suggest that Asia will become a critical battleground in the prevention of a pandemic.

If history serves as a guide, Asia must either work to contain the coming pandemic or suffer the consequences. Over the past 90 years, five major disease outbreaks, including SARS and avian flu, have passed through this region. Four of these outbreaks have originated in Southeast Asia. During the 1918 influenza pandemic, which killed up to 50 million people worldwide, Asia experienced the greatest number of fatalities of any region.³ India and Japan, for example, reported 17 million and 250,000 deaths respectively, out of 20–34 million total deaths for the entire Asian region. Outbreaks in 1956 and 1968, known as “Asian influenza” and “Hong Kong influenza” respectively, originated in Hong Kong and

¹ SARS figures and numbers have been taken from the WHO website, <http://www.who.int/csr/sars>. For WHO Avian Influenza A figures and numbers, see http://www.who.int/csr/disease/avian_influenza/en/index.html.

² As of February 20, 2006.

³ David K. Shay, Centers for Disease Control and Prevention, National Center for Infectious Diseases, Influenza Branch, <http://www.dhhs.gov/nvpo/meetings/PowerPoints/ShayNVACpanflu4-20-05.ppt>.

ultimately killed between 2 to 5 million globally. In 1997 the Hong Kong influenza spread within the entrepot's bird population, resulting in the deaths—both from the disease and the subsequent culling policy—of 1.5 million birds. To make matters worse, in the same year the first documented cases of bird-to-human transmission of H5N1 were reported in Hong Kong. In 2005 the WHO reported a link between the 1997 outbreak and the current avian flu. Due to an extremely high mortality rate of 33% (six deaths of out of the eighteen infected), this most recent outbreak has signaled the possible beginnings of a repeat of 1918. In fact, in November 2005 the WHO officially stated that the next flu pandemic is not a question of “if” but rather “when.”

This essay argues that, as Asia handles the current outbreak and attempts to avoid a repeat of 1918, 1956, and 1968, countries in the region must reconceptualize national security so as to fight this threat more effectively. After outlining this need, the essay then offers suggestions as to how Asian countries can reconceptualize both national security and how such security is enforced.

The Need to Reconceptualize “National Security”

For too long Asian countries—much like their counterparts in Europe and North America—have tended to equate security with the military. Traditional military conflicts—such as those in China, the Korean Peninsula, Nepal, and Vietnam—only reinforce this belief. Although military threats will continue to present legitimate security concerns, the concept of national security cannot ignore non-military threats. This need is particularly true in the case of the pandemic flu. The 1956 Asian influenza pandemic, for instance, killed more people in a single year than all of the historical uses of nuclear, chemical, and biological weapons combined.⁴ Pandemic flu is a very credible security threat. Much as terrorism has forced militaries to develop alternative combat tactics, infectious diseases will similarly force traditional security structures to adapt.

⁴ The two nuclear bombs dropped on Hiroshima and Nagasaki in 1945 killed approximately 250,000 people both instantly and in the short term (see <http://www.pbs.org/wgbh/aso/databank/entries/dp45at.html>). Though information on biological and chemical-related deaths is incomplete, chemical weapons killed approximately 100,000 people in World War I, with thousands killed in Iran, Iraq, and a handful of other countries. The number of deaths from intentionally released biological agents is most likely in the thousands (see <http://news.bbc.co.uk/1/hi/world/americas/1562534.stm>).

Traditional security measures now fallible. Such a security renovation requires a major structural overhaul. First, the term “national security”—a concept developed when security could be easily measured in terms of troop levels or columns of tanks—must be redefined. In former times, a nation could secure itself simply by building more weapons or erecting physical barriers to deter another nation from attacking. A flu pandemic, however, cannot be contained

In former times, a nation could secure itself simply by building more weapons or erecting physical barriers to deter another nation from attacking. A flu pandemic, however, cannot be contained by such deterrents.

by such deterrents. Whether spreading via birds or humans (but especially birds), pandemic flu slips easily through both borders and traditional security measures. Additionally, national security implies the presence of an enemy that seeks power and influence, and is thus susceptible to diplomatic and military deterrence efforts. Power

and influence are irrelevant to pandemics. Pandemic flu seeks only to survive, and in order to do so moves from host to host regardless of ethnic, national, or political lines. Traditional security is also built upon the premise of force and the potential threat to life and well being. Pandemic flu does not respond to such threats, and will therefore not respond to such traditional security measures.

Traditional emphasis on secrecy now ineffective. Second, countries must dispense with the traditional habit of associating security with secrecy. The traditional military-security bond emphasizes secrecy as a means of keeping potentially sensitive information out of the hands of an adversary. With pandemic flu, however, failure to share information only serves to increase the probability of the flu spreading and killing more people—both nationally and internationally. The lack of communication in the early stages of the SARS outbreak highlights this point clearly. Sharing of information, though, cannot occur only among the

highest levels of government but must also include intra- and inter-governmental as well as public-private organizational exchange. The sooner national and global institutions obtain access to flu-related data, the more quickly governments can develop and implement policy solutions. For example, in November 2005 the WHO credited Thailand, the country with the second most avian flu cases, with reporting the situation to the world in a timely fashion.⁵ Such actions allowed Thailand access to resources—including surveillance and monitoring capabilities provided by a range of international institutions—previously unavailable yet necessary in slowing the spread of avian flu. Thailand’s response demonstrated the importance of timely reporting, as delays would have almost certainly resulted in more fatalities both in Thailand and elsewhere.

National security no longer national. Third—and most importantly—the problem with the term “national security” is the implication that one nation alone can prevent a pandemic; this assumption is not only false, but also extremely dangerous. Pandemics can adversely affect even “first world” countries regardless of the degree of economic or military development. Canada and Singapore are prime examples.⁶ The SARS outbreak infected 251 people in Canada and 238 in Singapore, killing 43 and 33 people respectively. These two developed countries—both of which enjoy strong national health care services and high per capita income—experienced the second and third most SARS-related infections and deaths (after China). Despite constituting two of the wealthiest nations on the planet, Canada and Singapore were not able to implement preventive measures capable of stopping SARS from killing Canadian and Singaporean citizens. Clearly, no single nation can defend itself against pandemic flu. Furthermore, the truly global nature of this security threat can be demonstrated by the fact that Iraq—a country that lies roughly 7,000 kilometers west of Southeast Asia—has also seen the beginnings of an outbreak. In order to prevent a pandemic on the scale of the 1918 outbreak, individual countries require global assistance and cooperation. Countries must regard one another not as a threat but rather

⁵ See World Health Organization, “Avian Influenza and Human Pandemic Influenza” (summary report, Geneva, Switzerland, November 7–9, 2005), http://www.who.int/mediacentre/events/2005/avian_influenza/summary_report_Nov_2005_meeting.pdf.

⁶ There is substantial international travel between Southeast Asia and Canada, particularly between Hong Kong and both Toronto and Vancouver. The spread of SARS in Canada is directly linked to travel from Asia.

as a partner in security. Only through international cooperation will countries achieve national security.

Actively Combating the New Security Threat

Public health must provide security. Because the traditional military approach to national security is inadequate to deal with pandemic flu, the focus must switch to more appropriate institutions. The main argument that this essay makes is that public health institutions—not the military—must lead, coordinate, and implement pandemic flu policy. In some circumstances, as was made notably clear during the response to the 2004 Indian Ocean tsunami, the military appears to possess the requisite tools for the successful exercise of policy. Such tools, however, must be directed through the public health sector. An essential component of pandemic response is trust. Because public health institutions are more transparent, they provide the population with a greater sense of trust than does the military. Additionally, these institutions also reduce even the appearance of secrecy, which is detrimental to fighting pandemic flu. Finally, throughout history public health institutions—not the military—have provided protection from naturally occurring threats such as influenza. From the global eradication of smallpox to the current fight against HIV/AIDS, public health institutions can marshal the experience, expertise, and infrastructure necessary in the fight against pandemic flu.

Better prepare public health institutions. Despite being well-placed to respond, public health institutions are not adequately prepared to lead the fight against pandemic flu. Imbalances in the global public health infrastructure are detrimental to fighting pandemic flu. The WHO report noted, for example, that uneven monitoring and surveillance systems do not allow for real-time reporting of new cases of avian or human influenza. This is particularly true in Asia. Countries such as Laos and Cambodia need substantially more resources if they are to bolster their monitoring and surveillance systems. Additionally, a better communication structure is required to pass information more rapidly to the appropriate institutions and decisionmakers. The current patchwork system provides an intermittent exchange of information at best, and at worst keeps information stagnant. The WHO report cited examples of progress in China,

Japan, Malaysia, and Vietnam. Given the problems experienced at the beginning of the SARS outbreak, Asian countries now understand much more clearly the need for stronger public health and information infrastructures. The goal now is to work to put in place a system to defend against the coming pandemic.

Conclusion

Framing flu pandemic as a security threat is essential precisely because it is one. The 1918 flu had a mortality rate of 2.5%. If that rate seems low, consider these two related points. First, if a new pandemic with a similar mortality rate emerges, upwards of 150 million people could die. Second, the mortality rate for avian flu is 50%. Even though this type of deadly pandemic is not guaranteed to transpire, every major national and international health organization has stated in no uncertain terms that a pandemic will occur sooner rather than later.

Countries and governments will serve as the front line in this battle for survival. This battle will not be fought with standing armies, but with effective, public health policy. The cases of avian flu in Vietnam and other parts of Asia suggest that this fight may have already begun. Asian countries need to recognize that, in order to prevent a devastating outbreak, they must implement a completely new security framework. In place of smart bombs we need smart medicines. Instead of military tactics we need public health plans. Asia's high population concentrations—coupled with the fact that humans there live and interact in such close proximity to animals—will continue to foster highly contagious, naturally occurring diseases such as avian flu. Absent immediate action, the people of Asia will most likely be the first to suffer the dire consequences of a pandemic.

Combating a Collective Threat: Protecting U.S. Forces and the Asia- Pacific from Pandemic Flu*

Andrew S. Erickson

ANDREW S. ERICKSON (PhD) is Assistant Professor of Strategic Studies in the Strategic Research Department at the U.S. Naval War College in Newport, Rhode Island. His publications include “Anchoring America’s Asian Assets” in *Comparative Strategy* and “China’s Ballistic Missile Defense Countermeasures” in *China’s Nuclear Modernization*.

* The views expressed in this study are those of the author. This study is based on public sources and does not represent the official position of the U.S. Navy or any other organization of the U.S. government.

...in today's interconnected world acting in the global interest is likely to mean acting in one's national interest as well. In other words, exercising sovereignty and contributing to global security are no longer mutually exclusive events.

—Admiral Michael Mullen
U.S. Chief of Naval Operations¹

In light of the substantial global responsibilities of the U.S. armed forces, the U.S. military cannot afford to be immobilized by pandemic influenza. Yet the widespread deployment of U.S. forces and the sheer scope of U.S. military operations illustrate the challenges inherent in guarding against this contingency. Within the U.S. government, efforts to prepare for pandemic influenza are apportioned as follows: the Department of Homeland Security has overall responsibility, the Department of Health and Human Services oversees domestic efforts and medical issues, the Department of State manages public diplomacy (and most overseas issues), and the Department of Agriculture manages animal-related issues. The U.S. Pacific Command (PACOM), due to its scope of operations and interactions with regions in Asia known to be potential incubators of avian flu, is also on the front lines of the pandemic flu threat. Though not itself a lead agency in avian flu prevention efforts, PACOM is preparing to support the U.S. government in its effort to combat domestic and international outbreaks of influenza.

In the event of pandemic influenza, PACOM must be prepared both to maintain the operational capabilities of U.S. forces and to protect military troops, civilians, and dependents as well as PACOM's military bases and facilities. This will be a difficult task: PACOM's area of operation spans 169 million square kilometers over 16 time zones, and encompasses 43 nations that are collectively home to 60% of the world's population. This region is also the site of the world's six largest armed forces, five of the seven U.S. mutual defense treaties, and 35% of U.S. trade (over \$550 billion).² More than 300,000 U.S. troops are based in the region. The dimensions of PACOM's responsibilities are exacerbated by the fact that, though ten pandemics have erupted in the past three centuries, the eleventh

¹ Admiral Michael Mullen, "Remarks as Delivered for the 17th International Seapower Symposium," Naval War College, Newport, RI, September 21, 2005, <http://www.navy.mil/palib/cno/speeches/mullen050921.txt>.

² U.S. Pacific Command, "PACOM Facts," <http://www.pacom.mil/about/pacom.shtml>.

will be the first to occur in a world characterized by instant communication and increasing interconnectedness.³

Given the potential for pandemic flu to spread rapidly and to inflict devastation on human societies, PACOM must develop coordinated capabilities that can rapidly respond to, address, and continue to ensure the function of relevant organizations during such an outbreak. Because this is a task that no nation can accomplish alone, proper prevention and treatment will hinge upon multilateral cooperation. Effective information sharing will thus be essential to the success of such a broad-based effort. Because of the potential need to engage the active involvement of law enforcement agencies and even militaries from many countries in the Asia-Pacific region, significant mutual trust is essential if preparation efforts are to meet with success.

This essay surveys the strategic planning goals formulated by PACOM to respond to a pandemic outbreak in the Asia-Pacific region. Given the importance of cooperation between countries in combating a pandemic, this essay also explores the challenges and opportunities of working with China—the Asia-Pacific’s largest developing member—to combat the spread of avian flu. Working with China in this regard may be a potentially productive area of cooperation for the U.S. and Chinese militaries.

Preparations to Protect U.S. Troops, Dependents, and Asian Neighbors

In order to assist U.S. forces, military dependents, and citizens of other countries to prepare for an influenza pandemic, PACOM has developed a set of planning goals to address all foreseeable contingencies. These goals involve regional cooperation, preparation and prevention, containment, and recovery.

PACOM is currently seeking to improve the regional security environment by cooperating with Asia-Pacific nations. The United States has much to learn from experts in the countries that have experienced clusters of H5N1 infection, and PACOM is well aware that preparations for avian influenza have been more

³ “An Analysis of the Potential Impact of the H5N1 Avian Flu Virus,” Food Industry QRT Pandemic Analysis, August 2005, 3 and 6, <http://www.cidrap.umn.edu/cidrap/files/47/panbusplan.pdf>.

thoroughly tested in some Asian countries than in the United States, which thus far has been fortunate not to have suffered from an outbreak of avian flu.⁴ In order to facilitate this learning process, the United States plans to build a Pacific Region Coordination Center, which will “allow rapid communications, coordination, and information sharing among the 43 [Pacific] nations, their militaries, international organizations, and U.S. interagency representatives active in the Pacific.”⁵ It is hoped that this effort will forge a positive basis for collective health security.

Two additional aspects of current operations to shape the health security environment involve preparation and prevention. The dissemination of educational materials among U.S. military personnel is an essential component of “preparing” the anti-pandemic “battlespace.”⁶ Toward this end, in October 2005 PACOM sponsored a Public Health Emergency Officer Influenza Seminar that was held in Pearl Harbor, Hawaii.⁷ Information awareness is an essential component of security maintenance. For this reason, the Military Medical Laboratories Syndromic Surveillance Network is actively monitoring over 30 sites in Southeast Asia. Laboratories in Indonesia and Thailand will help both the host nation and the World Health Organization (WHO)’s Surveillance Network for Influenza to better track the spread and evolution of the disease. In the event of an actual outbreak, such tracking methods will allow the implementation of appropriate countermeasures in a timely manner. In a recent issue of *Nature*, medical experts urged that this existing network of rapid response laboratories be enhanced in collaboration with the WHO to emulate U.S. Naval Medical Research Units (NAMRU).⁸ In order to minimize the chances that U.S. forces and related

⁴ Bob Brewin, “Pacom Leads Military in Pandemic Planning,” *Government Health IT*, February 8, 2006, <http://www.govhealthit.com/article91626-12-06-05-Web>.

⁵ Rear Admiral R. D. Hufstader, Command Surgeon, U.S. Pacific Command, Testimony to Joint House Committee Hearing of Hawaii State Legislature, “Avian Flu Preparations and Role with State of Hawaii Agencies,” November 18, 2005, <http://www.pacom.mil/speeches/sst2005/051118hufstader-flu.shtml>.

⁶ “DoD’s Pandemic Flu Web Site Goes Live,” *American Forces Press Service*, http://www.pentagon.mil/news/Nov2005/20051107_3264.html.

⁷ Spc. Tim Meyer, “PACOM Sponsors Influenza Seminar,” U.S. Pacific Command Public Affairs, <http://www.pacom.mil/articles/articles2005/051027story1.shtml>.

⁸ NAMRUs were established after World War II to protect U.S. troops overseas. See “‘Military-style’ Flu Network Call,” *BBC News*, March 1, 2006, <http://news.bbc.co.uk/2/hi/health/4763224.stm>; and J. P. Chretien, J. C. Gaydos, J. L. Malone, and D. L. Blazes, “Global Network Could Avert Pandemics,” *Nature*, vol. 440 (March 2, 2006): 25–26.

personnel will contract and transmit avian flu, the U.S. Department of Defense has been stockpiling the drug Tamiflu at PACOM bases. As of February 2006, six million doses had been stored.⁹ In November 2005 PACOM held a “Tabletop Exercise” in order to test preparations for a pandemic. Finally, PACOM has used a variety of forums, including ASEAN, Chiefs of Defense (CHOD) meetings, and Noncombatant Evacuation Operations (NEO) planning meetings to help provide forums for discussion on pandemic influenza and to share planning ideas with a number of foreign government and military leaders.

