Avian Influenza: A Symposium Report

Political, Social and Economic Dimensions of the Continuing Threat from Emerging Infectious Diseases

While world health experts focus on medical solutions to prevent a potential infectious avian flu pandemic, International Resources Group (IRG) and George Washington University (GWU) Medical Center have turned their attention to understanding the preparations required to assess and mitigate the social, economic, political, and environmental impacts of such an event. Development professionals responsible for ensuring preparedness and coordinating our response to a pandemic, whether as a result of the current or some future threat, will need to have information, tools, and strategies to understand its causes and mitigate its impacts.

On November 15, 2005, IRG and GWU Medical Center therefore held a symposium to discuss:

- The magnitude of the threats posed by emerging infectious diseases, particularly in regard to the current concern with avian influenza H5N1;
- The emergency response planning needed to mitigate the political, social, and economic impact of such pandemics;
- The need for increased capacity building, both to control the current crisis and guard against future outbreaks;
- The mechanisms for interagency/intergovernmental coordination necessary to ensure and maintain effective communication and the best use of resources;
- Transparency outlined by the International Cooperation, rapid reporting, and support the principles of scientific cooperation, rapid reporting, and transparency outlined by the International Partnership on Avian and Pandemic Influenza.

Together animal and human health specialists and economic and social analysts to assist countries in preparing and implementing integrated programs to reduce the spread of avian influenza. They also work with bi- and multilateral agencies—the most prominent being the World Health Organization (WHO), the U.S. Food and Agriculture Organization, and the Animal Health Organization (OIE)—to ensure a coordinated, international approach.

Keynote Speakers

Underscore Need for International Cooperation

As Vice President and Head of Network Operations Policy and Country Services at the World Bank, James W. Adams brings...
In his keynote address, Mr. Adams said that a world-wide, coordinated response would be critical to overcoming the threat posed by the H5N1 virus, beginning with an international needs assessment (which the Bank recently completed) and followed by programs specifically tailored to countries where the disease is endemic as well as to countries that are at risk, with ongoing surveillance elsewhere to quickly spot new risks or outbreaks. It is also important to strengthen and support effective veterinary services in developing countries. The Bank and the United Nations recently estimated the cost of such a response to be between $750 million and $1 billion, not including the cost of the vaccines that may be needed.

The Bank will request up to $500 million from its Board of Directors to help in the initial phase of these efforts. The funding plans, however, extend beyond that. “Given the global threat and the global implications of H5N1, we will also seek to mobilize grant funding from other international donors,” Mr. Adams said. The Bank expects to establish a global trust fund, financed by the European Commission, WHO, FAO, OIE, and other bi- and multilateral donors, following a needs assessment in China in mid-January. “Financing is only one aspect of the problem, however,” he said. “Strengthening capacity in animal health and putting adequate surveillance systems in place will help advance the ability of developing countries to respond, not only to the current threat, but to future problems.”

Dr. Bruce Gellin, Director of the National Vaccine Program Office (NVPO) of the U.S. Department of Health and Human Services delivered the second keynote address. The NVPO coordinates and integrates the activities of all federal agencies involved in immunization efforts to ensure that immunization programs are carried out in an efficient and timely manner, and develops strategies to achieve both the highest possible level of prevention of human diseases through immunization and the highest level of prevention of adverse reactions to vaccines. The well-recognized potential global impact of H5N1 and the coverage the virus is currently receiving in the popular press may provide the impetus needed to successfully advocate for policies, procedures, and funds that enable us to respond more effectively to emerging diseases, Dr. Gellin said.

The H5N1 virus appeared in 1997 and has spread to many countries in Asia, and more recently to Eastern Europe. While no one knows whether the virus will mutate in a way that permits easy transmission from poultry to humans, or subsequently from human to human, “the signs so far are not good,” Dr. Gellin said. “A virus that was initially pathogenic in a few species of birds has expanded its reach. It now affects a wide range of wild and domestic poultry, as well as a number of mammalian species, including felines, and humans. The spread of avian influenza to Eastern Europe has raised awareness of the threat to the U.S., given the amount and ease of interchange of people, animals, and agricultural products between Europe and America. Global pandemics of infectious diseases is going to be with us for a long time, we must strike a balance between short-term responses, such as culling and quarantining, and long-term measures, such as strengthening surveillance and institutional, regulatory, and technical capacity in animal and human health and other relevant sectors.

Lastly, we need to consider how best to support research and development of new types of vaccines and anti-viral medications and how to increase our capacity to manufacture and stockpile them in order to allow rapid response to future pandemics.

Closing Remarks
In his closing comments, Dr. Tee Guidotti, Chair of the Department of Environmental and Occupational Health in the GWU School of Public Health and Health Services, reviewed the countermeasures needed to deal with the immediate threat posed by AI, including ongoing surveillance and continued efforts to eradicate or contain the virus in avian populations; culling, vaccinating, maintaining sanitation and biosecurity, and keeping domestic birds separate from wildfowl; decreasing the probability of transferring AI from poultry to humans by improving animal handling practices and maintaining occupational health measures; and reducing human-to-human transmission through basic domestic and international agencies is essential. Third, we must remember that the current threat is not a single, unique event, but only the most recent of a series of emerging, and potentially dangerous, infectious viruses. “While we are likely to dodge this bullet, others will come our way,” Mr. Shaikh warned.

Fourth, although avian influenza is primarily a health problem, there are strong economic vested interests that will affect our response. “An effective containment strategy will require marshalling and deploying resources globally,” he said. “Can we overcome our individual vested interests in order to forge a united response?”

Fifth, while one should not be unduly alarmed about the avian flu threat, an effective response will require a new way of doing business, worldwide, and for the foreseeable future.
emphasized that these estimates are based on a mild pandemic with an assumed mortality rate of less than 0.1 percent of the U.S. population; actual deaths in a new pandemic could be significantly higher.

Extrapolating from the U.S. to all high-income countries, said Mr. Brahmbhatt, there could be a present value loss of $550 billion. The loss to the world would be significantly larger because of the impact on developing countries. But it is not appropriate to make a simple extrapolation from studies of rich countries to poor countries, where health systems are much less developed and mortality could be much higher.

Turning to the impact on businesses, Mr. Brahmbhatt noted that there is a presumption that services sectors such as tourism, transport, domestic trade, leisure and other sectors dependent on discretionary consumer spending will tend to be hardest hit. Firms may well face a need for more external financing to survive a steep downturn in cash flows lasting from six months up to two years, especially in these sorts of services sectors. While well-capitalized firms would be best placed to survive such a shock, bankruptcies would surge in the hardest hit sectors, for example airlines.

Governments may need to plan for policies that would facilitate corporate restructuring and getting industries relaunched promptly after the crisis. Firms also need to plan for all sorts of severe disruptions in logistics, input supply chains and the availability of key business services, most obviously business travel, for example by clarifying alternative sources of supply. Firms could also consider building up buffer stocks of critical inputs. That may eat into short-term profit margins and run against current just-in-time management philosophy, but could help ensure the very survival of the firm during this type of catastrophic event.

Second, because of the close links between animal and human health, our response needs to draw on the best available knowledge and guidelines from international technical agencies, such as the OIE, FAO, and WHO, and country-level plans must be prepared with cooperation from all concerned government ministries—agriculture, health, finance, education—as well as local governments and civic organizations, and under strong political leadership.

Third, all the strategies that are currently being implemented should be carefully evaluated to determine if outcomes are meeting expectations. The control strategies used by countries that have been the most successful in curbing avian flu—Hong Kong, Korea, and Japan—should be studied and emulated.

Fourth, because the threat of young and otherwise healthy people have been infected with this virus and two out of three of them have died.” (The current number of human infections and deaths is available on the WHO website at http://www.who.int/csr/disease/avian_influenza/pandemic/er/index.html.)

“One of the most important tools we have for pandemic preparedness is vaccination,” Dr. Gellin said. “Because H5N1 is a novel virus, the majority of the population is likely to be susceptible.” The challenge is to produce a vaccine tailored to match the emerging virus. “One of the critical elements of our response plan is to encourage and examine, where possible, that there will be sufficient domestic surge capacity for vaccine production.” At present, this capacity does not exist. “We must increase investment to increase capacity,” Dr. Gellin said.

Dr. Gellin also stressed the need for international collaboration in efforts to confront a pandemic. To date, almost 90 countries and nine international organizations have agreed to support the principles of scientific cooperation, rapid reporting, and transparency outlined by the International Partnership on Avian and Pandemic Influenza, which President Bush presented to the United Nations in September 2005.”

Session I: Potential Public Health Impact of a Pandemic

After the keynote addresses, three panelists discussed the public health implications of H5N1. Dr. John Ragan, a veterinarian employed by the Animal and Plant Health Inspection Service of the U.S. Department of Agriculture, gave an overview of avian influenza from an animal health point of view.

Dr. Ragan explained that there are three types of influenza viruses: Type A affects humans, swine, equine, avian, and other species; Type B affects humans only; and Type C affects humans and swine, but is uncommon and causes only mild disease. The concern with regard to Type A strains, which include H5N1, is the ease and frequency of mutations and their ability to adapt to new hosts. The avian influenza (AI) subset of Type A viruses is widely

Over 100 attendees from USAID, the State Department, the World Bank, foreign embassies, local NGOs, and private companies attended the Symposium.
disseminated, with a large reservoir among waterfowl, making migration an important factor in its spread. It is often asymptomatic in waterfowl. Low pathogenicity AI is common worldwide, appearing in the U.S. two or three times a year. It produces subclinical respiratory disease in poultry, with the virus found only in respiratory and intestinal tissues.

High pathogenicity AI, although somewhat uncommon, is also more problematic. It results in severe illness and high mortality, especially in domestic poultry, and infects all systems and all tissues. H5N1 is included in this subtype. First seen in Hong Kong in 1997, H5N1 spread to South Korea in 2003, to Vietnam, Japan, Thailand, Cambodia, and China in 2004, and to Indonesia, Malaysia, Kazakhstan, Russia, Mongolia, Turkey, and Romania in 2005. While the initial Asian outbreak caused concern, Dr. Ragan said, the subsequent spread to Eastern Europe has raised awareness of the potential threat in the U.S. even further, given the amount and ease of interchange of people, animals, and agricultural products between Europe and America. H5N1 is not currently known to exist in the U.S.

Among waterfowl, Dr. Ragan said, H5N1 infection is subclinical to severe; in poultry, however, it results in severe disease and high mortality. “Hundreds of millions of birds have been lost in outbreak areas to the combined effects of the disease and control efforts,” he said. Of the more than 125 human cases reported, approximately 50 percent have resulted in death. Although AI viruses are “somewhat fragile,” Dr. Ragan said, “they survive long enough to infect people.” In addition to serologic tests, AI viruses are easily isolated with tracheal or cloacal swabs. “Control measures are the same as for any highly infectious agent,” Dr. Ragan explained. These measures include surveillance, biosecurity, quarantine of infected and exposed birds, depopulation, cleaning and disinfection, and vaccination.

“At present,” Dr. Ragan said, “there are 40 million doses of avian vaccine in the U.S. vaccine bank. This includes H5N1. However, while there are funds available to increase this supply, because of the constantly evolving nature of AI viruses, there is no certainty that vaccines made now will be effective next year.” Dr. Ragan also stressed the fact that control measures are demanding and resource intensive everywhere, and even more difficult to implement in developing countries.

Creating the right vaccines and the next generation of anti-viral medications needed to combat future threats. To ensure an effective response, he concluded, we will need to:

- Strengthen existing systems;
- Engage host government ownership;
- Stockpile medications and vaccines for rapid deployment;
- Balance domestic priorities with international imperatives; and
- Maintain a five to ten year optic for preparedness and rapid response.

The final speaker during this session was Milan Brahmbhatt, Lead Economist for East Asia and the Pacific at the World Bank. He reviewed the economic costs and incentives of prevention and control strategies and discussed the potential macroeconomic impacts of a pandemic.