In the event of a pandemic, PACOM would support the relevant U.S. agencies to work with Asia-Pacific nations and the WHO to contain the outbreak. Given the capacity of the United States to provide substantial aid, the U.S. government would also work to support any recovery efforts that might ensue as a result of the outbreak. Potential regional challenges stemming from an avian flu outbreak in the Asia-Pacific region may include damage to the regional economy¹⁰ and threats to domestic stability. Economic threats could involve the disruption of transnational supply chains and reductions in foreign direct investment. Threats to domestic stability could occur in those Southeast Asian nations that rely heavily on poultry production as well as in those in Pacific island states that might be particularly vulnerable were a significant portion of their population to be threatened with infectious disease.

Uniting Against a Common Threat

Cooperation is vital to defend against pandemic influenza. No nation is safe from this threat, and every nation is essential to pandemic flu defense efforts. Robust partnerships involving Japan, South Korea, Australia, New Zealand, ASEAN nations, and other Asia-Pacific allies will be critical. Indeed, important

⁹ Audrey McAvoy, “Hawai’i Forces Take Aim at Bird Flu,” *Honolulu Advertiser*, November 13, 2005, <http://the.honoluluadvertiser.com/article/2005/Nov/13/ln/FP511130340.html/?print=on>.

¹⁰ U.S. Congressional Budget Office Report, “A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues,” December 8, 2005, <http://www.cbo.gov/ftpdocs/69xx/doc6946/12-08-BirdFlu.pdf>.

progress has been made already.¹¹ Several factors, however, make China worthy of particular focus. Home to some 800 million people who live in close contact with over 15 billion poultry, China will likely be at the center of any avian influenza

Home to some 800 million people who live in close contact with over 15 billion poultry, China will likely be at the center of any avian influenza crisis.

crisis.¹² China's massive scale thus gives that country a unique importance in disease control measures. Despite continuing challenges in relations between the United States and China, no effort will be complete without cooperation between what are respectively the world's

largest developed and developing nations. Given the important work that remains to be done before such a goal can be realized, the remainder of this essay will be devoted to suggesting how effective cooperation between the United States and China might be achieved.

As two Asia-Pacific nations potentially threatened by pandemic influenza, the United States and China have significant shared interests in the area of catastrophic disease prevention. The two nations also share a strategic interest in fighting other unconventional threats such as terrorism.¹³ Combating catastrophic disease, however, offers even more common ground upon which to build effective cooperation.

¹¹ See, for example, World Health Organization (WHO), Regional Office for the Western Pacific, "Japan-WHO Joint Meeting on Early Response to Potential Influenza Pandemic," Tokyo, Japan, January 12–13, 2006, http://www.wpro.who.int/sites/csr/meetings/mtg_20050112-13.htm; WHO, Regional Office for the Western Pacific, "Regional Director's Speech," <http://www.wpro.who.int/NR/rdonlyres/2FFE9F2B-1369-44C4-9281-761747BF8A95/0/RDSpeech.pdf>; and WHO, Regional Office for the Western Pacific, "Asian Countries Commit to an Early Response to the Threat of an Influenza Pandemic," Manila, January 16, 2006, http://www.wpro.who.int/media_centre/press_releases/pr_20060116.htm.

¹² Jim Fisher-Thompson, "U.S. Officials Praise China for Efforts to Combat Bird Flu Prompt Investigation, Reporting of Suspected Cases Key to Preventing Epidemic," *Washington File*, Bureau of International Information Programs, U.S. Department of State, March 2, 2006.

¹³ For further support of this assertion, see Jonathan D. Pollack, ed., *Strategic Surprise? U.S.-China Relations in the Early Twenty-First Century* (Newport, RI: Naval War College Press, 2003). Washington, however, does not accept Beijing's expansive definition of terrorism, which includes political activities.

The United States and China have already made considerable progress in bilateral and international fora. In October 2005, for instance, Chinese Minister of Health Gao Qiang signed an agreement with the U.S. Department of Health and Human Services to enhance cooperation on avian flu and other infectious diseases.¹⁴ On November 19, 2005 the United States and China announced a “Joint Initiative on Avian Influenza,” through which the countries’ respective ministries of Health and Agriculture will “strengthen cooperation” over vaccines, detection, and planning.¹⁵ At the January 2006 “Ministerial Pledging Conference for Avian Influenza,” attended by representatives of over 100 nations, Chinese Premier Wen Jiabao stated that “China will continue to actively participate in international cooperation in avian influenza prevention and control, share our experience with related countries and help them fight avian influenza.”¹⁶ Paul Wolfowitz, president of the World Bank, emphasized, “By hosting this event in Beijing, the Chinese Government is sending a powerful message...that we urgently need a global commitment to share information quickly and openly, and to find ways to work together effectively.”¹⁷ In April 2006 China hosted the “Asia-Pacific Economic Cooperation Symposium on Emerging Infectious Diseases.”

U.S.-China Military Medical Cooperation: Challenges and Opportunities

The fight against avian influenza has proven fertile ground for enhanced levels of U.S.-China cooperation. There is now potential for both countries to build upon this success to achieve progress in the area of military information exchange. Military information and related technology lacks direct offensive

¹⁴ Jim Fisher-Thompson, “U.S. Officials Praise China for Efforts to Combat Bird Flu; Prompt Investigation, Reporting of Suspected Cases Key to Preventing Epidemic,” *Washington File*, Bureau of International Information Programs, U.S. Department of State, March 2, 2006.

¹⁵ U.S. Department of State, “United States-China Joint Initiative on Avian Influenza,” November 19, 2005, <http://www.state.gov/r/pa/prs/ps/2005/57157.htm>.

¹⁶ “Address by Premier Wen Jiabao at the Opening Session of the International Pledging Conference on Avian and Human Pandemic Influenza,” Beijing, China, January 18, 2006, http://www.undg.org/documents/7317-Premier_Wen_Jiabao_Opening_Speech.pdf.

¹⁷ “Paul Wolfowitz Remarks to the International Pledging Conference on Avian and Human Influenza” (statement made via videoconference to the International Pledging Conference on Avian and Human Influenza, Beijing, China, January 18, 2006), http://www.undg.org/documents/7327-Statement_by_Paul_Wolfowitz.doc.

military application, and is abundantly available in both countries. Having played a significant role in the handling of the 2003 SARS crisis, China's People's Liberation Army (PLA) can now claim valuable experience in infectious disease control measures.¹⁸ In fact, due to its large network of hospitals and research facilities, the PLA holds jurisdiction over a crucial element of China's disease prevention responsibility and expertise. This raises the possibility of both parties benefiting equally. Concerns that such mutual benefits could not be achieved has frustrated previous military exchanges. Admiral William J. Fallon, commander of PACOM, has already extended an invitation to the Chinese military to engage in a discussion concerning avian influenza.¹⁹ In March 2006 a PACOM medical team met with medical leaders in the PLA to discuss pandemic influenza (PI) planning efforts and opportunities for the U.S. military and the PLA to work together.

To be sure, the timely flow of information could stand some improvement. Due to both the Chinese political landscape²⁰ and concerns that Chinese scientists receive proper credit for their research,²¹ some inherent challenges may accompany such exchanges. Aside from domestic politics, one major reason for the curtailment of U.S.-China military contacts has been U.S. concern that military transparency and cooperative benefits will be asymmetric. This discrepancy can be addressed, however, by determining which areas demand an absolute equality of exchange, and which disparities might be compensated for by alternative areas

¹⁸ See, for example, Fan Shunliang and Zhou Meng, "Quanjun fangzhi qinliugan gongzuo dianshi dianhua huiyi zhaokai" [Army-Wide Avian Flu Prevention and Control Work Television Teleconference Convened], *Jiefang junbao*, February 6, 2004; Tao Zhiping, "Qunfang qunkong jianjue dahao fangzhi qinliugan yingzhang" [Group Defense and Crowd Control for Preventing and Curing Avian Flu], *Renmin junduibao*, February 7, 2004, 1; Yin Fei, "Yifa zuohao gaozhi bingxing qinliugan fangzhi gongzuo" [Conduct Effective Avian Flu Prevention and Cure Work on the Basis of Law], *Jiefang junbao*, February 15, 2004.

¹⁹ Keith Bradsher, "U.S. Seeks Cooperation with China," *New York Times*, September 12, 2005.

²⁰ See, for example, Chi Fulin, ed., *Jingzhong—Zhongguo: SARS weiji yu zhidu biange, Zhongguo gaige fazhan yanjiuyuan 2003 nian zhuangui yanjiu baogao* [Alarm—China: SARS Crisis and System Reform, Transition Report 2003], (Beijing: China Institute for Reform and Development (CIRD), 2003); Yi Ping, "Xinxi gongkai yu fazhi zhengfu—cong 'feidian' dao 'qinliugan' de qishi" [Information Publication and Government by Law—Inspiration from "SARS" to "Bird Flu"], *Hebei faxue* 22, no. 11 (November 2004): 147–50.

²¹ Nicholas Zamiska, "How Academic Flap Hurt World Effort on Chinese Bird Flu," *Wall Street Journal*, February 24, 2006, A1.

of comparative advantage and willingness to share information. Cooperation undertaken in response to the mutual threat of avian flu could be an excellent place to begin efforts to improve military relations between the United States and China.

One way to increase mutual understanding and goodwill would be for the U.S. Foreign Broadcast Information Service (FBIS) to translate unclassified Chinese documents—starting with those concerning avian flu and related public health threats—into English and facilitate a wider distribution among Western experts. Such dissemination could increase Western knowledge of Chinese advances in disease prevention and control. Moreover, from a broader perspective, analysts and scholars could use such documents to augment their analysis and understanding of China. A robust and nuanced spectrum of U.S. analyses is in China's interest. Such analyses could demonstrate that, although the United States and China have differences in their national interests, they also have many mutual interests, which should serve as a strong basis for positive engagement. Specifically, fostering the emergence of a peaceful and prosperous China that acts as a responsible stakeholder in the international system is in both Beijing and Washington's interest. Much like its foreign counterparts, the U.S. military is duty-bound to anticipate and prepare for worst case scenarios. An exclusive focus on the possibility for conflict, however, could negatively influence U.S.-China relations. Thus more optimistic projections, produced by other analysts free from the responsibility to prepare for worst case military scenarios, are extremely important as well.

Cooperation against the threat of avian influenza could build mutual confidence and gain momentum for initiatives in other areas. In addition to enhancing communication, the building of bilateral contacts could instill in both sides a healthy respect for each other's capabilities, thereby reducing the chance of dangerous miscalculations. Ongoing tensions in U.S.-China relations are based in part upon enduring differences in national interests. A bilateral military relationship will not in and of itself resolve these tensions. But such a relationship could offer realistic first steps that might serve to outline and safeguard mutual interests and thereby provide incentives to avoid unnecessary escalation. The bottom line is that differences in national interests should not prevent the United States and China—or, for that matter, any nation—from recognizing the world's

Protecting U.S. Forces

growing collective interest in combating emerging borderless threats such as pandemic influenza.

Military Preparation and Response to Pandemic Influenza Outbreak in the Asia-Pacific Region*

James R. Campbell

JAMES R. CAMPBELL (PhD, MPH) is an infectious disease microbiologist serving as Manager for Biosecurity and Biodefense at the Pacific Northwest National Laboratory in Richland, WA. He has led large scale public health research projects on infectious diseases throughout Africa and Southeast Asia, and managed U.S. Navy biodefense research programs. He is a retired U.S. Navy Captain.

* The arguments in this essay are based upon unclassified information, and do not necessarily represent the views of the U.S. Department of Defense, the U.S. Department of Energy, or the Pacific Northwest National Laboratory.

A pandemic disease instigated by H5N1 (also known as “avian” or “bird flu”) or another highly pathogenic strain of influenza would constitute a nightmare scenario of global concern. Responsible public health and other governmental agencies are developing strategies to prevent or limit the spread of pandemic flu and mitigate the consequences of a natural outbreak of disease. Although the U.S. military is likewise preparing for a potential natural outbreak of H5N1 influenza, given the military’s primary role in defense, consideration must also be given to a willful biological attack that utilizes a highly pathogenic flu strain. How would the U.S. military’s planning for and reaction to a pandemic flu outbreak in the Asia-Pacific region differ if the flu were intentionally spread as opposed to naturally occurring? Drawing upon three decades of the author’s experience as a military officer and a public health researcher in Asia, this paper discusses potential military responses under these two different scenarios. In both cases clinical procedures would be similar, and significant disruption to normal business and activities would ensue. Distinct from a natural outbreak, however, a suspected biological attack would initiate an elevated threat condition status, which would in turn prompt increased surveillance, targeted infrastructure protection, and a shift in command and control. Though a medical response would be immediate, military priorities within an attack scenario would focus more on mission accomplishment.

Background

A willful biological attack that utilizes H5N1 or other pandemic influenza strains to target U.S. military forces is a very unlikely scenario, in part because the logistics and mechanics of carrying out such an attack would pose a challenge. Because Southeast Asia has historically given rise to most of the world’s influenza strains, an outbreak of influenza among military personnel in the Asia-Pacific region would not be unexpected. An outbreak of infectious disease primarily among U.S. military personnel or at U.S. military facilities, however, should raise suspicions of a willful attack. Because any sort of attack could be potentially disruptive to operations, U.S. military planners have an obligation to develop defensive measures capable of maintaining the continuity of operations.

Military Responses Common to a Naturally Occurring Pandemic and a Willful Biological Attack

Whether a natural occurring infection or an intentionally released biological agent, several common discernable traits would be sure to emerge. From a medical perspective, the examination, diagnosis, and triaging of patients would continue to utilize standard protocols and appropriate laboratory technologies such as enzyme-linked immunosorbent assay and polymerase chain reaction. Treatment would be consistent with good medical practice appropriate for the organism involved. In the case of pandemic flu, oral antiviral medications such as amantadine, rimantadine, and oseltamivir (also known as “Tamiflu”) would be disseminated, and adequate supportive care would be available. Many public health practitioners believe that the use of Tamiflu at the outbreak site could slow or even stop an outbreak of H5N1.¹ Recently, there has been concern that some flu viruses have developed a resistance to certain drugs. Tamiflu, however, appears thus far to have retained its effectiveness against most influenza strains, and a new inhalable antiviral formulation, Relenza (zanamivir), though not yet widely available, may be effective against Tamiflu-resistant strains of H5N1. In general, viruses tend to become less virulent the more resistant they become to medications. More detailed genetic analysis on clinical isolates of the virus would be useful in order both to determine drug resistance profiles and to identify biomarkers of increased pathogenicity and human-to-human transmissibility. Though such sophisticated analytical capabilities would not generally be readily available to military medical treatment facilities, they should, if possible, be carried out for public health reasons.

Because there is currently no approved human vaccine for prevention of H5N1 infection, appropriate patient isolation and infection control procedures within military medical treatment facilities would be instituted to control spread of the disease. Entry to and exit from affected areas would be limited, and in the case of a ship, or a fixed military site such as a base, actual quarantine of personnel could be imposed (extending up to ten days after the last case). Quarantine would be unlikely, however, because of effects on general and medical logistics support, and possible ramifications for battle plans. Travel restrictions

¹ The high cost of Tamiflu, however, is cause for concern. A five-day course costs approximately \$90.

intended to contain the outbreak to the Asia-Pacific region would be imposed on non-mission essential travel undertaken by military personnel. From a medical perspective, the military is better prepared than other government entities to respond to a biological attack; because the military must maintain readiness for all contingencies, however, military resources might not be made available to civilian interests (except to preclude civilian encroachment on military facilities).

Military Responses Unique to a Willful Attack with H5N1 Influenza

A biological attack that is carried out by an enemy with specific tactical and strategic objectives would instigate unique planning and response activities from the U.S. military. Because biological agents take longer than other traditional weapons to harm personnel, the initial symptoms of an unannounced H5N1 attack would be indistinguishable from a naturally occurring outbreak of the disease. Whereas a disease outbreak resulting from an intentional release of the virus would have specific targets, and would not be presaged by reports of increasing disease incidence on a regional or global scale, the epidemiological and demographic characteristics of a natural outbreak would be consistent with the natural history of the disease. Any successful countering of unannounced attacks on military targets would depend both upon accurate monitoring of threat conditions to determine increased windows of opportunities for terrorist attacks as well as adequate medical monitoring of military personnel. Military planners would also need to be alert for any sign of a “hyper-attack,” in which willful attacks might be carried out opportunistically under the cover of an ongoing natural outbreak. Military commanders face a challenge in justifying the costs of maintaining specific defensive measures for a type of attack that is less likely to occur than more conventional kinetic attacks. One important focus of an attack would be psychological and would target morale, order, and discipline, yet would not necessarily be intended to result in high mortality among troops and support personnel. In either case, due to the removal of essential personnel from workplaces for extended periods of time, critical infrastructure such as computer networks and transportation and logistics systems would ultimately be threatened. In a natural outbreak, however, such consequences would represent

secondary, non-specific effects; in a willful attack these outcomes would represent primary tactical objectives.

Military responses would quickly focus on protecting key personnel and assets and initiating base recovery operations. Immediate consideration would also be given to the possibility of secondary or follow-on attacks crafted by adversaries and designed to exploit the situation. If an outbreak of infectious disease were suspected to be the result of a willful attack, the first necessary task would be to secure the affected area and ascertain the nature and severity of the threat.

Military planners would also need to be alert for any sign of a “hyper-attack,” in which willful attacks might be carried out opportunistically under the cover of an ongoing natural outbreak.

Additional coordinated attacks that might use pandemic flu, other pathogens, or combinations of pathogens could be expected, and may even target medical response personnel. Such an attack would require enhanced medical responses and more complex patient isolation strategies and procedures. In this type of situation, military planners would also anticipate “mixed” attacks, including cyber and more conventional kinetic attacks, and would deploy the appropriate security enhancements. Today’s military personnel are trained to conduct operations in environments contaminated by chemical, biological, and radiological agents. These military personnel are trained in the use of personal protective gear, and thus would be prepared to execute a warfighting mission (and all that might involve), under the conditions of a biological attack. The Department of Defense (DOD) would supplement medical personnel in the Asia-Pacific by calling up reserve forces and drawing personnel from stateside military treatment facilities, with the result that some stateside facilities might have to temporarily reduce services for military dependents and retirees.

An unresolved policy issue for the DOD under such conditions involves the protection and control of non-military personnel associated with military installations, such as government-employed civilians, military dependents, and

contractors. Beyond providing protection for such personnel, the military must also have contingency plans in place that will ensure continued operations in the event that significant numbers of contractors become sick or abandon their positions for fear of becoming sick. Though less common aboard ships, on land-based facilities the military has turned many functions over to contractors, including logistics, food service, and information technology support. In the face of a willful attack the military structure is designed to be resilient and maintain the continuity of command operations. Specific contingency plans must also address the continuity of critical contractor supported functions.

In contrast to a natural outbreak, a confirmed attack would serve as a “tripwire” for elevating the ThreatCon (or “Threat Condition”) for readiness. In the DOD a change in ThreatCon level automatically invokes a set of predetermined activities consistent with the new threat level. Military commanders need to know when they are attacked so they can make immediate operational decisions unrelated to medical surge requirements. An adversary who deploys H5N1 against forward-deployed forces in the Asia-Pacific region has committed an act of biological warfare: under such conditions, meeting operational commitments is pre-eminent. **Table 1** summarizes the information needs of the military during an outbreak of pandemic disease. Compared with a more medically managed response to a natural outbreak, any response to an offensive H5N1 exposure in the Asia-Pacific region would be directed primarily by staff in the operations, logistics, and command and control directorates at the U.S. Pacific Command in Hawaii.

Forensics

A unique feature of the military response to a willful attack is forensics. In coordination with other federal agencies, DOD would assist forensic investigations in establishing attribution. Identifying perpetrators serves the dual purpose of helping to assess the risk of further attack and executing precision responses such as a counterattack. In this regard, the possibility of “fifth column” activities would also be considered by military planners. Due to the military culture, insider participation is unlikely though not without precedent. Military security and intelligence personnel conduct surveillance activities intended to deter and

Table 1. Pandemic Influenza Outbreak Information Requirements

Military Response Terminology	Who	What	Where	When	How
presumptive	Commanders	Information to act	tactical	Within minutes to hours	Reasonable confidence
confirmatory	Medical specialists	Information to treat	operational	Within 1–3 days	FDA standards
definitive	President; Secretary of Defense	Information to retaliate	strategic	Within 1–3 weeks	International standards

Source: A. Mauroni, “The Changing Face of Biological Warfare Defense,” CML Army Chemical Review, April 2004, http://www.findarticles.com/p/articles/mi_m01UN/is_2004_April/ai_n6120814.

defeat attacks against U.S. forces. If certain characteristics of the outbreak suggest a willful attack, surveillance and associated forensic activities would be enhanced appropriately, and a chain of custody would be closely maintained over clinical and environmental samples so as to validate decisions regarding retaliation.

Coordination of Military Responses

In all military operations, joint service coordination as well as coordination with allies and coalition partners is essential for efficient defense and effective response. The five Joint Combatant Commands coordinate worldwide responses for the four U.S. military services (Army, Navy, Air Force and Marines) and with the U.S. Coast Guard within their respective Areas of Responsibility (AOR). The U.S. Pacific Command is responsible for the Asia-Pacific AOR, and military activities are coordinated with allies in the region, in particular Korea, Japan, Australia, and New Zealand. In a natural disease outbreak, although coordination would certainly occur with the aim of limiting the spread of the disease and improving public health, the focus would be more on clinical responses and medical logistics support. In the case of a willful attack, medical priorities would be secondary to operational mission requirements. Because any pandemic disease outbreak in the Asia-Pacific region would quickly spread to the U.S. mainland, military planning and policies must be developed and coordinated with Homeland Security (HS)

programs. The military's failure to participate in HS discussions could lead to decisions being made for the Joint Forces instead of with them.

Military Public Relations

Finally, the public relations campaign would be different. During a natural outbreak, military public affairs officers would generally be more open and proactive in dealing with the press and civilian populations, as well as with local, state, federal, and international authorities. Transparency in reporting and good risk communication is key to building public confidence and cooperation. If a known or unknown adversary were involved, however—as would be the case with a willful attack—the military would seek to control the situation and gain military advantage by restricting the release of information on casualties and other specific data that carried potential operational impact. Nuances of an evolving H5N1 outbreak could provide an adversary with critical “battle damage” estimates—an unintended consequence of reporting that is not always fully appreciated by the media. Whereas the media generally resists any limitations on their freedom to report, the military meters its releases according to the dictates of the perceived security situation.

Conclusion

Military response planning elements that are common to both natural disease outbreaks and willful attacks with pandemic influenza include clinical activities and medical surge capabilities. Military planning and response activities unique to an offensive event recognize the involvement of human adversaries and include additional dimensions of security, information management, targeted asset protection and forensics. The overriding goals of a military response to any attack, including biological, are maintaining the continuity of operations and meeting military missions.

Regional Impacts of Avian Influenza

Myo Thant and Ann Marie Kimball

MYO THANT is Principal Economist at the Asian Development Bank based in Manila, Philippines. His major professional interests have included the development of new forms of regional economic cooperation such as “growth triangles,” and economic analysis of the HIV/AIDS pandemic.

ANN MARIE KIMBALL (MD, MPH) is Professor of Epidemiology and Health Services at the University of Washington’s School of Public Health and Community Medicine, and Director of the APEC Emerging Infections Network. She has received both NCS Fulbright scholar and Guggenheim awards for her work in emerging infections and global trade.

There is an increasing sense of uncertainty and fear regarding the potential impact of avian influenza (AI) on the world's population. Will the virus create a worldwide human pandemic? How will it spread and to what populations? How will governments deal with the potentially deleterious impact of AI on a country's population, economy, and society?

In assessing AI's likely impact and devising effective preventive measures, one must first acknowledge that the world's peoples are not homogenous. Even an epidemic of short duration has the potential to create long-lasting and substantive social, economic, and political problems. A pandemic will, however, affect groups differently according to income, social class, nationality, and regions. The impact of a pandemic will differ from group to group, and are not distributed randomly. Regionalism—defined as a common sense of identity and purpose within a defined geographical area that is promoted through deliberate political actions—has increased markedly in the world since the end of the Cold War. This is particularly true in Asia, the likely ground zero of an AI pandemic. Because regionalism has the potential to provide public health goods, many Asian countries have in fact initiated agreements that would foster cooperation and joint actions. Depending upon such factors as labor availability, family structures, saving and investment behavior, and commitment to regional agreements, however, the pandemic would also change relationships within and between regions.

This paper is divided into four sections. The first section briefly discusses regionalism in Asia. The second offers a general overview of how AI has spread through the Asia-Pacific region and the possible economic impacts. A third section discusses how the Asia-Pacific has responded as a region. The essay closes with a discussion of factors that will strongly influence how different regions are affected and how they will eventually emerge from an AI pandemic.

Regionalism

The appropriateness of refracting and analyzing AI through the prism of regionalism and regionalization may seem puzzling. After all, it is commonplace to say that we are now living in a global village. Technical and financial innovations have made possible instantaneous communication and rapid and cheap travel.

These innovations allow us to consume almost identical goods irrespective of our location on this planet. AI itself is seen as being spread across the world through global trade and communication channels, which are simultaneously intermediaries of the pandemic and at risk to the pandemic.

Under the sub-strata of globalization, however, regionalism is very much alive and thriving. Regionalism, as exemplified by groups of geographically contiguous countries cooperating with each other for political and economic objectives, is particularly common in Asia. In addition to the Association of Southeast Asian Nations (ASEAN), Asian states have in the post-Cold War period established at least ten new regional cooperative arrangements. These regional cooperative forums represent the state's willingness to at least partially substitute national interests and traditional distrust with regional cooperative behavior capable of achieving common political and economic goals. Some arrangements, such as the Greater Mekong Subregion, are large and cover an area the size of western Europe; others are much smaller and contain only geographic segments of member countries. The more advanced cooperative forums have moved beyond the "talk-shop level" to both increased economic activity within the grouping and agreements to eventually create a free trade area or economic community by a specified date.¹

Avian Flu and the Asia-Pacific

Much like the 1957 and 1968 pandemic viruses as well as SARS of 2003, AI is emerging from within Asia.² Infected wild birds migrating from Asia have already been found across Europe and Africa. Given Asia's greater number of people, high population density, and heavy reliance on intensive agriculture, the region will likely become ground zero of a human-to-human transmitted pandemic.

¹ See Myo Thant et al., ed., "Growth Triangles in Asia: A New Approach to Regional Economic Cooperation," 2nd ed. (Oxford University Press, 1998).

² The 1918–19 pandemic may also have originated in China. See C. Langford, "Did the 1918–19 Influenza Pandemic Originate in China?" *Population and Development Review* 31, no. 3 (September 2005).

The AI pandemic already has caused a great deal of damage, most notably in Southeast Asia, where the H5N1 virus had been found in ten Asian countries by the end of 2005. Over 90 human influenza A cases have been discovered in Vietnam, with a mortality rate of over 50%. In Indonesia, H5N1 had spread to 26 of 33 Indonesian provinces, resulting in 18 deaths. Unlike Indonesia, Thailand, and Vietnam have responded aggressively by culling 140 million chickens (though without full compensation to farmers).

Haunted by memories of the recent SARS epidemic, which, despite a low morbidity rate, led to economic losses of between \$30 to 50 billion, Asian leaders are uncertain about the potential impact of AI. Pessimistic forecasts predict that AI human transmission could result in the cessation of large swaths of economic activity, severe disruption of trade flows, and a recession of the global economy. According to the World Bank, the total cost of a global pandemic to the world economy could amount to \$800 billion. If the pandemic is as mild as the 1968 pandemic, which killed 700,000 people worldwide, WHO estimates of the likely total death toll range from 2 to 7.4 million. Should the new pandemic, however, prove to be as virulent as the 1918–19 Spanish flu, which killed at least 50 million people worldwide, the death toll could reach 150 million.

More moderate projections also foresee large morbidity rates, but a relatively minor impact on the global economy. Although a pandemic on the scale of the 1918–19 Spanish flu could potentially kill over 130,000 people in Canada alone, the short duration of the pandemic and the continuation of income-generating activities and re-allocation of spending across sectors would limit any adverse impact on GDP growth.³ A similar forecast holds for the United States as well. As long as the pandemic is relatively short-lived and the population behaves rationally, however, the size and strength of the U.S. economy would ensure that such a non-pervasive exogenous shock would not affect investment.⁴

³ Canadian Department of Finance, Economic Analysis and Forecasting Division, “Economic Impact of an Influenza Pandemic,” December 14, 2005, mimeo.

⁴ See Robert Shapiro, “Economic Consequences of Epidemics” (conference, “Bulls, Bears, and Birds: Preparing the Financial Industry for a Pandemic,” sponsored by the Center for Biosecurity, New York, September 23, 2005).

Avian Flu and Asia-Pacific Regionalism

Although regional cooperation programs are primarily designed to achieve economic cooperation, Asian states have used these cooperative venues to promote regional health programs and complement national pandemic plans. The Leaders' Declaration of APEC (Asia-Pacific Economic Cooperation) has since 2000 emphasized the need to combat emerging infections. In 1996 APEC's Industrial Science and Technology Workgroup funded the Emerging Infections Network, the first regional cooperative "health" project. Following the SARS outbreak, APEC convened its first meeting of health ministers and launched a new Health Task Force, which is focusing on cooperative efforts to combat AI. The lack of financial support and difficulty in coordinating across numerous working groups, however, have thus far hampered APEC's response.⁵

The SARS epidemic convinced Asian political leaders of the importance of regional cooperation on public health goods. In mid-December 2005 during the first ever East Asian Summit, sixteen Asian leaders signed the "East Asian Summit Declaration on AI Prevention, Control, and Response." In October 2004 regional cooperation and coordination at the cabinet-level was enhanced through the establishment of an ASEAN Highly Pathogenic Avian Influenza (HPAI) task force. In November 2004 health ministers from ASEAN+3 member countries met to discuss AI. The ASEAN Health Group on Communicable Diseases monitors human health aspects through the ASEAN+3 Emerging Infectious Disease program, and an ASEAN Animal Health Trust Fund has also been established. In November 2005, during the second summit meeting of the Ayeyawady-Chao Phraya-Mekong Economic Cooperation Strategy (ACMECS) (one of the newer regional groupings), the five members adopted the Declaration on Partnership in Combating AI and Other Infectious Diseases. The members of ACMECS also discussed closer cooperation on monitoring and surveillance,

⁵ Established in 1989, APEC includes 21 members from both developing and developed countries. On January 19 2006 APEC held a virtual symposium on preparedness, hosting eleven economies in real-time collaborative conferencing via an access grid. Such robust communications platforms will increasingly come into play if travel restrictions figure as heavily for influenza as for SARS.

sharing of information and best practices, developing rapid response teams, and the possibility of establishing a regional stockpile of drugs.⁶

If a human pandemic were to break out in Asia, however, these regional cooperative forums on public health could very well prove ineffective. Many agreements are little more than declarations of intent, and most are grossly underfunded. During the SARS epidemic, which resulted in the deaths of less than a thousand people worldwide, most public activities requiring face-to-face interaction were cancelled. Entertainment, retail shopping, and travel were all severely curtailed. Economies such as Hong Kong, which rely on the tourism sector

If a human pandemic were to break out in Asia, however, [the existing] regional cooperative forums on public health could very well prove ineffective.

to promote employment and earn foreign exchange earnings, were severely affected. An H5N1 human pandemic can be expected to result in an even greater impact on overall global economic activity. Many Asian countries rely heavily on tourism to provide employment and foreign

exchange earnings. These countries, which have increasingly been marketing themselves as members of a single large tourist destination, will be severely affected by a pandemic. In general, a clampdown on inter-regional trade may be expected. The movement of poultry between China and Vietnam has already been curtailed. Though China and Thailand alone account for 15% of all global poultry shipments, Chinese and Thai poultry products have already been banned in Japan, the biggest export market for such products. A human AI pandemic would likely lead to a further tightening of trade restrictions.

An AI pandemic would also likely impinge upon the movement of labor within countries. In China, the restriction of travel between the interior and coastal regions would have a deleterious effect on both the nation's economic growth rates as well as employment generation. The restriction of labor mobility among

⁶ ACMECS was established in late 2003. The five member nations are Cambodia, Laos, Myanmar, Thailand, and Vietnam.

countries, such as between the Philippines and the Middle East or Thailand—the latter of which receives over a million laborers from its neighboring countries—would severely curtail economic activity in these countries. Because illegal migrant laborers often lack access to public health facilities, a large scale pandemic will most likely result in more stringent border controls, the deportation of labor, and acute suffering among illegal migrants.⁷

Looking to the Future

There are four long-term factors that will determine how a major pandemic will affect different regions and how these regions will eventually recover.

Impact on labor availability. Increased absenteeism and mortality will increase in the short term. In the longer term, the impact from an AI pandemic will depend upon the rate of mortality and diminution of human labor skills. The overall impact on labor will depend upon unemployment and underemployment levels, the ability of the economy to switch to more capital intensive means of production, and the relative price of labor. Given that human capital shortages are real and acute for most developing countries, however, the adverse effects of an AI pandemic on labor competitiveness constitutes a threat to economic prosperity.

Impact on the structure of the family. The family is the basic unit of production in most agrarian-based Asian economies. The family is also the primary source of insurance and the transmitter of culture and knowledge across generations. The AIDS epidemic has shown that humans have a remarkable capacity to adapt and survive even with heavily afflicted environments. The AI pandemic is different, however, in that infection is rapid and there is little time or scope for devising survival strategies.

Impact on savings and investment. An AI pandemic will adversely affect long-term savings and investments. Savings, which have traditionally been very

⁷ Foreign labor migrants appear to be particularly vulnerable to the negative effects of regional calamities. Following the 1997 Asian financial crisis, many were deported or fled. A large number of migrant workers in Myanmar and Thailand were thought to have been killed by the tsunami of late 2004. Without proof of legal status, survivors reportedly received no assistance. See D. Wilson, “Meeting the Health Needs of Migrant Workers Affected by the Tsunami,” *Public Library of Science Medicine* 2, no. 6 (June 2005).

high in Asia, may be reduced due to shrinking output and increased health expenditures. Depending upon the forecast for future economic prosperity, incentives to save and invest may decrease. Regions strongly affected by a pandemic may also become less attractive to external investors.

Relationships between countries. The most important factor likely to test relationships during a pandemic is whether regional agreements and commitments to cooperation are upheld during the actual pandemic. Rapid and adequate access to regional stockpiles of drugs is one such area that will require cooperation.⁸ The financial burdens shouldered by specific countries or groups of countries, pre-emptive bans, and controls on the movement of people and goods from AI-affected regions will all test the willingness of countries to work together to achieve common goals.⁹ Post-pandemic relations between different regions will be determined by the extent of damage suffered and resilience of individual countries. Although every state will suffer from some form of economic and political disruption, poorer states will find themselves far less able to cope with the effects of a pandemic. The resulting sense of insecurity could contribute to a reduction in regional cooperative arrangements and the possible rise of aggressive unilateral actions.