The most immediate economic impacts of a human influenza pandemic might arise from the uncoordinated efforts of people to avoid becoming infected, said Mr. Brahmbhatt. This was the case during the SARS pandemic, when people tried to avoid infection by minimizing face-to-face interactions, resulting in severe demand shock for tourism, mass transport, retail sales, hotels, and restaurants, and in supply shock due to workplace absenteeism and disruption of production, he said. If emergency public policy measures such as quarantines or restrictions on travel and trade were needed during a global pandemic, trade dependent economies such as East Asia could be severely affected, Mr. Brahmbhatt warned. To get a very broad idea of the kinds of economic costs that might arise, one can note that the disruptions associated with SARS led to an immediate economic loss of two percent of East Asian regional GDP in the second quarter of 2003, even though only about 800 people ultimately died from this disease. A two percent loss of global GDP during an influenza pandemic would represent around $800 billion over a whole year. If anything, this scenario of a two percent loss of world GDP based on SARS is likely to be an underestimate. The impact of SARS was mitigated by its being mainly restricted to East Asia, so that East Asia’s exports were not depressed by a SARS shock in the rest of the world.

With a global flu pandemic, on the other hand, there would be simultaneous declines in aggregate demand and international trade all over the world, generating even larger declines in national income and output. A human flu pandemic would also entail a sizeable loss of output through a reduction in the size and productivity of the world labor force due to illness and death, to which the costs of hospitalization and medical treatment would need to be added. There is a lack of detailed studies of what these sorts of supply side costs of a flu pandemic might amount to at a global level. But one 1999 study for the United States calculated that a relatively mild flu pandemic, similar to that in 1967, could result in 100,000 to 200,000 deaths, 700,000 hospitalizations, 40 million outpatient visits, and 50 million associated illnesses. The present value of economic losses associated with this level of mortality and morbidity is between 100 and 200 billion dollars. Mr. Brahmbhatt
of new and deadlier pathogens, also runs the risk of making influenza a scourge inflicted on those who can’t afford vaccines or drugs, as has already happened with malaria, tuberculosis, and HIV/AIDS.”

Dr. Victor Barbiero, former Chief of the Implementation Support Division, Office of HIV/AIDS at USAID, discussed the short- and long-term development priorities associated with our response to AI.

Dr. Barbiero emphasized the need to respond quickly, given what we know about the rapid spread of pandemic influenza once it becomes established in a population. “The keys to a successful response,” Dr. Barbiero said, “are surveillance, rapid containment of outbreaks, good management and coordination on the ground, effective communication among all parties, timely reporting, and accountability.”

The results of our responses to past pandemics can guide our response today, Dr. Barbiero suggested. The response to polio, while successful, was militaristic in nature and did not emphasize capacity building. Universal child inoculation achieved more than 90 percent coverage, but questions remain regarding its sustainability. The campaign against polio has produced cadres of trained epidemiologists and more and better labs, but eradication is still proving more difficult than expected.

Other existing platforms that can guide and strengthen our response include agriculture extension services, reproductive health and family planning services, community education services, and civil society organizations. Dr. Barbiero also stressed the importance of forging novel inter-agency partnerships among bi- and multilateral donors, U.S. government agencies, non-government and faith-based organizations, corporations, private doctors and pharmacists, foundations, and religious and community groups.

Complicating our response, however, will be the fact that “most developing countries have limited ability to monitor disease patterns, identify new organisms causing the disease, or determine the routes of transmission,” he cautioned. He cited other problems faced by developing nations, including a limited ability to stockpile and mobilize commodities; a lack of trained personnel needed to mount a rapid response; and difficulty educating the public about how to prevent disease and when to seek medical care. “Limited regulations regarding how domestic animals are reared, transported, and sold, and the lack of coordination among agriculture, health, and other sectors pose yet another set of difficulties,” he said. Other factors that could hinder the effectiveness of our response include “fragile and inadequate systems, limited laboratory capacity, limited human capacity, minimal existing stockpiles of medicine and vaccines, and a resistance to reporting outbreaks.”

The most important development initiatives to be undertaken, Dr. Barbiero suggested, include strengthening the surveillance system and training local experts, lab workers, and health providers on surveillance and reporting, developing systems of monthly data collection and analysis, and establishing effective communication among all players.

Dr. Barbiero also discussed potential policy dilemmas. These include questions regarding whether and/or when to stockpile and mobilize medicines, vaccines, and personnel on behalf of other countries; how to measure the impact and cost effectiveness of a “non-event,” if we are successful in diverting a pandemic; and August of 2002 for variable lengths of time from one to six weeks. The task force varied in size, ranging from 100 to 200 people. All workers received daily orientations to keep them current.

Task force members collecting samples from dead poultry, which farmers left in barrels on the perimeter of their properties, wore protective suits to block further spread of the virus. The suits were used once and discarded after use. Workers’ shoes were disinfected before and after entering their cars after each sample collection.

Dr. Faye Bresler, an Adjunct Assistant Professor of Environmental and Occupational Health at GWU School of Public Health and Health Services, described the human impact—on workers, communities, and public health infrastructure—from Avian Influenza in Birds during an outbreak of low pathogenicity AI in Virginia in 2002.

The Virginia outbreak started in March, with the last infected flock detected in July. Viral surveillance continued through December because cool and humid conditions favor the reappearance of the virus. The outbreak had little media coverage, except for brief notices that there would be no poultry shown at the state fair that year. But the outbreaks effects were not minor. Almost five million birds were culled on 197 farms. The multi-agency task force handling the situation included veterinarians, poultry industry personnel, the Virginia Departments of Agriculture and Consumer Services and of Environmental Quality, the U.S. Department of Agriculture, the Forest Service, and the Animal Health and Inspection Service. The U.S. Public Health Service deployed its National Disaster Medical System, Veterinary Medicine Assistance Teams, and Commissioned Corps Readiness Force, and the U.S. Army provided laboratory support.

More than 750 personnel were deployed between March and

Dr. Faye Bresler of USAID with Timothy R. Knight from IRG.

Dr. David Goldsmith, of the GMUMC School of Public Health and Health Services, then discussed the importance of surveillance in guiding the management of AI outbreaks and evaluating the interventions taken.