⁸ Two studies in Asia assert that rapid application of Tamiflu will halt or severely limit the spread of AI, raising the question of how willing countries with a large supply of Tamiflu will be to share the drug with other countries during a pandemic. See “Strategies for Containing an Emerging Influenza in Southeast Asia,” *Nature*, August 3, 2005; and “Drugs, Quarantine Might Stop a Pandemic Before it Starts,” *Science*, August 5, 2005.

⁹ On April 1, 2005 President Bush issued an executive order that authorizes the use of quarantines inside the United States and permits the isolation of international visitors who are suspected of carrying the flu. On February 16, 2004, during an emergency meeting of SAARC (South Asian Association for Regional Cooperation), senior officials noted that poultry products in their own region were safe but recommended enforcement of temporary ban of imports of poultry, feed, medicines, and vaccines from HPAI-infected countries.

An Avian Flu Pandemic in the Asia-Pacific: Lessons on Regional Cooperation from the 2003 SARS Outbreak

Melissa Curley

MELISSA CURLEY (PhD) is Lecturer in International Relations in the School of Political Science and International Studies, University of Queensland, Australia. Her research interests include non-traditional and human security in the Asia-Pacific, non-governmental organizations, and state-civil society relations in the region.

The H5N1 virus (also known as “avian” or “bird flu”) was first identified in Hong Kong in 1997.¹ The potential of H5N1 to instigate a global pandemic that could result in the deaths of millions of people is at the heart of the virus’ perceived threat to Asia-Pacific states. Thus the H5N1 virus not only poses a threat to the economic security of states, but also to the health of various populations. To date, the spread of the virus has prompted the mass culling of hundreds of millions of chickens and resulted in 176 human cases, of which 97 have proven fatal (see **Table 1**).²

Despite the historical propensity of East Asian states to view security in traditional terms, these states are now faced with the dilemma of responding to the transnational nature of the H5N1 threat. Be that as it may, strategies designed to educate both political and scientific regional elites concerning H5N1’s genetic structure and behavior in both wild birds and domestic poultry are crucial to the early identification of the virus.³ By emphasizing the need for regional cooperation, the futility of prioritizing narrow sectoral and state interests over regional and global public health interests becomes readily apparent.

This essay suggests that an analysis of regional cooperation efforts during the 2003 SARS outbreak will provide an indication of the challenges facing the Asia-Pacific region in the event of a pandemic outbreak of H5N1. The author argues that adequate pandemic preparation measures will include the implementation of legislation that authorizes the controlled movement of Asian populations as well as international scientific cooperation on surveillance and monitoring.

This essay is divided into three sections. The first section examines how traditional state-centric notions of sovereignty in East Asia pose significant obstacles to regional efforts to combat the spread of H5N1. The second section explores the public’s misperception of the nature of H5N1, and the need for more comprehensive surveillance and reporting techniques regarding the spread of the

¹ For an introduction to and discussion of the emergence of the H5N1 virus in Hong Kong, see D.S. Melville and K.F. Shortridge, “Influenza: Time to Come to Grips with the Avian Dimension,” *Lancet Infectious Diseases* 4, no. 5 (May 2004): 261–62.

² World Health Organisation, www.who.int/csr/disease/avian_influenza/country/cases_table_2006-03-10/en/index.html

³ Interview with Prof. Ken Shortridge, leading authority on H5N1, Emeritus Professor and Former Chair Professor in Microbiology, University of Hong Kong, and Honorary Professor in Medicine and Pathology, University of Auckland, February 28, 2006.

virus. A final section recommends specific measures that could serve as a useful basis for action.

Table 1

Country	2003		2004		2005		2006		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Cambodia	0	0	0	0	4	4	0	0	4	4
China	0	0	0	0	8	5	7	5	15	10
Indonesia	0	0	0	0	17	11	11	10	28	21
Iraq	0	0	0	0	0	0	2	2	2	2
Thailand	0	0	17	12	5	2	0	0	22	14
Turkey	0	0	0	0	0	0	12	4	12	4
Viet Nam	3	3	29	20	61	19	0	0	93	42
Total	3	3	46	32	95	41	32	21	176	97

Notes: As of March 10, 2006 the total number of cases includes the number of deaths. WHO reports only laboratory-confirmed cases.

Source: World Health Organization, http://www.who.int/csr/disease/avian_influenza/country/cases_table_2006-03-10/en/index.html

Sovereignty and State-centrism in East Asia

State-centric notions of sovereignty in many East Asian countries constitute a significant obstacle to achieving the cross-border cooperation necessary to respond to a regional pandemic outbreak. East Asia's recent experience of responding to the threat of SARS in 2003, however, has increased public awareness of the benefits of regional cooperation on public health issues—issues that are not traditionally considered a security threat to countries in the region.

The SARS outbreak illustrated how East Asian countries can utilize existing institutional frameworks, such as the Association of Southeast Asian Nations (ASEAN) and ASEAN+3, to instigate regional cooperation, exchange information, and approve initiatives previously adopted at regional ministerial meetings. Despite the value of regional responses, however, the SARS crisis also showed that states were largely responsible for prevention strategies at the front line, regional cooperation was reactive, and a state's self-interest could prevent collective action when perceived national and international interests conflicted.⁴

⁴ Melissa Curley and Nicholas Thomas, "Human Security and Public Health in Southeast

Delays by industry and government in the reporting of H5N1 outbreaks have already occurred in East Asia. Such delays merely underscore the importance of intensive factory poultry production in particular economies (e.g., China, Thailand, Vietnam, and Indonesia), and the potential economic losses that would be incurred by businesses should an outbreak of H5N1 occur and the inevitable wide-scale slaughter of poultry ensue.

The concept of sovereignty—the right of states to manage their own domestic affairs—remains central to the thinking of key East Asian states at risk

The concept of sovereignty—the right of states to manage their own domestic affairs—remains central to the thinking of key East Asian states at risk of a flu outbreak.

of a flu outbreak. China, Vietnam, Indonesia—all countries where many cases of H5N1 infection have occurred—remain highly aware of the potential impact that an outbreak of infectious disease could have on the economy. Whether out of fear of international sanctions and other restrictions being

imposed or in the hope that outbreaks can be contained without international detection, numerous states both in East Asia and other regions have repeatedly failed to report outbreaks of infectious diseases.⁵ China's delayed reporting of the SARS virus in early 2003 is a recent case in point.

Although political elites fear economic and other sanctions, outbreaks may also go undetected due to poor or non-existent surveillance techniques. This lapse is a function not only of government capacity, but also of insufficient scientific knowledge in government officials (such as government veterinarians, microbiologists, and other front-line medical staff). Where possible, available funding should be channelled to these groups to facilitate increased communication between ornithologists, veterinarians, influenza virologists, and

Asia: The SARS Outbreak," *Australian Journal of International Affairs* 58, no. 1: 17–32.

⁵ Andreas Schloenhardt, "From Black Death to Bird Flu: Infectious Diseases and Immigration Restrictions in Asia," *New England Journal of International Law* 12, no. 2 (forthcoming).

arbovirologists. This will result in government elites being better informed to take policy decisions and initiate regional cooperation on surveillance and reporting.

Security is, on the whole, still conceptualized in a traditional way. Although concepts of human and non-traditional security have permeated some sections of bureaucracies and the mindsets of political elites, these concepts are not widely accepted and are subject to various interpretations. Nevertheless, the potential for infectious diseases such as SARS and H5N1 to disrupt essential travel and trade flows, and the attendant costs to regional economies was starkly illustrated in 2003.

As such, there is growing recognition within government elites and bureaucracies that an outbreak of contagious disease poses a clear and immediate threat to the economic security of the state, and that outbreaks in the region make these states susceptible to economic downturns in trade and travel, regardless of whether the infection occurs in their country. The SARS experience, as well as recent regional attempts to prepare surveillance and response mechanisms, has illustrated that there is a growing awareness of the threat that an outbreak of H5N1 could present to the region.

As a result, countries may now be more likely to comply with regional cooperation mechanisms designed to contain outbreaks and prevent cross-border contamination. In the event of an outbreak, the crucial task of controlling the movement of people will depend upon international cooperation. Regional immigration laws restricting the ingress and egress of afflicted people are likely to be invoked. Immigration laws presently in place in East Asian countries make it possible to “exclude those persons from immigration who are perceived to pose a danger for reasons of public health.”⁶ Regional law varies as to which diseases are referred to specifically, but as Schloenhardt points out, “the law of all jurisdictions in Asia provides special discretionary power for the Minister or Director of Immigration to prohibit their entry.”⁷

Because the H5N1 virus would be spread through human cough particles, halting human traffic around the region would help prevent further spread of

⁶ Schloenhardt, “From Black Death to Bird Flu.”

⁷ Ibid.

the virus. In such a scenario, prior regional discussion of and agreement on the best immediate strategies—beyond that provided by WHO guidelines—would be useful.

Misinformation and Public Awareness

The intensification and decentralization of poultry (specifically chicken) production in Southeast Asia and China carry important consequences for the potential outbreak of a H5N1 pandemic in Asia or other parts of the world. The genetic makeup and behavior of H5N1 means that the virus can be carried and transmitted through birds by numerous complex means.⁸ For instance, in addition to migratory birds, the disease could be spread by ornamental birds, local poultry, short-distance birds, feral birds, or bird droppings on the bottom on car tires. Furthermore, the media's emphasis on the role of migratory birds in the transmission of H5N1 virus has tended to obscure the fact that many outbreaks in domestic and backyard poultry have been linked back to a H5N1 virus in the intensive factory poultry production process.⁹ Furthermore, expert scientific opinion on the issue states that, "although the role of terrestrial birds in influenza ecology remains uncertain, the timing and extent of the apparent spread of H5N1 does not accord with current knowledge of the migration of species, such as sparrows, pigeons, and starlings, which are known to feed around domestic poultry and fish ponds in Southern China."¹⁰ Though space does not permit a detailed discussion, lack of public awareness regarding the complexity of the virus and the way in which the virus is transmitted and amplified, could compromise future regional cooperation efforts.

Policymakers should be aware of the vested interests that the intensive poultry manufacturing industry holds in its promotion of the view that the primary form of H5N1 transmission is through migratory birds. As noted above, this suggestion is far from proven. Melville and Shortridge suggest that:

⁸ Interview with Prof. Ken Shortridge, February 28, 2006.

⁹ GRAIN, "'Fowl play': The Poultry Industry's Central Role in the Bird Flu Crisis," February 2006, <http://www.grain.org/briefings/index.cfm?id=194&print=yes>.

¹⁰ Melville and Shortridge, "Influenza: Time to Come to Grips with the Avian Dimension," 261–62.

More likely the spread of the virus within and outside the epicentre of southern China has been facilitated by day-to-day activities in an area where hygiene and bio-security are lax. The role of migratory birds in the movement of H5N1 cannot be discounted, *but at this point in our understanding we think it of lesser importance* whilst recognising that they may act as a reservoir for virus.¹¹

Because the H5N1 virus is asymptomatic in ducks, meaning they show no outward sign of infection, pro-active weekly surveillance testing is required to monitor the situation. The virus could therefore “smoulder” for years before resulting in an outbreak.

Although traditional approaches to state security and sovereignty currently dominate in most East Asian countries, the impact of SARS has created a regional space within which regional cooperation can and should be further exploited. Though such cooperation and dialogue can increase regional preparedness in areas such as the restriction of human traffic, raising the awareness of regional elites regarding the complexity of the H5N1 virus is also a priority. If genuine regional cooperation in surveillance and reporting—arguably the two most important factors in the early identification of a pandemic outbreak—is to occur, then this step is an important precursor.

Looking Toward the Future

The development of a road map as a basis for action would be useful. An initial regional conference for related scientific experts¹² could focus on the following areas: 1) potential collaboration on surveillance (particularly on regional geographical areas and species of interest), 2) scientific reporting mechanisms and the development of necessary transnational administrative and bureaucratic procedures, 3) discussion of potential areas for research collaboration among regional scientists to increase regional capacities, and 4) creating more opportunities for information dissemination on the genetic behaviour of the H5N1 virus, and the specific implications of such findings within individual country contexts.

¹¹ Melville and Shortridge, “Influenza: Time to Come to Grips with the Avian Dimension,” 261–62. Emphasis added.

¹² Ornithologists, veterinarians, influenza virologists, and arbovirologists.

The New Trade Dilemma: Population Protection or Trade Protection?

Ann Marie Kimball

ANN MARIE KIMBALL (MD, MPH) is Professor of Epidemiology and Health Services at the University of Washington's School of Public Health and Community Medicine, and Director of the APEC Asia Pacific Emerging Infections Network. Her research interests include emerging infections, global epidemic, prevention, surveillance, investigation, and control of infectious diseases.

Although economic independence and easy access to goods and services have increased trade and travel in the 21st century, the concomitant rapid movement of people, animals, meat, produce, and industrial products amplifies the risk of cross-border transmission of infectious diseases. As a nexus of increasing trade and human travel, the Asia-Pacific region is uniquely vulnerable to infectious diseases that are spread through cross-border trade. The security of the region thus hinges increasingly upon each country's ability to maintain the security of human populations against emergent zoonotics (animal diseases). In attempting to implement procedures capable of combating the spread of avian influenza, policymakers are faced with three dilemmas. First, within those economies where the presence of avian flu has already been detected, policymakers must decide whether to risk jeopardizing the marketability of their products by implementing widespread vaccine and testing initiatives. Second, within those economies where avian flu has yet to be detected, policymakers must first decide whether to continue importing products from infected countries and, if so, what scientific and safety assessments would best prevent the disease from entering non-infected economies. Finally, policymakers should recognize that they may not be able to determine their country's response to the presence of a contagion—fear of infection among traders and travelers could supersede the government's ability to react.

Strict inspection measures, public education, consistent vaccination, and testing of live animal exports and imports offer some assurances for safe, uninterrupted trade. Importing countries often find it difficult to verify the effectiveness of safety measures within the borders of their exporters. Similarly, exporting countries often cannot ensure that they are managing all vulnerable areas effectively. In order to prevent or combat a contagion, trade and travel are the first candidates for restriction and embargo. The institution of trade and travel restrictions, however, often carries enormous negative economic consequences. By implementing such measures, policymakers risk economic damage. Trade strategies that are designed to combat and prevent infectious disease outbreaks often require counterintuitive solutions. Though these solutions may promise safety and protection in the long term, they are often economically damaging in the short term.

Trade Strategies Most Commonly Used to Stop the Spread of Pandemics

In the event of an infectious disease epidemic, countries often halt the importation of foods and other goods from epidemic-affected areas. The legal basis for these control measures varies across economies. In order to ensure that such measures are used effectively and with a full understanding of the economic consequences they can hold, careful epidemiological investigation and vigilant analysis must guide their application. **Table 1** outlines the international agreements governing trade embargos, vaccination strategies, travel advisories, and patent protection for pharmaceuticals.

Trade embargoes. Trade embargoes are often put into place as a preventative measure to assure minimal risk of importation of disease. This “safety first” action is known as the “precautionary principle,” whereby governments proscribe trade even if there is only a theoretical risk of harm to the importing economy. On the one hand, the precautionary principle could potentially be used as an excuse by governments to block market access rather than protect public health. If health threats were exaggerated for the sole purpose of blocking trade, the principle would then become an arbitrary and unjustifiable trade barrier. On the other hand, preventive measures may constitute the only recourse many governments have against strict international regulations aimed at preventing such trade.

Trade embargoes carry severe economic consequences that can have a long-lasting negative impact. The number of SPS emergency notifications filed with the WTO secretariat during 2004–05 illustrates the prevalent fear of such consequences. Such notifications are allowed only when there is acute danger for human, animal, or plant health. Thirty countries filed urgent notifications that cited avian influenza as the motive for restricting the import of live fowl, eggs, meat, and other poultry products from their trading partners. Interestingly, both China and Thailand—two economies with documented cases of avian influenza in birds and sporadic human cases—filed these emergency notifications in an effort to justify embargoes against products from other affected areas.

Avian flu has been detected among fowl in most Asian countries and is now present in Europe, Africa, and the Middle East. The complete cessation of the poultry trade across the globe would create huge trade complications in almost

Table 1

International Agreement	Relevant Function
WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement)	<ul style="list-style-type: none"> • Allows member states to halt importation of products that pose a threat to human health. Members are encouraged to do so in manners that will least interfere with trade. • Gives the WTO the power to override a country's use of the precautionary principle, which allows countries to take protective action against suspect imports. Under SPS rules, however, countries must provide scientific evidence of a threat before the threat can be regulated. • Recognizes "disease free areas" as part of a country or parts of several countries. Even if the disease in herds or flocks is under control, however, vaccination strategies will not return a "disease free" status to a country,. • Negotiated during the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), and entered into force with the establishment of the WTO at the beginning of 1995.
WTO Agreement on Technical Barriers to Trade (TBT Agreement)	<ul style="list-style-type: none"> • Ensures that technical regulations and standards are not used as measures disguised to protect domestic industries from foreign competition. • Negotiated during the GATT Uruguay Round and entered into force with the establishment of the WTO at the beginning of 1995.
WTO Trade-Related Aspects of Intellectual Property Rights Agreement (TRIPS)	<ul style="list-style-type: none"> • Article 31's "compulsory licensure" clause sets down minimum standards for most forms of intellectual property regulation within all WTO member countries in the event of national emergencies and "circumstances of extreme urgency." • Negotiated at the end of the GATT Uruguay Round in 1994.
WTO Doha Declaration on the TRIPS Agreement and Public Health	<ul style="list-style-type: none"> • Ensures that countries affected by public health emergencies such as epidemics can have access to medicines regardless of patent protection. • Allows member states to circumvent TRIPS to gain better access to essential medicines. • Adopted by the WTO Ministerial Conference in November 2001.
WHO International Health Regulations (IHR)	<ul style="list-style-type: none"> • Requires member states to notify the WHO if and when specific diseases occur on their territory, and offers WHO consultation and technical cooperation to members to enhance epidemic control and containment within their borders. • Includes a travel advisory strategy (based on the SARS experience) for when epidemics become widespread. Countries that cannot halt transmission within their territories and continue to export infection through travel are at risk of advisories. • After World War II, member states of the newly formed WTO adopted the International Sanitary Regulations, which became the International Health Regulations (IHR) in 1969. Minor modifications were made in 1973 and 1981.

every economy, particularly those whose livelihoods depend upon poultry both for trade and nourishment. Considering that a large percentage of poultry—even from affected countries—is safe, an embargo on the poultry trade would not only be unlikely to prevent the spread of the disease, but would also usher in severe economic repercussions. Nevertheless, because consumers tend to be risk-averse, the demand for poultry and eggs has decreased drastically in many countries, straining the industry even within economies free from infection.