According to Dr. Goldsmith, “surveillance is key to knowing where to put our efforts and resources.” He defined surveillance as “the systematic clinical evaluation of people (or birds) who, because of their medical status or exposure to a disease, have an increased risk of illness, death, or the ability to spread disease. Early findings of surveillance can improve the lives of the larger group being followed through the interventions that are initiated as a result.”

While a reservoir of AI viruses is always present in migratory waterfowl and domestic flocks, the close interaction between humans and birds in many Asian nations increases the threat of transmission, Dr. Goldsmith explained. Avian influenza is transmitted through respiratory and nasal secretions, fecal matter, and direct contact. Contracting
the disease through ingestion has been demonstrated in chickens, but is uncertain in humans. If it does occur in humans, however, it would not be from eating the meat, but from contact with feathers, feces, or entrails.

Dr. Goldsmith emphasized the importance of having veterinary epidemiologists on the scene during outbreaks to support surveillance efforts. Their work includes monitoring the health of wild fowl and defining viral reservoirs, detecting when a virus begins to be passed from poultry to humans, collaborating with farmers to maintain sanitary conditions and viral-free poultry populations, and determining when culling is needed.

Viral outbreaks can be prevented in a number of ways, Dr. Goldsmith said. On farms, in addition to maintaining sanitary conditions, farmers should be alert to signs of illness in their flocks, such as coughing, sneezing, or having a decreased appetite. If a flock shows signs of illness, it is important to isolate the flock and have it tested for avian influenza. Early detection and reporting of outbreaks can prevent the spread of the virus to other flocks.

During the second session, speakers focused on the possible social and economic dimensions of an influenza pandemic. Dr. Dennis Carroll, the Senior Infectious Disease Coordinator in the Bureau of Global Health at USAID, emphasized that “the growing public concern about AI has created an unprecedented opportunity—to address the causes that give rise to emergent diseases.”

To illustrate the fact that emergency responses alone, although “of critical importance to saving lives now, will not be sufficient to prevent pandemic influenza from actually emerging,” Dr. Carroll compared AI to another recent headline-grabbing “force of nature,” hurricanes.

Men wear special clothing to protect themselves against the avian flu virus in Long An province, Viet Nam. Source: FAO

“The heart of the response to the record-breaking 2005 hurricane season is to rebuild homes, repair levees and sea-walls, and strengthen building codes to ensure sturdier structures. These are critical and laudable investments, but they don’t address the underlying cause of the problem, which is rising sea surface temperatures, driven, most experts agree, by global warming.”

Not to address the underlying causes, whether of record-breaking hurricanes or emerging viruses, Dr. Carroll warned, is “a recipe for disaster.”

“Over the past 18 months,” he said, “we have seen wave after wave of AI moving more rapidly across a broad spectrum of the animal kingdom. Our first response has been to minimize the immediate risk by acquiring the skills and technology to do their own disease surveillance; recognize suspected cases quickly; confirm the diagnosis with laboratory tests; and, not least, treat the ill and protect the caregivers and the public.”

The CDC is also urging all health care workers to get flu shots immediately, and health care workers who get ill are being advised to stay home for 24 hours after the resolution of their fevers.

Session II: Social and Economic Dimensions of a Pandemic

During the second session, speakers focused on the possible social and economic dimensions of an influenza pandemic. Dr. Dennis Carroll, the Senior Infectious Disease Coordinator in the Bureau of Global Health at USAID, emphasized that “the growing public concern about AI has created an unprecedented opportunity—to directly address the causes that give rise to emergent diseases.”

To illustrate the fact that emergency responses alone, although “of critical importance to saving lives now, will not be sufficient to prevent pandemic influenza from actually emerging,” Dr. Carroll compared AI to another recent headline-grabbing “force of nature,” hurricanes.

“To achieve such long-term protection, we must address the underlying causes that are driving the emergence of novel viruses, which include “age-old traditions of backyard farming, marketplaces that mix all kinds of animals in a regular Noah’s Ark, and recent surges in the populations of people and animals that allow for an explosive mixture of animal viruses and immunologically naïve people,” he said.

Traditional animal husbandry and marketplace practices must be made more bio-secure, while still meeting the increased needs for protein demanded by increasing human populations, Dr. Carroll said. Transforming these practices will require significant capital and new partnerships between public sector entities, such as the World Bank and USAID, and the business community, that bring an array of technical, as well as financial, resources to the task.

Involvement of the business community is critical, Dr. Carroll said, not only for the additional resources and new capabilities it would bring, but because the potential economic impact of a pandemic, even if confined to a single region, would be devastating.

Dr. Carroll further cautioned that merely “building a protective shield of vaccines, drugs, and early warnings, while doing nothing to limit the emergence
the disease through ingestion has been demonstrated in chickens, but is uncertain in humans. If it does occur in humans, however, it would not be from eating the meat, but from contact with feathers, feces, or entrails.

Dr. Goldsmith emphasized the importance of having veterinary epidemiologists on the scene during outbreaks to support surveillance efforts. Their work includes monitoring the health of wild fowl and defining viral reservoirs, detecting when a virus begins to be passed from poultry to humans, collaborating with farmers to maintain sanitary conditions and viral-free poultry populations, and determining when culling is needed. Viral outbreaks can be prevented in a number of ways, Dr. Goldsmith said. On farms, in addition to maintaining sanitation, detecting an outbreak in the early stages, and culling diseased animals, keeping outsiders off the property is also important. Steps that need to be taken in processing plants include rigorous and frequent inspections; zero tolerance for feces; quick disposal of heads, intestines, and lungs; washing carcasses in an antimicrobial solution; maintaining plant refrigeration, and, again, keeping outsiders off the premises. Consumers should be warned not to accept less-than-perfect products and to use pre-cooked products, or ensure that raw products are thoroughly cooked. Concern for the possibility of a flu pandemic is raised by what we know about how such infections are spread among humans. “The incubation period for influenza—from one to four days—is very short,” Dr. Goldsmith said, “which suggests that a single infected person can transmit the virus to a large number of susceptible individuals.”