Trade and travel embargo strategies are only effective in excluding the infectious agent if the agent is not already present in the importing country. Given the wide-ranging geographical scope of avian influenza outbreaks over the past three years, avian flu is now present in most Asia-Pacific countries. Thus in most countries in the region, the goal of a disease-free status is unattainable. Thailand, among others, has clearly articulated this in its national pandemic planning. Nevertheless, the SPS Agreement has increasingly emphasized *regionalization of risk*, a formulation that gives member countries the chance to provide evidence that certain regions in the country may be disease-free and therefore safe to conduct trade with. As a result, even in countries where an infectious agent is present, zones may exist where the risk of exporting a contagion is minimal. Because the documentation of risk-free zones is difficult, however—if not impossible, given the lack of regulations and logistical hurdles in monitoring vast geographical spaces—this strategy has not been widely employed by Southeast Asian countries.

Vaccination of fowl. In order to prevent importing countries from implementing unnecessary embargos on poultry imports and exacerbating the economic situation for many whose income relies upon the poultry trade, several exporting countries have initiated the widespread vaccination of fowl in an effort to prevent disease infection. For example, Beijing has announced that China intends to vaccinate all poultry within its borders against avian influenza. After a number of infections were discovered in Hong Kong in 1997, the entrepot began requiring vaccination of all poultry, and has been since spared any additional cases of avian influenza. Vietnam, along now with France and Russia, are also vaccinating poultry. Although these vaccination strategies have proven effective in reducing human contagion from fowl, countries that implement such programs are still not guaranteed a “disease free status” under the SPS agreement. There are

concerns, particularly in the United Kingdom, that in some cases vaccination may do nothing more than mask the effects of disease, thereby making detection more difficult and further contagion more likely. Because vaccination alone is not 100% effective in preventing the spread of disease, policymakers cannot consider vaccination to be an equally effective alternative to trade sanctions. Consequently, trade barriers imposed on large exporters such as China will likely remain in place.

As the number of vaccinations in Asia and Europe increases, the widespread belief that vaccination eradicates the presence of disease may lead to a concurrent rise in the cross-border trade of poultry products. There are numerous regional and bilateral free trade agreements in place that will facilitate the economic recovery process for the region. If vaccination measures ultimately fail to prevent widespread human disease, however, the WHO will almost certainly announce stringent travel advisories (similar to those seen during the 2003 SARS epidemic) warning against public travel to areas struggling to contain epidemics.

Travel advisories. WHO travel advisories during the SARS outbreak, and the extensive media coverage they received, caused a precipitous drop in travel to almost every country in the Asia-Pacific other than Japan. In order to remove their country from the WHO list, authorities in the affected countries adopted a variety of measures designed to meet two crucial WHO regulations: 1) reduce transmission within the population, and 2) prevent infected individuals from boarding airplanes. From the perspective of the WHO, appeals to remove a country's name from the travel advisory list were futile so long as goods from that country were simultaneously being traced as the sources of contagion in other areas. From the perspective of the affected countries, policymakers were faced with the apparent contradiction of restricting the movement of their own traveling public while attempting to sustain day-to-day operations and economic activity at the same time. Those countries that were required to enforce bans on domestic travel suffered doubly, as the combined drop in domestic and international tourism—and the trade such travel facilitated—fast became economically crippling.

The lasting effects of those travel bans were enormously damaging to the economy of the Asia-Pacific. Before the SARS epidemic, China, was the

most attractive place for foreign investment. The perception that the Chinese government grossly mishandled the epidemic, however (by misreporting the number of cases and employing questionable quarantine enforcement measures) fueled uncertainty regarding the government's ability to deal with public challenges effectively—a problem that could one day create economic instability. Though the economy has recovered and foreign investment in China continues to pour in, an avian flu epidemic—especially if it were to reach pandemic proportions—could threaten the multitude of low-cost factories that help keep inflation and prices down across the world. Without sustained foreign investment in China, the prices of goods across the world may start to rise, ultimately threatening the rest of the world with higher prices in inflation.

Aside from the economic impact of an avian flu pandemic, some national authorities may restrict ingress into the country or attempt to minimize panicked out-migration from infected areas.¹ Such efforts would be geared toward preventing an influx of infected tourists on national health systems already burdened with ill patients.

Intellectual property trade measures—antiviral drugs for humans. Faced with the looming threat of a human avian influenza pandemic, authorities in countries around the world are scrambling to ensure that their supply of medicine and vaccines is sufficient to withstand the effects of a pandemic. Under the 2001 Doha agreement of the World Trade Organization (WTO), countries affected by public health emergencies such as epidemics are guaranteed access to appropriate medicines regardless of patent protection. The Trade-Related Aspects of Intellectual Property Rights Agreement (TRIPS), which sets down minimum standards for most forms of intellectual property regulation, has

This compulsory licensing safeguard...is essential for poorer countries, which often lack the technical and economic capacity to manufacture their own cheap medicines.

¹ During the “black plague” epidemic in Surat, India in 1994, between 400,000 and 600,000 people fled from the infected area to other parts of India, carrying contagion with them.

termed this process “compulsory licensure.” This compulsory licensing safeguard allows governments to override patents and authorize the production and import of cheap generic versions of newly patented medicines. This safeguard is essential for poorer countries, which often lack the technical and economic capacity to manufacture their own cheap medicines.

Compulsory licensure has placed pressure on the pharmaceutical company Hoffman La Roche to liberalize its patent on oseltamivir phosphate (popularly known as “Tamiflu”), a drug considered to be effective in preventing and treating human influenza. Rather than face the prospect of compulsory licensure, Hoffman La Roche has chosen to work with numerous Asian governments and companies to launch widespread production. Taiwan, Thailand, and India are also producing generic versions of the drug. Interestingly, at the time of the agreement in 2001, the United States and 22 other developed countries decided to eschew the compulsory licensure system. Whatever the initial motivation, opting out of the agreement may now effectively prevent developed countries from importing generic versions of Tamiflu made by companies in other countries.

Although patent protection is of central importance to industry, there may be good reason to relax patent protection during times of pandemic threat. For instance, under such crisis circumstances, the cooperative licensing of a drug under patent would allow for more widespread access than would strict enforcement of international intellectual property laws.

These patent law concerns surrounding Tamiflu are not unprecedented. Indeed, in the 1990s, developing countries that lobbied for greater access to affordable medication for HIV/AIDS also raised similar concerns. As a result, access was granted to generic versions of anti-retroviral drugs. Additionally, during the anthrax scare in 2001, the U.S. government threatened to override Bayer Corporation’s patent on the drug Cipro. Bayer subsequently lowered the cost of the drug significantly and promised to make ample supplies available in the event of an emergency.

Implications for a Pandemic Flu Outbreak

Trade embargos. The SPS, TBT, and TRIPS agreements all include language that requires governments that implement trade embargos to provide clear evidence justifying their use. During times of pandemic threat, such language becomes ever more important. Though the nature of such “evidence” may come under dispute, the need for tangible evidence of a threat still exists. In order to avoid the unnecessary disruption of trade and economic activity, international adherence to evidence-based agreements is essential.

Vaccination. Mass vaccination is a useful strategy for protecting domestic poultry markets against avian flu. With regard to the international trade in poultry, however, mass vaccination against avian flu has received mixed reviews. Vaccination alone will not be sufficient to control a pandemic flu outbreak among poultry. Only when used in conjunction with the culling of diseased or exposed poultry, strict biosecurity and quarantine measures, and other procedures aimed at preventing further spread of the disease, can vaccination be considered to be effective.

Travel advisories. WHO and CDC travel advisories—and the enforcement of such advisories—will be extremely important during a pandemic. Countries should implement no-fly provisions similar to those enforced in Hong Kong during the SARS epidemic in 2003. No-fly provisions require local authorities to take responsibility for keeping infected people from boarding planes to other countries. Governments must consider whether a neighboring country or trading partner would close airports to travelers from an affected country.

Property protection. The liberalization of medical patent licensures is completely appropriate both for purposes of preventing and preparing for an avian flu pandemic as well as attempting to maintain the stability of industry. Though international law is often difficult to enforce, compulsory licensure (as outlined in the TRIPS agreement) during times of severe public health threats will place pressure on the pharmaceutical industry to license important drugs more freely. Companies comply with these agreements both to avoid losing exclusive patent rights as well as to protect their reputation.

Avian Flu Pandemic

Panel #2:
Delineating Public and Private Sector Roles

Ming-liang Lee

National Health Research Institutes

Melinda Moore

RAND Corporation

Andrina Lever

Lever Enterprises

Roberto Romulo

Philam Insurance Co.

K. John Pournoor

3M

Joseph H. Alhadeff

Oracle Corporation

Lessons Learned from the SARS Outbreak in Taiwan

Ming-liang Lee

MING-LIANG LEE (MD, PhD) former Minister of Health in Taiwan, is Director of the Center for Health Policy Research and Development at the National Health Research Institutes in Taiwan. During the SARS crisis, Dr. Lee coordinated Taiwan's efforts to halt the spread of the disease.

The world is now threatened with a new emerging infectious disease: the potentially fatal “avian flu” (or H5N1), a disease for which there is currently no effective vaccine nor curable anti-viral drug. Though of short duration, outbreaks of infectious diseases usually result in a disproportionately high number of casualties, and can cause major economic disruptions. A good example of this is Severe Acute Respiratory Syndrome (SARS). The outbreak of SARS in Taiwan began in late April 2003 and ended in early June of the same year. In 2003 alone SARS exacted an economic loss of US\$4.6 billion in Taiwan and US\$59 billion in East and Southeast Asian Countries. Taiwan’s GDP growth retarded by 0.5%, while East and Southeast Asian Countries declined by 0.6%—extraordinary losses by any measure.¹

Though avian flu is certainly cause for concern, overreaction to the outbreak may be just as deadly as underreaction. In Taiwan SARS infected only 346 people and resulted in just 73 deaths—numbers that are almost negligible when compared to those from other disasters. For instance, the annual death toll from seasonal influenza in Taiwan numbers over 3,000; similarly, automobile accidents account for 4,000–5,000 deaths per year on the island.

The public’s hysterical reaction to the SARS outbreak, however, was such that national security became imperiled: foreigners left Taiwan in a mass exodus, businesses shut down, the educational system was disrupted, and emergency medical systems were saddled with overwhelming burdens. No government should underestimate the potential dangers of epidemics as well as their threat to national security.

This essay is organized as follows. The first section seeks to explain the strategies that Taiwan developed in order to meet the challenges posed by the SARS crisis. The second draws lessons for how countries can work to prevent, or at least mitigate, future crises. There are two major findings. First, a general sense of complacency, combined with ignorance of the disease on the part of both medical professionals and the public, was largely responsible for the rapid spread of SARS in Taiwan. Second, lessons from the SARS pandemic make manifest the need to ensure that the public is fully aware of contagious diseases and properly

¹ Figures derived from Asian Development Bank, “Assessing the Impact and Cost of SARS in Developing Asia.” *Asian Development Outlook 2003 Update*, 75–92.

educated concerning how such diseases are spread. By such means panic can be avoided, the disease can be contained, and any outbreak thus stopped short at an early date. As with all social problems, education is the cheapest, most effective, and most fundamental solution.

Containing the Pandemic

Though vaccines and anti-viral drugs are important, the “three i’s”—information, identification, and isolation—proved to be the deciding factors in how the government and people of Taiwan stopped the spread of the disease once it arrived on the island.

Information. In the midst of an outbreak the government created an emergency meeting place as a temporary command center with all necessary communication facilities.

This center provided an avenue for representatives from the ministries of Internal Affairs, Labor, Defense, Transportation, Finance, Economy, and Education to meet. These individuals were authorized to represent their own ministries on any relevant issue and, if necessary, could

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communicate directly with their superiors to solve the issue on the spot.² Four regional epidemic control centers were also established to coordinate the control of outbreaks within the defined areas. This arrangement greatly facilitated the capacity of the authorities to gather information; engage in on-site, daily problem solving; and then execute decisions.

² After the epidemic, the government carefully re-evaluated the structure and function of this group, and established a new permanent National Health Command Center (NHCC) (essentially an expanded version of the U.S. Secretary Command Center) within the Center for Disease Control. This center now operates 24 hours per day, 7 days per week.

More specifically, in combating an outbreak of any transmittable disease, governments must have information regarding the critical signals or breaks in the infection process. The characteristic symptom of SARS can be expressed in the phrase “no fever, no transmission.” This information was uncovered by scientists and transmitted to Taiwan.³ The command center and regional control centers worked quickly to disseminate this information across the island.

Identification. The realization that all SARS patients exhibit fevers enabled authorities to promptly implement two important measures: 1) mandating the measurement of body temperature before allowing access to public areas (including schools, restaurants, pubs, theaters, and other public buildings), and 2) installation of infra-red heat detectors in all the entryways of air and seaports.

Isolation. Throughout the epidemic, most of the afflicted patients (305, or 88%) were confined to hospitals in two of Taiwan’s largest cities—Taipei in the north and Kaohsiung in the south; with the exception of these two cities and their immediate environs, the majority of the country remained SARS-free. Worth noting is the fact that, out of the total 346 SARS-inflicted patients, 248 (72%) were infected within hospitals.⁴

This realization led the government to increase efforts to isolate cases—or potential cases—of SARS carriers. The first line of defense was the establishment of “fever clinics” just outside of every major hospital, thereby allowing doctors to quickly identify and isolate all febrile patients. As an added measure, Taiwanese citizens were instructed to isolate themselves and report to the public health agencies immediately in the event of a fever. When necessary, evacuated military camps and unoccupied public buildings were also used for isolation purposes.

All together, the government isolated 150,628 people, most of who were confined to their own homes. Isolated patients, though not allowed to depart without permission, received daily visits from public health workers. In some cases

³ Based on thorough tracing of our own cases, as well as communication with the U.S. Center for Disease Control and health officers of the WHO, Hong Kong, and Singapore, we concluded that there was no evidence of transmission from asymptomatic persons.

⁴ Following an assessment of the SARS crisis, the medical community has implemented a new infectious disease prevention program for hospitals that includes training and the hiring of more specialists in the public health agencies.

(4,063, or 2.6%), surveillance monitors were installed within main entryways in order to ensure that no one left the premises without authorization.⁵

Lessons from Taiwan's SARS Experience

Importance of government communication. The experience of the government and health care community in combating SARS in Taiwan has taught us that the most important tasks in combating an infectious disease are the arousal of public awareness and public cooperation. The early stages of the SARS outbreak on Taiwan created an unprecedented social panic that stemmed partially from incomplete medical information but was mostly due to distorted, greatly exaggerated news reports from the media. Shopping malls and restaurants were deserted, and public transportation—both air and land—ground to a virtual halt. The SARS phenomena caused an enormous economic downturn on the island, including the closing of many businesses in Taiwan.

Numerous initiatives were adopted in order to reverse the situation. The government set up twenty-four hour regional hot lines that were manned by local medical practitioners; physicians as well as nurses answered phone calls, gave advice, and, if necessary, arranged referrals. Authorized health officers held daily news briefings and, whenever necessary, additional news conferences were arranged to counter rumors. Most importantly, the commander-in-chief of Taiwan's anti-SARS efforts provided five-minute television updates three times per day in several languages regarding the number of SARS cases, test results, patients admitted to and discharged from hospitals, and other important information. The chief's daily television appearances—viewed by 80% of the general public—played an extremely important role in the control of the outbreak.

A massive public campaign was also launched to urge strict practice of personal hygiene such as washing hands, using masks when necessary, maintaining a clean living environment, cleaning work surfaces with anti-septic solution, and avoiding unnecessary exposure to crowds. Washbasins were set up at all hospital

⁵ In retrospect, Taiwan's isolation policies were often controversial, perhaps unconstitutional, and may have even violated human rights. Such concerns never became issues during the outbreak, however, suggesting that the general public was willing to sacrifice certain individual rights for the sake of public safety. As we look to the future, the legality of individual and group containment measures must be clarified.

entrances, and visitors were required to wash their hands before entering and leaving the hospital. Notably, during 2003 the number of patients inflicted with viral infectious diseases other than SARS was greatly reduced. Compared to 2002, the year before the outbreak of SARS, patients exhibiting positive viral cultures in general dropped from 3,567 per year to 2,376, a decrease of one-third. Toward the end of the outbreak, Taiwan held a ten-day national public health exercise in which 75% of the population participated.

Sound public infrastructure. Because Taiwan maintains a comprehensive and efficient public health infrastructure (which enables authorities to mobilize the various component health subsystems in a very short period of time), no community outbreaks of SARS occurred throughout the entire epidemic. Public health workers, together with medical personnel, were the first to investigate suspected flu cases, report them to authorities, and advise the patients on proper daily care. These workers paid daily visits to the patients (who were quarantined in their own residences), ensured that body temperatures were taken, and often delivered meals and other necessities. The above examples should make clear that a sound public health infrastructure is one of the most essential factors in successfully combating any infectious agent, whether old or new.

International cooperation. Finally, the fact that infectious diseases do not heed national boundaries cannot be emphasized enough. SARS was brought to Taiwan by a Taiwanese businessman who had just returned from an infected area in China. Developing a fever and respiratory symptoms soon after returning to Taiwan, he visited several medical clinics before finally ending up at a major metropolitan hospital in Taipei. Because the patient did not inform his doctors that he had just returned from China, his doctors failed to make an accurate diagnosis of this new disease. By the time his doctors finally realized the gravity of the situation, many more people had already been infected—including several health care workers through whom the pathogens were transmitted to many more patients. The disease quickly jumped from one hospital to another, causing chaos throughout the entire medical care system.

SARS ultimately infected people in 30 different countries and adversely affected the global economy. Consequently, there should be no gaps in the global prevention network of infectious diseases. No place is safe unless every place

is safe. Because Taiwan was not a member of the World Health Organization (WHO), the WHO office in Geneva repeatedly ignored Taiwan's request for advice. Experts from the WHO finally did arrive, for which the people of Taiwan are indeed very grateful. The fundamental lesson taken from the SARS epidemic is, however, that human health should be viewed as a global concern irrespective of race, religion, and economic and political status. As clearly stated in the WHO charter, human health is a fundamental human right.

Influenza Surveillance in the Asia-Pacific Region: A New Role for Business

Melinda Moore

MELINDA MOORE (MD, MPH) is a public health physician and Senior Researcher with the RAND Corporation. Previously, she worked for nearly 25 years with the Department of Health and Human Services, focusing primarily on global health, and also served as the first chair of the APEC Health Task Force from 2003 to 2005.

The Asia-Pacific region has both a large stake in, and a large responsibility for, detecting and responding quickly and effectively to the threats posed by a new global influenza pandemic—not least because Asia has historically been the epicenter for the emergence of new influenza viruses, and experts believe that the next pandemic will begin there. Moreover, public health surveillance is the foundation for disease detection and effective response. Therefore, efforts to improve influenza surveillance should be a cornerstone of pandemic influenza preparedness. This entails the improvement of human disease surveillance and the strengthening of animal disease monitoring capabilities.

The intersection of the public and private sectors offers promising opportunities for the improvement of influenza surveillance. Though the business community has not been a traditional partner in global public health initiatives, the argument that business should engage in pandemic influenza preparedness is growing more persuasive. By working together with governments, business leaders from all industrial sectors can be engines for local, regional, and global initiatives to enhance influenza surveillance through such fora as APEC, ASEAN, and the World Economic Forum. Such leaders can help the Asia-Pacific region improve influenza early warning systems and attempt to mitigate the impact of the next pandemic.

This essay is structured as follows. The first section sets out arguments for why influenza surveillance must be strengthened in the Asia-Pacific region, and a discussion of tactical strategies for doing so follows. The final section highlights specific opportunities for the business community to participate in these efforts by utilizing their specific product and service lines, inherent business capabilities, and sense of corporate social responsibility.

The Case for Strengthening Influenza Surveillance in the Asia-Pacific Region

Pandemic preparedness, with surveillance as its cornerstone, is critical for the Asia-Pacific region for both epidemiologic and economic reasons. The epidemiologic case is based upon a number of factors. Both the high volume and relative speed of international travel today provide easy channels for the rapid and far-reaching spread of disease. Experts predict that a pandemic will infect

a significant proportion of the world's population within a relatively short time-frame. For example, the United States could see a 30% infection rate among its citizens.¹ Those countries that are the first to experience a pandemic will have less time to respond, and would therefore benefit most from better preparedness. Historically speaking, Asia has long proven to be fertile ground for the rise of new influenza viruses, and experts believe that the next pandemic will also begin there. Therefore, the epidemiological argument is most cogent for the Asia-Pacific region.

The economic case for preparedness in the region derives from the structure and strength of Asian economies. The economic strength of the region—the 21 economies of the Asia-Pacific Economic Cooperation (APEC) together account for approximately half of the world's trade and 60% of global GDP—also means that more is at stake should a pandemic strike.² With the international travel sector representing approximately 10% of the world's economy, the early impact of a pandemic would send tremors throughout the transportation, tourism, hospitality, and entertainment industries, and would ultimately impact international trade and financial markets. Economies most reliant upon these sectors would suffer the most.³

...Asia has long proven to be fertile ground for the rise of new influenza viruses, and experts believe that the next pandemic will also begin there. Therefore, the epidemiological argument is most cogent for the Asia-Pacific region.

¹ HHS Pandemic Influenza Plan, Part 1, November 2005, page 18, <http://www.pandemicflu.gov/pandemicflu/plan/pdf/part1.pdf>.

² Economic statistics are drawn from the APEC website, <http://www.apec.org/apec/tools/faqs.html#Q9>.

³ See the comments of Dr. Sherry Cooper, Executive Vice President, BMO Financial Group, spoken during a national conference on business preparedness for pandemic influenza in Toronto, in Robert Roos, "Business Leaders Urged To Plan For Severe Flu Pandemic," Center for Infectious Disease Research and Policy, February 14, 2006, http://id_center.apic.org/apic/influenza/panflu/news/feb1406summit.html.

A February 2006 study from Australia's Lowy Institute examined the global macroeconomic consequences of pandemic influenza for four different scenarios.⁴ The study models the impact of a pandemic influenza on the labor force, vulnerable service sectors, production costs, and market demand for goods and services. Under a worst-case scenario, the study projects 142 million deaths worldwide (including 28 million in China) and global economic losses of \$4.4 trillion—12.6% of global GDP. That figure is greater than the annual GDP of Japan, the world's third largest economy. Another recent report describes a new "economic risk exposure" index that indicates Hong Kong, Singapore, China, Malaysia, and Thailand as the economies most vulnerable to an emerging pandemic.⁵ These studies validate the emerging recognition of the serious impact a pandemic could have on all sectors of society. Indeed, recent attention to pandemic influenza across not only health but also political, economic, security, and business sectors is unprecedented. The potential economic impact of a pandemic in the Asia-Pacific region provides further impetus for the region to prepare for the likely impact of a pandemic.

The Shifting Focus of Influenza Surveillance

Public health surveillance—"information for action"—is the cornerstone of disease control and has traditionally been the purview of government health ministries. Whereas health ministries focus mostly on human disease, agriculture ministries concern themselves with animal and plant disease. Human influenza surveillance involves the monitoring of clinical disease cases and laboratory test results. Such surveillance serves multiple purposes: early outbreak detection, isolation of novel strains (including vaccine candidates), and the tracking of the spread of a disease. Clinical disease reporting typically comes from selected service delivery sites, often with substantial delays. Laboratory surveillance on a global scale is anchored in the WHO Global Influenza Surveillance Network (GISN). National Influenza Centers exist in 83 countries worldwide, and in

⁴ Warwick J. McKibbin and A.A. Sidorenko, "Global Macroeconomic Consequences of Pandemic Influenza," Lowy Institute for International Policy, February 2006, <http://www.brookings.edu/views/papers/mckibbin/200602.htm>.

⁵ Bio Economic Research Associates, LLC, "Thinking Ahead: The Business Significance of an Avian Influenza Pandemic," http://www.bio-era.net/research/add_research_18.html.

most countries in the Asia-Pacific region (including 19 of APEC's 21 member economies). Three of the WHO's four GISN Reference Laboratories are located in APEC economies. Although current surveillance may be effective in monitoring seasonal influenza, ensuring the timely detection of a pandemic influenza virus wherever it may arise will require greater efforts. Moreover, a government's human public health infrastructure is typically much stronger than its veterinary public health infrastructure, thus leaving even greater gaps in animal influenza surveillance.

Evaluating surveillance. There are three hallmarks of good disease surveillance worth noting here: adequate coverage (across and within countries), quality, and timeliness. Strategies for improving influenza surveillance *coverage* include expansion of surveillance efforts to more countries, increasing the number and density of traditional surveillance reporting sources, adding new types of reporting sources, adding new indicators for human disease, and tracking animal disease occurrences in a more comprehensive fashion.

Surveillance *quality* can be improved through increased accuracy in clinical diagnoses of animals and humans, greater laboratory diagnostic capacity (e.g., skills, equipment, and quality assurance), increased sharing of virus strains for molecular epidemiologic tracking and potential vaccine development, improved data integration (e.g., of various information signals across animal and human disease), and the strengthening of epidemiologic capacity for surveillance analysis and outbreak investigation.

The *timeliness* of reporting can be improved through tactical strategies to strengthen information technologies (e.g., equipment and connectivity, and other rapid communications modalities), increase the use of active data collection from sources (rather than rely on passive reporting), improve data flow and processing efficiency from the local to the national level (e.g., processes, systems, and technologies), facilitate motivation to report animal and human disease, and develop and deploy accurate rapid diagnostic tests that can be used at the local level.

Approaches to improving surveillance. The first approach in improving influenza surveillance is to strengthen traditional government surveillance infrastructures and ensure accurate laboratory diagnosis, timely laboratory and

disease reporting, processing and analysis of surveillance information, and timely and effective response to outbreaks. A second approach to surveillance is to integrate new types of information and new ways of capturing and transmitting such information.

New partners can help with both approaches. Though governments remain responsible for central surveillance functions, we must identify both potential new actors and the ways in which they can help improve the coverage, quality, and timeliness of government surveillance. New partners in the academic, nongovernmental organization (NGO), missionary and business communities can contribute to surveillance coverage by serving both as new sources of human case reporting within existing government surveillance systems and new types of information such as work or school absenteeism. Some of these new partners can contribute to much-needed improvements in animal disease detection and reporting (i.e., mass deaths among domestic, commercial, or migratory birds or other susceptible animal species, and other unusual events). Enhanced animal disease surveillance involves educating the population to detect and report such occurrences, thereby facilitating disease diagnosis and safe handling of animals, and creating adequate incentives for disease reporting. New partners can contribute to surveillance quality by providing laboratory and epidemiology training, laboratory equipment and supplies, their own laboratory surge capacity, more samples from ill patients for laboratory testing, and support to local and national authorities to improve data integration. Some new partners may be well-suited to facilitate more timely reporting of cases to surveillance authorities (e.g., through deployment and even development of new diagnostic and information technologies, support for active surveillance, assistance with surveillance processes and systems, and policy incentives to promptly report animal or human influenza cases).

The preceding discussion indicates that the focus of influenza surveillance is shifting in many dimensions and must continue to do so:

Traditional		New
purely government function	→	broader range of partners
focus on human disease	→	expansion of focus to include animal disease
selected reporting sites	→	more reporting sites
passive data reporting	→	selective use of active data collection
limited laboratory testing	→	more and better laboratory testing
time-consuming lab tests	→	new (“rapid”) diagnostic tests
slow reporting, processing	→	new information technologies and methods

Private Sector Opportunities to Help Improve Influenza Surveillance

The challenges of an influenza pandemic call for vision and leadership from both the traditional public sector and new private sector partners. The public sector must understand the private sector’s stake in minimizing the spread and impact of a pandemic as well as the potential of this sector to help improve influenza surveillance. For its part, the private sector must first understand the impact that a pandemic can have on business interests and then look beyond the legitimate interest of business continuity (e.g., workforce, supply chains, markets, and financial flows) to find concrete ways to support disease surveillance as a strategic business priority. A report published by the Bio Economic Research Associates reinforces this role, noting that “Small upstream investments in prevention and early detection may be more effective than larger investments further along the chain.” Although there is no simple recipe to guide business action in the Asia-Pacific region, some illustrative examples may be helpful.

Integrate employee healthcare into national surveillance. The first area for action relates to the healthcare services provided by or through employers. Most businesses worldwide probably provide healthcare coverage for employees and their families either directly or through reimbursement. Companies providing direct services through their own clinics and providers can sensitize their staff to clinical diagnosis and reporting and, when warranted, support laboratory testing.

Those companies that provide reimbursement also have options to consider, such as sensitizing local providers to clinical suspicion and influenza diagnosis, providing specimen collection materials to workers and family members so that they can be tested, and providing equipment and supplies to local laboratories to support influenza testing. All businesses can consider ways to encourage their workers to note and report suspicious animal diseases and to promptly seek clinical care if they develop an illness symptomatic of influenza. Businesses can also work to ensure that all influenza cases in workers and their families are reported to the appropriate public health surveillance authorities. All of these strategies will help to improve coverage, quality, and timeliness of surveillance.

Utilize relevant business strengths. A second area for action would draw upon the inherent capabilities of businesses, whether through their own product and service lines or through more generic business capabilities. For example, successful businesses with well-developed data systems may be well-suited to share their expertise in support of timely reporting and data integration; others may have supply chain expertise relevant to influenza surveillance, such as knowledge of logistics and distribution of laboratory supplies and data tracking. The information technology sector is particularly strong throughout the Asia-Pacific region.

How can businesses work with governments to channel these strengths into improved disease surveillance processes and systems? Is there a role for strengthened telemedicine and telehealth efforts? Korea, for instance, is leading an “e-Health” effort within APEC. Might this effort, or related efforts, be applied to improve influenza surveillance in the region? Are there business interests in the region that can develop accurate rapid diagnostic tests practical for local use, thereby improving clinical diagnosis and disease-specific surveillance signals? Which business partners are best suited to help strengthen animal disease surveillance and reporting? Finally, can businesses contribute to policy incentives for diagnosing and reporting influenza in animals, including domestic, commercial, and migratory birds?

Corporate social responsibility. A third area for action relates to corporate social responsibility (CSR), a growing interest among business leaders in the Asia-Pacific region. The annual convention (since 2002) of the Asian Forum for

Corporate Social Responsibility (to be held this year in Manila) and the more recent convention of Ethical Corporation Asia conferences (held in Singapore in 2003 and Hong Kong in 2004) stand as testament to this growing interest. Matthew Anderson of Ogilvy Public Relations Worldwide makes a strong case for linking branding and CSR in Asia, noting, “Marketers have realized that what motivates people to buy products is far more complex today...[branding and CSR] entails taking responsibility for the way your entire business affects society.”⁶ He cites studies from Hong Kong and elsewhere in Asia as indications that consumers avoid brands “whose parent company was not a good corporate citizen” and switch to brands associated with good causes. In the case of pandemic influenza, because businesses are likely to be impacted, they are already motivated through self-interest. Beyond this, CSR interests could spur financial or other types of support for selected surveillance strategies, even if these strategies do not fall directly within the business product and service line. For example, distribution of laboratory or other surveillance materials need not be restricted to transportation companies, and information technology equipment and application support can be provided by businesses beyond the IT sector.

Conclusion

When it comes to the prospect of pandemic influenza, business as usual is no longer appropriate for either the public or the private sector. Now is the time to harness the collective interests and capabilities of public and private sector partners. Effective disease surveillance should be the cornerstone for such efforts. Vision, leadership, and action are needed from all stakeholders. Every business should ask itself how it can specifically support influenza surveillance based on specific product/service line, inherent business capabilities, or more socially motivated interests. Business leaders can be an engine for regional and global initiatives, including surveillance initiatives, by working together with governments through such fora as APEC, ASEAN, and the World Economic Forum.

⁶ Matthew Anderson, “Branding and Corporate Social Responsibility Go Hand in Hand in Asia,” Ogilvy Public Relations Worldwide, Expert Views, <http://www.ogilvypr.com/expert-views/branding-corporate-responsibility.cfm>.

In the Asia-Pacific region, the challenges related to pandemic influenza are clear—perhaps clearer than in any other region in the world. The key actors are well qualified—perhaps better qualified than in any other region. This essay has pointed out some opportunities that exist for the business community to actively help improve regional influenza surveillance and, in doing so, thus contribute to the early detection and effective control of the next influenza pandemic.

Business, AI, and APEC: Putting Rubber to Road—A Response Plan for Every Business

Andrina Lever and Roberto Romulo

ANDRINA LEVER is the founder and president of Lever Enterprises. In 1998 the Prime Minister of Canada appointed her as a representative to the APEC Business Advisory Council (ABAC), where she now chairs the Capacity Building Working Group. She holds a B.A. from Texas Tech University and a law degree from Polytechnic of Central London.

ROBERTO ROMULO is Chairman of Philam Insurance Company, Inc. A Philippine representative to ABAC since 1996, Mr. Romulo chairs the Action Plan Monitoring Committee. Previously with IBM for 25 years, he was General Manager in Thailand, Burma, Bangladesh, and President of IBM Philippines. From 1989 to 1992 he served as the Philippine ambassador to Belgium, Luxembourg, and the European Communities, and as foreign secretary from 1989 to 1992. He holds an AB from Georgetown University and a LLB from Ateneo de Manila University.