Understanding the importance of surveillance, the U.S. Center for Disease Control (CDC) and the WHO Global Outbreak Alert and Response Network (GOARN) have developed an early warning system linking human and veterinary epidemiologists in several Asian countries. Their findings have already led to culling of flocks and the quarantine of travelers from outbreak areas who display symptoms of influenza. (A Washington Post article published on November 27 describes GOARN’s ultimate purpose as helping developing countries “acquire the skills and technology to do their own disease surveillance; recognize suspected cases quickly; confirm the diagnosis with laboratory tests; and, not least, treat the ill and protect the caregivers and the public.”)

The CDC is also urging all health care workers to get flu shots immediately, and health care workers who get ill are being advised to stay home for 24 hours after the resolution of their fevers.

**Session II: Social and Economic Dimensions of a Pandemic**

During the second session, speakers focused on the possible social and economic dimensions of an influenza pandemic. Dr. Dennis Carroll, the Senior Infectious Disease Coordinator in the Bureau of Global Health at USAID, emphasized that “the growing public concern about AI has created an unprecedented opportunity—a transformative moment—to directly address the causes that give rise to emergent diseases.”

To illustrate the fact that emergency responses alone, although “of critical importance to saving lives now,” will not be sufficient to prevent pandemic influenza from actually emerging,” Dr. Carroll compared AI to another recent headline-grabbing “force of nature,” hurricanes.

“Over the past 18 months,” he said, “we have seen wave after wave of AI moving more rapidly across a broad spectrum of the animal kingdom. Our first response has been to minimize the immediate risk by strengthening national preparedness plans, deploying early-warning surveillance teams, supporting rapid response, promoting behavior change, and stockpiling critical health commodities.”

Important as these emergency responses may be, Dr. Carroll stressed, they won’t adequately protect us, either from H5N1, if it becomes more robust in its ability to be passed from human to human, or from other viruses that may appear.

To achieve such long-term protection, we must address the underlying causes that are driving the emergence of novel viruses, which include “age-old traditions of backyard farming, marketplaces that mix all kinds of animals in a regular Noah’s Ark, and recent surges in the populations of people and animals that allow for an explosive mixture of animal viruses and immunologically naïve people,” he said.

Traditional animal husbandry and marketplace practices must be made more bio-secure, while still meeting the increased needs for protein demanded by increasing human populations, Dr. Carroll said. Transforming these practices will require significant capital and new partnerships between public sector entities, such as the World Bank and USAID, and the business community, that bring an array of technical, as well as financial, resources to the task. Involvement of the business community is critical, Dr. Carroll said, not only for the additional resources and new capabilities it would bring, but because the potential economic impact of a pandemic, even if confined to a single region, would be devastating.

Dr. Carroll further cautioned that merely “building a protective shield of vaccines, drugs, and early warnings, while doing nothing to limit the emergence...
of new and deadlier pathogens, also runs the risk of making influenza a scourge inflicted on those who can’t afford vaccines or drugs, as has already happened with malaria, tuberculosis, and HIV/AIDS.”

Dr. Victor Barbiero, former Chief of the Implementation Support Division, Office of HIV/AIDS at USAID, discussed the short- and long-term development priorities associated with our response to AI.

Dr. Barbiero emphasized the need to respond quickly, given what we know about the rapid spread of pandemic influenza once it becomes established in a population. “The keys to a successful response,” Dr. Barbiero suggested, “are surveillance, rapid containment of outbreaks, good management and coordination on the ground, effective communication among all parties, timely reporting, and accountability.”

The results of our responses to past pandemics can guide our response today, Dr. Barbiero suggested. The response to polio, while successful, was militaristic in nature and did not emphasize capacity building. Universal child inoculation achieved more than 90 percent coverage, but questions remain regarding its sustainability. The campaign against polio has produced cadres of trained epidemiologists and more and better labs, but eradication is still proving more difficult than expected.

Other existing platforms that can guide and strengthen our response include agriculture extension services, reproductive health and family planning services, community education services, and civil society organizations. Dr. Barbiero also stressed the importance of forging novel inter-agency partnerships among bi- and multilateral donors, U.S. government agencies, non-government and faith-based organizations, corporations, private doctors and pharmacists, foundations, and religious and community groups.

Complicating our response, however, will be the fact that “most developing countries have limited ability to monitor disease patterns, identify new organisms causing the disease, or determine the routes of transmission,” he cautioned. He cited other problems faced by developing nations, including a limited ability to stockpile and mobilize commodities; a lack of trained personnel needed to mount a rapid response; and difficulty educating the public about how to prevent disease and when to seek medical care. “Limited regulations regarding how domestic animals are reared, transported, and sold, and the lack of coordination among agriculture, health, and other sectors pose yet another set of difficulties,” he said. Other factors that could hinder the effectiveness of our response include “fragile and inadequate systems, limited laboratory capacity, limited human capacity, minimal existing stockpiles of medicine and vaccines, and a resistance to reporting outbreaks.”

The most important development initiatives to be undertaken, Dr. Barbiero suggested, include strengthening the surveillance system and training local experts, lab workers, and health providers on surveillance and reporting, developing systems of monthly data collection and analysis, and establishing effective communication among all players.

Dr. Barbiero also discussed potential policy dilemmas. These include questions regarding whether and/or when to stockpile and mobilize medicines, vaccines, and personnel on behalf of other countries; how to measure the impact and cost effectiveness of a “non-event,” if we are successful in diverting a pandemic; and the need for more effective communication among all players.

Dr. Faye Bresler, an Adjunct Assistant Professor of Environmental and Occupational Health at GWU School of Public Health and Health Services, described the human impact—on workers, communities, and public health infrastructure—from Avian Influenza in Birds during an outbreak of low pathogenicity AI in Virginia in 2002.

The Virginia outbreak started in March, with the last infected flock detected in July. Viral surveillance continued through December because cool and humid conditions favor the reappearance of the virus. The outbreak had little media coverage, except for brief notices that there would be no poultry shown at the state fair that year. But the outbreaks effects were not minor. Almost five million birds were culled on 197 farms. The multi-agency task force handling the situation included veterinarians, poultry industry personnel, the Virginia Departments of Agriculture and Consumer Services and of Environmental Quality, the U.S. Department of Agriculture, the Forest Service, and the Animal Health and Inspection Service. The U.S. Public Health Service deployed its National Disaster Medical System, Veterinary Medicine Assistance Teams, and Commissioned Corps Readiness Force, and the U.S. Army provided laboratory support.