As the possibility of a human pandemic arising from the avian H5N1 virus has grown increasingly salient in the past year, governments and businesses worldwide have turned their attention to preventive efforts designed to combat the spread of the virus. The business community is acutely aware that the workplace will be on the frontline of efforts to contain the impact should the avian flu virus evolve into a human-to-human transmissible disease. Though the workplace will become a primary place for potential transmission, business continuity will prove key to mitigating the economic impact of a pandemic. Even during a crisis, the private sector is responsible for providing most essential human services. The 2003 SARS outbreak taught the private sector significant lessons regarding the human and economic tolls of an epidemic. Although recent news headlines have focused attention on the threat of an avian flu pandemic, business owners will require even greater guidance in attempting to understand and prepare for possible contingencies. Because the business community cannot achieve this goal alone, collaboration between the private and public sectors will be critical.

The SARS outbreak, the 2004–05 Indian Ocean tsunami, Hurricane Katrina, the September 11 terrorist attacks in the United States, and other “events of scale” (i.e., natural disasters, large scale accidents, terrorist actions, or infectious diseases) have led international organizations such as the Asia-Pacific Economic Cooperation (APEC) forum to recommend that businesses and governments implement emergency planning procedures.¹ If businesses are to be expected to continue to provide essential services both during and after these “events of scale,” then public-private emergency preparedness cooperation between both sectors is essential.

In the event of a large-scale disaster, collaboration between the public and private sectors will also help to drastically minimize potential economic repercussions throughout the world. All businesses, including small and medium-sized enterprises (SME), will benefit both from pro-active participation in collaborative public-private disaster preparedness efforts and by incorporating business continuity planning into their general business strategies. The public sector can likewise benefit from this collaboration. To the degree that business would continue to provide essential services and goods during a crisis, government

¹ The Asia-Pacific Economic Cooperation (APEC) organization is made up of the governments of twenty-one economies surrounding the Pacific Rim.

can focus on public health and order. If governments are forced to become the sole providers of food, water, power, information, and other services, however, the accumulated burden placed upon the public sector might threaten to strain government resources and undermine the maintenance of public order. By sharing these responsibilities with the private sector, government could reduce its burden as the sole provider of emergency relief. Moreover, by utilizing the orderly business response to an event of scale, public-private collaboration will be able to accelerate economic recovery. Finally, the self-analysis inherent in business disaster preparedness planning (e.g., evaluating networks, supply chain, customer service, and personnel functions) could prove useful in streamlining everyday operations.

Educating business owners and government officials regarding the threat, risks, and consequences of a crisis such as a pandemic is not difficult. Attempting to articulate and coordinate the logistics of a planned response from each and every business both with each other and with government at the local, national, and regional levels, however, is a formidable challenge. This essay therefore addresses the following key aspects of this challenge: 1) how to empower businesses, in particular SMEs, to develop informed, effective pandemic preparedness plans and ensure business continuity in the event of an outbreak, 2) how to create transparency in government plans, 3) how to facilitate communication and collaboration between the public and private sectors, and 4) how the media can help the public and private sectors both understand and prepare for the health threat.

Though the workplace will become a primary place for potential transmission, business continuity will prove key to mitigating the economic impact of a pandemic. Even during a crisis, the private sector is responsible for providing most essential human services.

Empowering Small and Medium-sized Enterprises

Many large national and multinational corporations have created avian flu response plans. This is particularly true in Southeast Asia, where businesses learned valuable lessons from having to cope with the economic impact of SARS. Although official statistics have not been compiled, most of the SMEs around the Pacific Rim (with the possible exception of those in Southeast Asia) likely have yet not formulated or even considered formulating any such response plan. Aware of media reports announcing the threat and spread of avian influenza, many SMEs nonetheless remain only dimly aware of the challenges they face and wholly ignorant of the potential impact on their livelihoods. Many SMEs cite “resource constraints” as the primary reason preventing them from diverting the time and resources necessary for effective planning. Some SMEs view pandemics as theoretical or “foreign country” problems; others see them as an “act of God” about which they can do nothing. Many also consider a pandemic to be a government issue, and are waiting for instructions on how to implement planning efforts. And the occasionally dramatic nature of media reporting on avian influenza has led some business leaders to conclude that a possible pandemic may be more “hype” than reality.

Providing as much detailed information as possible will allow individual business owners to understand the basic science of the threat and the urgency of the problem. Equally important is the development of a framework from which to begin planning. Formulating a framework from scratch, without any examples or templates, is intellectually and operationally difficult for any company, whether local or multinational. Ready access to templates, checklists, and model plans that have already been created is an essential part of the process of informing business leaders of the key factors to be considered. Singapore’s template—complete with a planning framework, recommendations for appropriate action at each stage of an avian flu outbreak, and links to government planning procedures—is an excellent example.² Similarly, the U.S. government has via its own pandemic preparedness website issued a “Business Pandemic Influenza Planning Checklist.”³ Many

² The template is accessible through Singapore’s Ministry of Health website, <http://www.moh.gov.sg/corp/index.do>.

³ This website is maintained by the U.S. Department of Health and Human Services, <http://www.pandemicflu.gov>.

governments have already posted avian flu response plans online, and some include information on business planning. A number of business organizations have also posted business planning information on the Internet. Although such websites are by no means comprehensive, motivated business owners now have easy access to significant resources.

The nature of the challenges that a flu pandemic would pose to businesses would vary according size, sector, and geographic area. Those in the service industries will need to reduce instances of face-to-face exposure. Manufacturing and goods industries will need to consider supply chain and sales points, while those involved in essential services—water, power, food, transportation, health, information, etc.—will face demands for continuity within a restricted operating environment. All businesses, however, will encounter increased absenteeism from sick employees or employees caring for sick relatives, and all will have to screen employees for sickness to some degree.

Creating Transparency in Government Disaster Preparedness Plans

Governments often struggle to coordinate emergency planning both among their own diverse agencies and between national and local governments for events of scale. As a result, the extra effort required to collaborate with the private sector often gets neglected. Additionally, in order to prevent protests from those potentially affected by restrictive measures or simply to maintain flexibility of response, governments may sometimes keep confidential certain portions of its planning. If businesses are to receive the information they need to ensure that their own preparedness plans are complementary with those of the public sector, however, public-private collaboration and communication is essential. Additionally, government must be able to determine which basic services business can be counted on to perform and which services the government will need to plan for. The workplace must also be involved in carrying out public health and safety instructions from government.

The Internet is, of course, the logical starting point for governments to post plans. Interaction between frontline government officials and individual business stakeholders (particularly at the local level and in less technologically advanced economies), however, is crucial to the discussion of plans and

expectations. During such interactions, the private sector must demand from government the maximum level of transparency and detail. In cultures where deference to government authority is high, this may be difficult. Nations with advanced economies are often host to a cacophony of information; businesses must cut through the “hype” and create a plan relevant to their needs. Waiting until the pandemic threat becomes more advanced will increase the difficulty of communication across sectors and the implementation of preparedness plans. Though the government must take the lead in determining what stage the threat has evolved to, business should already know what it will do as each stage is reached.

Facilitating Public-Private Sector Communication and Collaboration

International organizations have played an active role in attempts to ensure that public-private collaboration occurs early enough to prevent or effectively combat a pandemic. The World Health Organization has issued human health guidelines for each country to follow in creating individual plans, and these guidelines form the basis of the national government plans now under development. The UN Food and Agricultural Organization has created a comprehensive plan for responding to outbreaks of avian influenza in animals, and the World Organization for Animal Health has developed specific animal health regimes that require communication and collaboration between animal owners and government to prevent or contain outbreaks.

APEC, too, is doing its part. The APEC “Initiative on Preparing for and Mitigating an Influenza Pandemic” calls for each APEC member economy to complete its plans—including stipulations for interaction with the private sector and protocols for the continuity of essential services and trade—by November 2006. Australia has undertaken a project to develop model protocols for cooperation between government and business; these models call for the preparation of information posters and cards, pre-positioning of personal protective equipment, establishing a hierarchy of essential services, relocation of essential business, protection of key personnel, and special communication channels. The United States is undertaking an initiative to conduct surveys on

pandemic influenza planning and preparedness in APEC economies, a project that should provide a scorecard of progress and identify gaps and limitations.

At a recent workshop in Singapore on “Avian Influenza and Business Preparedness,” the APEC Business Advisory Council (ABAC)⁴ endorsed twelve “Key Points for Business Preparedness,” which the organization is now seeking to disseminate more broadly to the regional business community. These points are:

- 1) **Monitor:** Each company needs to put in place a formal procedure to monitor pandemic risk stages and assess when action is necessary.
- 2) **Identify a Champion:** A senior manager of the company needs to be clearly identified as the point person to take charge of decisions related to threat assessment, movement toward plan implementation, as well as the implementation phase itself.
- 3) **Communicate—Information is Key:** Employees need to understand in advance what the company plan is and what their roles will be during implementation. Staff members responsible for liaison with government, suppliers, and customers need to be identified.
- 4) **Identify Critical Areas:** Companies need to determine what critical areas of a business’ operation are most vulnerable, with the goal of sustaining operations for up to four weeks.
- 5) **Identify Essential Personnel:** Understand what personnel are essential to keeping operations going, and cross-train employees to fill critical vacancies that may occur due to employee or family illness.
- 6) **Telecommute When Possible:** In those economies with sufficient IT infrastructure, employees should be permitted to work from home to the maximum extent possible, where the nature of the business allows it.
- 7) **Go Virtual:** Expand business with customers and suppliers online, allowing self-service wherever possible. Find creative ways to avoid unnecessary direct contact.
- 8) **Review Supply Chain and Inventory Policies:** Review where supply interruptions might occur, how they might be overcome, and what level of inventory is necessary.
- 9) **Update Personnel Policies:** Review sick leave and family leave policies, and clarify both circumstances in which employees may be asked not to report for work and company pay policies under scenarios of plan implementation.
- 10) **Plan for Forced Closure:** Understand the circumstances under which circumstances may force businesses to close, and develop staff emergency evacuation plans accordingly. Prepare to weather such a closure financially.
- 11) **Review Insurance Policies:** Understand what coverage may be necessary to mitigate the effects of a pandemic, and assess what changes may be necessary in employee health coverage.

⁴ The APEC Business Advisory Council (ABAC) is unique in being an organic part of a governmental organization; it is made up of three private sector representatives from each of the APEC member economies.

- 12) **Train Employees for Health and Hygiene:** Provide detailed information on how a pandemic virus is spread and encourage staff to take preventive measures against the spread of the virus both in and out of the workplace. Develop procedures to monitor staff, customers, and clients for early signs of infection. Stockpile necessary health supplies, such as masks, thermometers, gloves, soap, etc.

ABAC believes that the optimum response to a pandemic threat will be achieved when the pressure for public-private communication and collaboration comes from both the public and private sectors. As businesses plan for emergencies, they will seek information about government plans; alternatively, as governments focus on the value of private sector planning, they will seek information on the state of that planning.

This process is just starting, and, given the swiftness with which a pandemic could spread around the globe, progress is excruciatingly slow. In light of the extensive measures needed, however, both sectors have made a reasonable start. Only one year ago awareness of the pandemic threat was negligible and planning minimal. By this temporal comparison, many countries have already reached a higher state of readiness. ABAC's objective is to highlight the need for all companies in the Asia-Pacific region to implement an active, up-to-date pandemic preparedness and response plan (preferably as part of a greater plan to respond to "events of scale"). In order to spread this message, ABAC will use its contacts with chambers of commerce, trade associations, exporter federations, and business groups of all kinds, as well as utilize government exhortation and media coverage. Additionally, ABAC intends to impart to every business knowledge of the tools necessary to gain a thorough understand of, and the ability to plan for, a pandemic threat. Finally, as direct advisers to the APEC organization, ABAC will continue to impress upon government leaders and officials the importance of transparency and cooperation in pandemic preparedness and response between the public and private sectors.

Only when this message is disseminated widely, and public-private cooperation is robust, can we say that the rubber has hit the road and traction has been achieved.

How the Media Can Help

The world's media has played an important role in alerting most people to the existence of the avian influenza threat. This reporting has generated an excellent response in the animal health communities and other businesses dealing with animals (such as poultry) potentially susceptible to avian flu infection. This response constitutes the first line of defense.

To be certain, however, a fair amount of alarmist reporting has led some, including many in the wider business community, to conclude that the threat of avian influenza could be much ado about nothing—another Y2K scare. Such conclusions have led to the belief that money, time, and effort spent in business planning for a non-event will be wasted.

In order to make a real difference in how the world prepares for and combats the next pandemic, the media should focus more on the science of pandemics. More informational and instructive reporting may do more to advance the cause of practical pandemic preparedness. Ideally, the media would also report on plans formulated by the government and business sectors to respond to any such pandemic. SMEs would benefit greatly from journalistic feature stories concerning regional planning measures and where to access templates, checklists, and sample plans.

Surge Capacity: Bridging Readiness Gaps through International Government-Industry Partnerships*

K. John Pournoor

K. JOHN POURNOOR (PhD) 3M Company USA, is the business manager of 3M's Global Avian Flu Public Health Solutions Program. He works in collaboration with product and service leaders of many 3M divisions to serve governments worldwide.

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The threat of natural and manmade disasters is stimulating governments and businesses to raise their levels of coordination, readiness, and ability to respond to a sudden surge in patients and casualties. Just-in-time production—the ability of industry to optimize and produce goods and services at levels needed by consumers—is practiced globally. In this age of just-in-time production by providers of goods and services and just-in-time consumption by the health care and public health systems, little surge elasticity exists. Alignment with national and regional requirements demands the marriage of public health, epidemiology, and supply chain—three disciplines critical to national preparedness. The combination of the fundamental principles of public health, disaster and recovery epidemiology, and supply chain management can create a series of novel, predictive surge capacity demand planning tools.¹ In order to predict readiness, these models can fuse together country, state/province/county, and city demographics; health care infrastructure data; number and distribution of the health care workforce; and emergency response plan patient flows. Such a tool can be applied to personnel in geographically dispersed locations as well. With significant customization, one can seek to uncover strategies for the optimal distribution of assets and logistics for various scenarios envisioned by country planners. These scenarios offer an opportunity to explore the match between the health readiness profile, respond to a surge in patients, and provide policymakers with a means to establish practical guidelines with which to optimize the process and address any gaps. These new predictive tools will provide health readiness professionals with insight into their current readiness levels and will enable preparations for future judicious expansions of health delivery surge capacity infrastructure.

Public Health, First Responders, Critical Infrastructure, and Business Continuity

The SARS experience in the Asia-Pacific region taught manufacturing and distributing multinationals as well as governments many important and valuable lessons. The SARS epidemic highlighted three sectors of every economy that must be adequately prepared to respond to a nation-wide crisis.

¹ 3M has developed Demand Planning Tools to predict the needed surge in goods and services during an event corresponding to a surge in patients.

- 1) **Healthcare Delivery Network and First Responders²:** Though adequately prepared to address the SARS pandemic, this sector did not fully anticipate the national and international consequences of a global infectious disease outbreak. This sector has improved its readiness levels in the aftermath of SARS.
- 2) **Critical Infrastructure (e.g., water, electricity, transportation):** Although SARS did not seriously affect this sector, infectious disease and natural disasters certainly pose a threat to critical infrastructure. This sector has now developed emergency preparedness and response plans designed specifically to combat “Infectious Disease Outbreak and Pandemics.”
- 3) **Business Operations:** Pandemic Influenza Business Continuity is now the focus of many commercial and non-profit organizations. There are three ways in which businesses will experience the ill effects of a rapidly spreading influenza virus: absenteeism, personnel mortality, and operating losses. Such concerns have prompted risk managers in these organizations to consider how best to minimize the impact of an outbreak on essential personnel and create plans to dampen business impact and assure continuity of operations during the course of a pandemic.

All three of these tiers are well served by the establishment of Minimum Readiness Levels (MRL) under public health leaders in the government segment and the guidance of occupational health leaders and medical officers in businesses. Based upon emergency preparedness and response plans, these MRLs can be quantified through demand planning tools.

Lessons Learned from The SARS Experience

Disasters and catastrophic events, whether natural or man-made, cannot be created in controlled environments for the purpose of leisurely scientific analysis. Rather, most lessons learned from such experiences occur through retrospective analyses of past successes and failures. The SARS experience in 2003 is one such example. Five important lessons can be culled from responses to the SARS pandemic.

² These include: fire services, police and law enforcement, highway patrol, emergency management services, ambulance services, physicians, clinics, emergency room, intensive care unit, minimal care unit, quarantine, homestay, national guard, civil defense, search and rescue.

Two-Tiered Plans. The SARS experience taught that, although plans that clearly define the “roles and responsibilities and workflows”³ so as to optimize interaction, collaboration, and command and control are useful, when disaster strikes, such measures alone are not enough. In addition to such plans, a “consumption of goods and services” plan is also required. This latter plan identifies quantity, deployment, and logistics of assets (i.e., additional personnel as well as additional medical supplies, personal protective equipment, disinfectants, and pharmaceuticals) necessary for those on the frontlines to fulfill their prescribed roles and responsibilities. For instance, a surge in frontline health care workers will require a corresponding surge in personal protective equipment. A surge in patients will require a surge in medical supplies. These two elements of a two-tiered plan are far better synchronized today than during the SARS epidemic.

National Stockpiles. Another critical lesson learned was that, in an age of just-in-time production by critical product manufacturers and just-in-time consumption by key frontline care providers, little elasticity remains in the system to respond to a sudden surge in demand. This means that manufacturers must work with the consumers of their products well ahead of an event and help governments in quantifying the levels of need for various event scenarios. Today, newly developed demand-planning tools bridge this gap. Governments worldwide use such tools and of the idea of significant national stockpiles (based on data-driven scenario-based analysis of potential demand) as the only practical way of mitigating a public health and national security risk.