More than 750 personnel were deployed between March and August of 2002 for variable lengths of time from one to six weeks. The task force varied in size, ranging from 100 to 200 people. All workers received daily orientations to keep them current. Task force members collecting samples from dead poultry, which farmers left in barrels on the perimeter of their properties, wore protective suits to block further spread of the virus. The suits were used once and discarded after use. Workers’ shoes were disinfected before and after entering their cars after each sample collection.

Dr. Bresler also discussed an outbreak of foot and mouth disease in the U.K in 2001 to further emphasize the potential mental health impact of incidents and incident response. In this case, few if any mental health personnel were deployed to counsel the farmers affected, and veterinarians were pressed into filling a role for which they were not trained. Security personnel, individuals tasked with slaughtering diseased stock, and entire villages were affected.

Dr. David Goldsmith, of the GMU/UC School of Public Health and Health Services, then discussed the importance of surveillance in guiding the management of AI outbreaks and evaluating the interventions taken. According to Dr. Goldsmith, “surveillance is key to knowing where to put our efforts and resources.” He defined surveillance as “the systematic clinical evaluation of people (or birds) who, because of their medical status or exposure to a disease, have an increased risk of illness, death, or the ability to spread disease. Early findings of surveillance can improve the lives of the larger group being followed through the interventions that are initiated as a result.”

While a reservoir of AI viruses is always present in migratory waterfowl and domestic flocks, the close interaction between humans and birds in many Asian nations increases the threat of transmission, Dr. Goldsmith explained. Avian flu is transmitted through respiratory and nasal secretions, fecal matter, and direct contact. Contracting
disseminated, with a large reservoir among waterfowl, making migration an important factor in its spread. It is often asymptomatic in waterfowl. Low pathogenicity AI is common worldwide, appearing in the U.S. two or three times a year. It produces subclinical respiratory disease in poultry, with the virus found only in respiratory and intestinal tissues.

High pathogenicity AI, although somewhat uncommon, is also more problematic. It results in severe illness and high mortality, especially in domestic poultry, and infects all systems and all tissues. H5N1 is included in this subtype. First seen in Hong Kong in 1997, H5N1 spread to South Korea in 2003, to Vietnam, Japan, Thailand, Cambodia, and China in 2004, and to Indonesia, Malaysia, Kazakhstan, Russia, Mongolia, Turkey, and Romania in 2005. While the initial Asian outbreak caused concern, Dr. Ragan said, the subsequent spread to Eastern Europe has raised awareness of the potential threat in the U.S. even further, given the amount and ease of interchange of people, animals, and agricultural products between Europe and America. H5N1 is not currently known to exist in the U.S.

Among waterfowl, Dr. Ragan said, H5N1 infection is subclinical to severe; in poultry, however, it results in severe disease and high mortality. “Hundreds of millions of birds have been lost in outbreak areas to the combined effects of the disease and control efforts,” he said. Of the more than 125 human cases reported, approximately 50 percent have resulted in death. Although AI viruses are “somewhat fragile,” Dr. Ragan said, “they survive long enough to infect people.” In addition to serologic tests, AI viruses are easily isolated with tracheal or cloacal swabs. “Control measures are the same as for any highly infectious agent,” Dr. Ragan explained. These measures include surveillance, biosecurity, quarantine of infected and exposed birds, depopulation, cleaning and disinfection, and vaccination.

“At present,” Dr. Ragan said, “there are 40 million doses of avian vaccine in the U.S. vaccine bank. This includes H5N1. However, while there are funds available to increase this supply, because of the constantly evolving nature of AI viruses, there is no certainty that vaccines made now will be effective next year.” Dr. Ragan also stressed the fact that control measures are demanding and resource intensive everywhere, and even more difficult to implement in developing countries.

Creating the right vaccines and the next generation of anti-viral medications needed to combat future threats.

To ensure an effective response, he concluded, we will need to:

- strengthen existing systems;
- engage host government ownership;
- stockpile medications and vaccines for rapid deployment;
- balance domestic priorities with international imperatives; and
- maintain a five to ten year optic for preparedness and rapid response.

The final speaker during this session was Milan Brahmbhatt, Lead Economist for East Asia and the Pacific at the World Bank. He reviewed the economic costs and incentives of prevention and control strategies and discussed the potential macroeconomic impacts of a pandemic. The most immediate economic impacts of a human influenza pandemic might arise from the uncoordinated efforts of people to avoid becoming infected, said Mr. Brahmbhatt. This was the case during the SARS pandemic, when people tried to avoid infection by minimizing face-to-face interactions, resulting in severe demand shock for tourism, mass transport, retail sales, hotels, and restaurants, and in supply shock due to workplace absenteeism and disruption of production, he said. If emergency public policy measures such as quarantines or restrictions on travel and trade were needed during a global pandemic, trade dependent economies such as East Asia could be severely affected, Mr. Brahmbhatt warned. To get a very broad idea of the kinds of economic costs that might arise, one can note that the disruptions associated with SARS led to an immediate economic loss of two percent of East Asian regional GDP in the second quarter of 2003, even though only about 800 people ultimately died from this disease. A two percent loss of global GDP during an influenza pandemic would represent around $800 billion over a whole year. If anything, this scenario of a two percent loss of world GDP based on SARS is likely to be an underestimate. The impact of SARS was mitigated by its being mainly restricted to East Asia, so that East Asia’s exports were not depressed by a SARS shock in the rest of the world.

A human flu pandemic would also entail a sizeable loss of output through a reduction in the size and productivity of the world labor force due to illness and death, to which the costs of hospitalization and medical treatment would need to be added. There is a lack of detailed studies of what these sorts of supply side costs of a flu pandemic might amount to at a global level. But one 1999 study for the United States calculated that a relatively mild flu pandemic, similar to that in 1967, could result in 100,000 to 200,000 deaths, 700,000 hospitalizations, 40 million outpatient visits, and 50 million associated illnesses. The present value of economic losses associated with this level of mortality and morbidity is between 100 and 200 billion dollars. Mr. Brahmbhatt
emphasized that these estimates are based on a mild pandemic with an assumed mortality rate of less than 0.1 percent of the U.S. population; actual deaths in a new pandemic could be significantly higher.

Extrapolating from the U.S. to all high income countries, said Mr. Brahmbhatt, there could be a present value loss of $550 billion. The loss to the world would be significantly larger because of the impact on developing countries. But it is not appropriate to make a simple extrapolation from studies of rich countries to poor countries, where health systems are much less developed and mortality could be much higher.

Turning to the impact on businesses, Mr. Brahmbhatt noted that there is a presumption that services sectors such as tourism, transport, domestic trade, leisure and other sectors dependent on discretionary consumer spending will tend to be hardest hit. Firms may well face a need for more external financing to survive a steep downturn in cash flows lasting from six months up to two years, especially in these sorts of services sectors. While well capitalized firms would be best placed to survive such a shock, bankruptcies would surge in the hardest hit sectors, for example airlines.

Governments may need to plan for policies that would facilitate corporate restructuring and getting industries relaunched promptly after the crisis. Firms also need to plan for all sorts of severe disruptions in logistics, input supply chains and the availability of key business services, most obviously business travel, for example by clarifying alternative sources of supply. Firms could also consider building up buffer stocks of critical inputs. That may eat into short-term profit margins and run against current just-in-time management philosophy, but could help ensure the very survival of the firm during this type of catastrophic event.

He concluded his comments by outlining some lessons that must be heeded if we are to respond effectively to a new pandemic. First, governments must establish credibility through the honest, accurate, and timely disclosure of information to their own citizens and to the world community. Evidence indicates that some of the costs of the SARS epidemic were magnified by the initial lack of public information in some countries.

Second, because of the close links between animal and human health, our response needs to draw on the best available knowledge and guidelines from international technical agencies, such as the OIE, FAO, and WHO, and country-level plans must be prepared with cooperation from all concerned government ministries—agriculture, health, finance, education—as well as local governments and civic organizations, and under strong political leadership.

Third, all the strategies that are currently being implemented should be carefully evaluated to determine if outcomes are meeting expectations. The control strategies used by countries that have been the most successful in curbing avian flu—Hong Kong, Korea, and Japan—should be studied and emulated. Fourth, because the threat of

Session I: Potential Public Health Impact of a Pandemic

After the keynote addresses, three panelists discussed the public health implications of H5N1. Dr. John Ragan, a veterinarian employed by the Animal and Plant Health Inspection service of the U.S. Department of Agriculture, gave an overview of avian influenza from an animal health point of view.

Dr. Ragan explained that there are three types of influenza viruses: Type A affects humans, swine, equine, avian, and other species; Type B affects humans only; and Type C affects humans and swine, but is uncommon and causes only mild disease. The concern with regard to Type A strains, which include H5N1, is the ease and frequency of mutations and their ability to adapt to new hosts.

The avian influenza (AI) subset of Type A viruses is widely

Over 100 attendees from USAID, the State Department, the World Bank, foreign embassies, local NGOs, and private companies attended the Symposium.
In his keynote address, Mr. Adams said that a world-wide, coordinated response would be critical to overcoming the threat posed by the H5N1 virus, beginning with an international needs assessment (which the Bank recently completed) and followed by programs specifically tailored to countries where the disease is endemic as well as to countries that are at risk, with ongoing surveillance elsewhere to quickly spot new risks or outbreaks. It is also important to strengthen and support effective veterinary services in developing countries. The Bank and the United Nations recently estimated the cost of such a response to be between $750 million and $1 billion, not including the cost of the vaccines that may be needed.

The Bank will request up to $500 million from its Board of Directors to help in the initial phase of these efforts. The funding plans, however, extend beyond that. "Given the global threat and the global implications of H5N1, we will also seek to mobilize grant funding from other international donors," Mr. Adams said. The Bank expects to establish a global trust fund, financed by the European Commission, WHO, FAO, OIE, and other bi- and multilateral donors, following a needs assessment in China in mid-January.

"Financing is only one aspect of the problem, however," he said. "Strengthening capacity in animal health and putting adequate surveillance systems in place will help advance the ability of developing countries to respond, not only to the current threat, but to future problems." Dr. Bruce Gellin, Director of the National Vaccine Program Office (NVPO) of the U.S. Department of Health and Human Services delivered the second keynote address. The NVPO coordinates and integrates the activities of all federal agencies involved in immunization efforts to ensure that immunization programs are carried out in an efficient and timely manner, and develops strategies to achieve both the highest possible level of prevention of human diseases through immunization and the highest level of prevention of adverse reactions to vaccines.

The well-recognized potential global impact of H5N1 and the coverage the virus is currently receiving in the popular press may provide the impetus needed to successfully advocate for policies, procedures, and funds that enable us to respond more effectively to emerging diseases. Dr. Gellin said.

The H5N1 virus appeared in 1997 and has spread to many countries in Asia, and more recently to Eastern Europe. While no one knows whether the virus will mutate in a way that permits easy transmission from poultry to humans, or subsequently from human to human, "the signs so far are not good," Dr. Gellin said. A virus that was initially pathogenic in a few species of birds has expanded its reach. It now affects a wide range of wild and domestic poultry, as well as a number of mammalian species, including felines, and humans.

The spread of avian influenza to Eastern Europe has raised awareness of the threat to the U.S., given the amount and ease of interchange of people, animals, and agricultural products between Europe and America.

Viewing AI as an opportunity to improve our understanding of the dynamics of emerging infections and transform our approach to their control brings different concerns to the fore, Dr. Guidotti said. He emphasized the need to address underlying causes, including both animal and human population density, outmoded animal handling practices, and anti-viral medications, and how to increase our capacity to manufacture and stockpile them in order to allow rapid response to future pandemics.