Regional Stockpiles. In addition to national stockpiles, many states and provinces are investing in regional reserves as well. These reserves provide yet another safeguard and minimize the risk of shortages during the time it would take to deploy national stockpiles to a region. Another lesson learned was that the best time for governments to prepare for such contingencies is long before disaster strikes. By doing so well ahead of the event, supply chain bottlenecks can be circumvented.

³ Often referred to as “pandemic influenza plans.” These plans typically address: bed surge capacity isolation capacity, augmentation of health care personnel due to a surge in patients, registration and credentialing systems, personal protective equipment, decontamination and environmental cleaning, pharmaceuticals, behavioral health, trauma and burn capacity, communications and information technology, medical services, laboratory capacity, surveillance, education, training and drills and exercises.

Global Supply Chain. Global economies rely on global supply chains. The more global a producer of goods and services is, the more versatile and adaptable to changing global demand its production and distribution network will be. Any meaningful response must be able to harness these networks.

Competition for National Resources. The competition for precious and scarce government resources constitutes an acute political challenge. The key determinant often revolves around the probability and consequences of events. If the likelihood of a catastrophic event transpiring were high, then the justification for national resources could easily be made. Yet if the consequences could be expected to have low-level impact, then the system can be expected to absorb the shock. The fact that the most devastating pandemics may occur only several times per century (i.e., are low probability yet high consequence) poses a vexing problem for governments attempting to allocate national resources in a prudent manner.

National Stockpiles

In order to prepare for pandemic influenza, countries around the world have implemented the creation of stockpiles and reserves in the following for categories:

- **First Responders, First Receivers, and Health Care Personnel:** personal protective equipment such as respiratory protection (e.g., N95 respirators or powered air units), hand antiseptics (emollient rich alcohol-based or higher grade hand rubs), barrier clothing (e.g. gowns and gloves), pharmaceuticals (e.g. antiviral agents), and vaccines⁴
- **Patients:** Additional basic medical supplies employed in stabilization and recovery of highly pathogenic influenza patients (e.g., catheters, dressings, and medical tapes), pharmaceuticals (e.g., antiviral agents), and vaccines
- **Infrastructure Protection:** added environmental disinfectants (like virucides)
- **Business Continuity:** respiratory protection, hand antiseptics, and environmental disinfection

⁴ Currently much investment by major research centers around the world is placed on identifying rapid means of creation of a vaccine should the current H5N1 strain mutate into a easily transmissible form. As of 2005, global production of seasonal influenza vaccine is just shy of 400 million doses.

Asian Perspective

Across Asia, many countries that experienced the SARS crisis have invested heavily in the further development of their pandemic influenza plans. Singapore, Hong Kong, China, Thailand, Australia, New Zealand, Korea, and many other countries have all developed excellent plans that are matched to the local health care infrastructure, resources, and needs of their citizens. These plans were designed in order to clarify the roles and responsibilities of all those who might be involved in a crisis, including frontline professionals such as first responders, first receivers, hospital personnel medical staff, and even civil defense personnel. Well-defined roles and responsibilities help give rise to the command and control efficiency necessary to deal effectively with higher demands on national resources.

In order to deliver adequate care, frontline professionals must have access to goods and services that make the delivery of such care possible. Asia-Pacific countries are at various stages of gestation of such plans, and have all undertaken

A government-industry partnership that combined the demand-planning expertise of industry with the public policy and national strategy focus of government could be highly effective in responding to an influenza pandemic and similarly catastrophic events.

the cooperative development of “consumption of goods and services” plans. This last step in essence creates a tactical and operational blueprint capable of displaying daily, weekly, and monthly inventory of how many resources—e.g., people, goods, or services—would be required in order to carry out the pandemic plan. Even though governments often possess the expertise necessary to implement

operational plans, industry—particularly the manufacturing sector—maintains a high level of demand-planning expertise. A government-industry partnership that combined the demand-planning expertise of industry with the public policy

and national strategy focus of government could be highly effective in responding to an influenza pandemic and similarly catastrophic events.

Quantifying Surge Capacity

Models that tie together key pieces of information can be used to estimate the level of reserves needed based upon input from public health professionals. High reserve levels will ensure that the public is protected in the event of a major catastrophe.

The matching of stockpile mixes to the unique profile of regional health systems is a prerequisite for sound planning—one size does not fit all. Below are some of the defining parameters of a country's unique regional public health profile:

- patient-to-staff ratios
- regional healthcare worker demographics
- health facility occupancy rates
- efficiency and effectiveness⁵ of various products
- intensity of consumption⁶ of goods and services
- rapid expansion capabilities of satellite health care networks

In order to save lives in an efficient manner, surge capacity must also mandate a minimum response by public health and healthcare networks. Minimum response levels and surge capacity requirements will determine the geographical concentration of stockpiles, optimum means of transport to incident sites, and subsequent effective distribution.

Conclusion

Currently, universally accepted standards and best practices in the area of “low probability, high consequence” events like pandemics do not exist. A series of demand-planning tools developed by 3M succeeds in effectively bridging key gaps. These tools can also be used to audit existing surge plans and identify gaps in

⁵ When preparing to respond to a surge in patients or casualties, products that can be used quickly and effectively are preferable to those that may take longer.

⁶ The higher the throughput of patients the more intense the consumption per unit time.

surge resources that will be needed to maintain sustained and intense operations over a period of days and weeks. Meeting quantitative minimum preparedness requirements will increase the ability to respond to and recover from high-consequence events. Alignment with national emergency plans requires a data-driven marriage of public health, epidemiology, and logistics/supply-chain—three disciplines critical to national preparedness.

Pandemic Survivability, Leveraged Solutions, and the Role of Information Computer Technology

Joseph Alhadeff

JOSEPH H. ALHADEFF is Vice President for Global Public Policy and Chief Privacy Officer for Oracle Corporation. He is responsible for coordinating and managing Oracle's global privacy and public policy issues. Mr. Alhadeff holds an M.B.A. in management and information systems from New York University and a J.D. from Boston University.

As the world becomes accustomed to a potential outbreak of an avian flu pandemic and develops ways to cope with the issue, an understandable focus has emerged on containing the spread of the disease, stockpiling the needed medications, providing incentives for the development of new vaccines and therapies, and developing travel containment programs and disaster recovery programs.¹ All of these efforts will prove essential in dealing with any such pandemic. There are, however, less direct issues that are also essential to surviving the pandemic. This article will review some of these necessary steps as well as explore the role of technology in facilitating the adoption of these steps.

Should a pandemic such as a critical outbreak of avian flu strike, there will be little time to consider any measures other than those related to containment. The less developed an economy an affected country has to draw from, the fewer resources that country will likely be able to utilize beyond containment, and the greater the strain on that country's limited infrastructure. The importance of these issues becomes clearer when we consider that the potential impact of a crisis may extend well beyond a sick populace and overburdened health workers. If a significant portion of the population is impacted, what other services will be affected? Due to close contact with infected patients, health and health support workers may be affected the most, but they may also be the best prepared and protected. Other essential services such as police, fire, and government may also be impacted. Both local and international transportation systems may be disrupted, which may in turn constrain or even halt local deliveries and foreign supplies. Water, power, communications, and other essential services may also suffer consequences.

Adequate preparations for this worst-case scenario require more than initial checklists, medication stockpiles, and containment and evacuation plans. Long-term survivability implies that critical business and public sector functions must continue to operate during the crisis, and not just be the subject matter of recovery. Survivability implies a different mindset than disaster recovery, which usually presumes a disaster with a defined end point *after* which plans for recovery

¹ To date, though concerns over a pandemic remain mostly concentrated in Southeast Asia, the spread of flu strains via migratory birds has given the issue global relevance. Asia, particularly Southeast Asia, offers an interesting and valuable microcosm of analysis because the region is home to a variety of cultures and levels of technical and infrastructure development.

are put into place. A pandemic may be a longer-term event in which the scope of the disaster continues to spread over a significant period of time. One cannot wait for the disaster to “end” before taking action. With a pandemic, merely waiting for the floodwaters to recede before deploying assistance is insufficient. Pandemics may very well disrupt normal routines of life for large segments of the population over a significant period of time. These affected populations will require strategies for surviving a continuing disaster. Though recovery plans must be formulated for the aftermath of a pandemic, plans to survive the duration of the pandemic must also be developed.

Beyond the public services and logistical functions outlined above, treasury, financial, and human resource functions must also continue to operate. These functions play a critical role in facilitating the essential services necessary to survive a crisis; just as importantly, they also serve as positive psychological reminders of normalcy, which is crucial for the maintenance of the spirit of the community. In the aftermath of the 2004 Indian Ocean tsunami, one of the main objectives was to reopen schools and recreate social structures so as to minimize some of the psychological trauma of the tsunami’s aftermath. The continued existence of familiar hallmarks of society, culture, family, and daily life from before the disaster are elements of survivability.

As cases of avian flu become more frequently reported, variations in tracking and identification mechanisms become more evident. In countries with the least developed health networks, it becomes imperative for those impacted economies, directly and with outside assistance, to enhance their tracking and information sharing resources. Can businesses that have access to communication networks, both large local enterprises as well as multinational corporations, and other owners and operators of communications networks supplement the information collection, tracking, and sharing mechanisms? What role can they play within an extended concept of pandemic survivability?

The question of the role of business and other players, including NGOs, in this matter is part of an attempt to think beyond traditional crisis response mechanisms. The governments of even developed countries—with extensive health networks and good infrastructure—will be seriously challenged by the effects of a pandemic. Challenges range from recognizing and tracking the

outbreak to staging materials and personnel to running governmental and business functions essential to society. Developing economies will be even more challenged. Businesses, NGOs, and other organizations may have untapped information, communication, logistical, personnel, and other resources that could be brought to bear in disaster relief. Without advance planning, an appropriate means of information sharing, or a logical method of coordinating plans and resources, however, we lack the ability to leverage these resources.

Enterprise Role in Disaster Preparedness

NGOs and many enterprises in the private sector are developing their own contingency plans for avian flu as well as disasters in general. These plans are of constrained utility if they cannot be coordinated with governmental response plans. At present there is less coordination in planning and more of a reaction to

Businesses, NGOs, and other organizations may have untapped information, communication, logistical, personnel, and other resources that could be brought to bear in disaster relief.

unilaterally developed plans.

At best plans are iterative instead of interoperable. For instance, the government will issue a disaster plan, and businesses then react by formulating new plans or amendments to their plans. In light of the fact that all parties are attempting to cope with a moving target—avian flu—this iterative

development of plans is understandable. Opinion varies as to the likelihood of an outbreak, the potential for a true pandemic, and the efficacy of any particular solution to address a specific problem. While this variety of opinion may lead to different levels of preparedness for a pandemic, all parties understand that some disaster is likely to occur. As such, greater public and private cooperation across stakeholders is essential for the development of a coordinated disaster response plan.

During SARS, the 2004 Indian Ocean tsunami, and Hurricane Katrina, the private sector has been able to assist, and in some cases lead, relief efforts. Disaster contingency cooperation, if developed in creative ways, could lead to new levels of readiness, continuity of business and government operations, increased efficiency in existing operations, and growth in the trade and investment sectors.

Enterprises, particularly those with large manufacturing workforces, may be able to spot some disease or sickness patterns (from employee absences or medical insurance claims) potentially of use to epidemiologists. These same enterprises often times also prove useful as vehicles for the education of the workforce on specific measures to help prevent and contain outbreaks, including education concerning contact with livestock, general hygiene, and the status of non-avian flu strains (which may be the incubators of recombinant strains). Enterprises also have resources in communication, logistics, supply, and distribution. Regional and global enterprises may also have local offices with better access to information and resources outside of the economy. In many ways, enterprises may provide a shadow network capable of supporting and supplementing governmental networks. Should there be a need to leverage some of these business resources and expertise, optimization of disaster preparedness will depend upon coordination with the government in advance of the disaster. Surviving a pandemic or disaster on the scale of the Indian Ocean tsunami or Hurricane Katrina requires the presence of continued economic activity. Businesses need to operate, employees need to be paid, insurance companies need to process claims, government treasuries need to fund programs, and various agencies need to be able to participate in relief efforts, whether by channeling donations or coordinating field operations. Depending on the nature of the disaster, the accessibility of electronic records in more than one location may actually preserve information essential to allowing the economy to continue to function.

Furthermore, regulatory and bureaucratic systems must be reviewed in order to ensure that they are responsive to the needs of disaster relief efforts. If there is a privacy regime in place in the economy, there are a number of questions that should still be asked. Have the relevant privacy authorities been consulted to discuss the necessary procedures for responsible but effective sharing of information? Have the customs and immigration authorities been consulted

on procedures to move material or personnel into the country in an expedited fashion so as to meet business and government needs? Have issues related to bureaucratic procedures on obtaining permits and operating licenses been dealt with to introduce proper streamlining?

Leveraging Disaster Preparedness and Response Mechanisms

In much the same way that business resources and coordination may be leveraged to create better and more effective disaster preparedness and response, government investments in disaster recovery systems and preparedness can be leveraged to benefit trade development and economic growth. Expenditures on disaster preparedness can also be viewed as strategic investments in future operations and economic growth rather than sunk costs in potential disaster recovery.

An example can serve to illustrate the concept. A developing economy attempting to plan for a disaster will need a thorough understanding of its physical and telecommunications infrastructure, information communications technology (ICT) resources, and personnel with relevant skills and expertise. This economy would also need to review some of the potential bureaucratic and regulatory impediments hindering a coordinated response with other players, including other economies, NGOs, and the business sector. As preparation for an event that may never happen, these are potentially significant expenditures for an economy with limited resources. There may, however, be ways to ensure that such investments are used to serve multiple purposes, thus leveraging their benefit and providing multiple justifications for the expenditure. For example, the inventory of resources, skills, logistics capability, and infrastructure could be used to attract foreign direct investment. Similarly, more streamlined bureaucratic processes may also attract business. The ability to develop public private partnerships and other cooperative and interactive ventures may also create local benefit and investment. Thus what started as an investment in disaster preparedness can also serve as an investment in economic growth and trade development. ICT systems, logistics solutions, and other hallmarks of disaster preparedness also happen to constitute the building blocks of economic capacity and local infrastructure. These can be viewed as investments rather than sunk costs.

In order to maximize this leverage from investments in disaster preparedness, these investments must be coordinated across a region, or at the very least with neighboring economies. Such investments are most effective when also coordinated with the private sector, universities, and NGOs, as each of these organizations can bring resources and expertise capable of complementing both preparedness and recovery.

A Series of Small Steps

Many economies will have to undertake preparations and expenditures on disaster preparedness in several stages. Coordination and planning with multiple stakeholders across a region can ensure that expenditures are best utilized and least duplicative.

At the outset, we must recognize that most economies, regardless of their state of development, possess relevant resources pertaining to crisis management. For instance, all economies contain medical personnel, critical infrastructure facilities, support staff for those facilities, and some level of ICT infrastructure. In most economies these resources exist in both the public and private sector; they remain, however, uncoordinated and underutilized. Comprehensive and current inventories of such technologies are unlikely to exist in many economies. Countries should thus be encouraged to manage existing databases to hold these inventories, develop schedules for review and renewal, and identify ownership, location, proximity to access, availability, and points of contact.

While this step alone would constitute a significant improvement in preparedness, a more user-friendly application of this information would be to combine it with spatial technology capable of associating this information with mapping functions (i.e., the ability to superimpose the real-time location of outbreaks, resources, skilled professionals, and needs on a map of the relevant geography). Thus, much like a military general relying upon topographical maps in order to position troops, relief coordinators can use the same information to gain a better understanding of how resources are positioned, make determinations over the staging of resources, and more clearly grasp the various dynamics and impediments to logistics, supply, and delivery issues. Because border areas may be best served through cross border supplies, the most efficient staging of resources

becomes possible only when these efforts are undertaken jointly and willingly by multiple economies in same region.

This same spatial technology that facilitates preparedness can also be used to superimpose epidemiological information so as to better track outbreaks and match supplies with needs. This becomes especially relevant when travel restrictions or logistical disruptions occur. Much of this information will be critical in developing contingency plans on the most efficient routing of supplies.

The benefits of such inventories and information stores extend beyond crisis management. The ability to detail both resources (such as water, energy/power, and ICT infrastructure) and topology (such as access to air, sea, rail and land routes, and rights of way) becomes a valuable tool with which to court foreign investment, especially when such information can be tied to or otherwise integrated with a land registry system. This information is part of a critical decision factor for businesses when they are selecting a location for manufacturing, development, and business support facilities. Inventories and mapping of resources may also facilitate applications to international development banks and NGOs for aid or investment. This information may also form the basis for the development of project funding and deployment plans. Thus economies with limited means may decide to make these infrastructure and inventory investments based not only on better pandemic (or other crisis) preparedness but also in order to help fuel current growth, trade, foreign investment, and development.

Conclusion

The purpose of this article has not been to provide an exhaustive list of solutions or even issues, but rather to focus on the following four points:

- issues other than the direct impact on public health will be essential to long-term pandemic survivability
- pandemic survivability—as opposed to recovery—requires the continued operation of citizen services and business activity
- coordination needs to be considered across government agencies, with the private sector and NGOs, as well as across neighboring or regional governments
- investments in disaster preparedness can be leveraged to create benefits to investment, trade, and growth

While pandemics and other disasters are by no means new phenomena, our approach to preparedness can, through better coordination and more creative thinking, surpass previous efforts.



PACIFIC HEALTH SUMMIT

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The goal of the Pacific Health Summit Emerging Infections/Pandemics Workgroup is to support programs and inform policies that save lives and minimize the economic impact of emerging infections and pandemic disease outbreaks worldwide.

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