Closing Remarks

In his closing comments, Dr. Tee Guidotti, Chair of the Department of Environmental and Occupational Health in the GWU School of Public Health and Health Services, reviewed the countermeasures needed to deal with the immediate threat posed by AI, including ongoing surveillance and continued efforts to eradicate or contain the virus in avian populations; culling, vaccinating, maintaining sanitation and biosecurity, and keeping domestic birds separate from wildfowl; decreasing the probability of transferring AI from poultry to humans by improving animal handling practices and maintaining occupational health measures; and reducing human-to-human transmission through basic sanitation, immunization, anti-viral medications, and quarantine.

Mr. Shaikh, President and CEO of International Resources Group, offered five “take home points” that encompass the most important considerations to keep in mind in the avian influenza response.

First, that response will require a worldwide effort.

Second, meaningful, effective coordination among both domestic and international agencies is essential.

Third, we must remember that the current threat is not a single, unique event, but only the most recent of a series of emerging, and potentially dangerous, infectious viruses. "While we are likely to dodge this bullet, others will come our way," Mr. Shaikh warned.

Fourth, although avian influenza is primarily a health problem, there are strong economic vested interests that will affect our response. "An effective containment strategy will require marshalling and deploying resources globally," he said. "Can we overcome our individual vested interests in order to forge a united response?"

Fifth, while one should not be unduly alarmed about the avian flu threat, an effective response will require a new way of doing business, worldwide, and for the foreseeable future.
About the Speakers

Dr. Tee Guidotti is Chair of the Department of Environmental and Occupational Health in the School of Public Health and Health Services and Director of the Division of Occupational Medicine and Toxicology in the School of Medicine and Health Sciences at GWU Medical Center. He earned his B.S. in Biological Sciences at the University of Southern California, his M.D. at the University of California at San Diego, and his M.P.H. at Johns Hopkins.

Asif M. Shaikh, President and CEO of International Resources Group, is a widely recognized authority on the links between economics, governance, and rural productions systems as well as on environmental policy and poverty alleviation. He holds a B.A. in Economics from Yale University and an M.A. in Economics from Columbia University.

James W. Adams, Vice President and Head of Network Operations Policy and Country Services at the World Bank, has overall responsibility for operational policy development, relations with the United Nations and non-governmental organizations, procurement, financial management, and support to regional staff. He holds a B.A. in Economics and Political Science from Colgate University and an M.P.A. in Economics from Princeton University.

Dr. Victor Barbiero is former Chief of the Implementation Support Division in the Office of HIV/AIDS at USAID. He holds a Masters of Health Sciences and a Doctorate in Pathobiology, both from the School of Hygiene and Public Health at Johns Hopkins. In December 2005, Dr. Barbiero joined the GWU Department of Global Health as Visiting Associate Professor of Public Health.

Milan Brahmbhatt is the Lead Economist for East Asia and the Pacific Region at the World Bank, where he focuses on cross-country economic policy growth, and poverty reduction issues. He holds B.S. and M.S. degrees in Economics from the London School of Economics and Political Science.

Dr. Faye Bresler is Adjunct Assistant Professor of Environmental Occupational Health at the GWU School of Public Health and Health Services, and Chief of the Foodborne Disease Investigations Branch at the U.S. Department of Agriculture Food Safety Inspection Service. She received a degree in Anthropology from Harvard University, a degree in Medicine from Stanford University, and an M.P.H. from the University of Michigan.

Dr. Dennis Carroll is the Senior Infectious Diseases Adviser at USAID, on detail from the U.S. Centers for Disease Control and Prevention. He was recently appointed Director of USAID’s newly-created Avian and Pandemic Influenza Preparedness and Response Unit. Dr. Carroll has a Ph.D. in Molecular Biochemistry.

Dr. Bruce Gellin is the Director of the National Vaccine Program Office at the U.S. Department of Health and Human Services, which provides leadership and coordination among Federal agencies, state and local health departments, community health centers, and non-governmental organizations, and non-governmental organizations. He holds a Ph.D. in Epidemiology from the School of Public Health, University of Rochester, and an M.S. in Public Health from the State University of New York at Buffalo.

Dr. John Ragan joined the Food Safety and Inspection Service at the U.S. Department of Agriculture in 2001, where he is the director of the Food Safety and Inspection Service’s Avian and Poultry Safety and Health Program. He is a member of the Animal and Egg Production Food Safety staff and the Animal and Plant Health Inspection Service.

International Resources Group (IRG) is the global leader in providing risk management solutions that enable governments, communities, and households to manage critical resources to build a safer and more prosperous world. IRG’s international development staff include world-renowned specialists who have pioneered many of the analytical techniques employed in their field. IRG’s ability to provide management, economic, and technical advice is further enhanced by the diversity, cross-cultural experience, foreign language skills, and management capabilities of its staff located in Washington, DC headquarters, corporate offices in India and the Philippines, and project-dedicated offices around the world.

Avian Influenza: A Symposium Report

While world health experts focus on medical solutions to prevent a potential infectious avian flu pandemic, International Resources Group (IRG) and George Washington University (GWU) Medical Center have turned their attention to understanding the preparations required to assess and mitigate the social, economic, political, and environmental impacts of such an event. Development professionals responsible for ensuring preparedness and coordinating our response to a pandemic, whether as a result of the current or some future threat, will need to have information, tools, and strategies to understand its causes and mitigate its impacts.

On November 15, 2005, IRG and GWU Medical Center therefore held a symposium to discuss:

- The magnitude of the threats posed by emerging infectious diseases, particularly in regard to the current concern with avian influenza H5N1;
- The emergency response planning needed to mitigate the political, social, and economic impact of such pandemics;
- The need for increased capacity building, both to control the current crisis and guard against future outbreaks;
- The mechanisms for interagency/intergovernmental coordination necessary to ensure and maintain effective communication and the best use of resources;
- The strategies needed to contain the spread of emerging infectious agents.

About the Speakers

International Resources Group (IRG) is an international professional services firm that helps governments, the private sector, communities, and households manage critical resources to build a safer and more prosperous world. Since 1978, IRG has completed over 700 contracts in more than 135 countries, delivering high-quality, cost-effective services that promote positive economic growth, institutional and social change, and intelligent use of resources—human, physical, environmental, and financial. IRG’s international development staff include world-renowned specialists who have pioneered many of the analytical techniques employed in their field. IRG’s ability to provide management, economic, and technical advice is further enhanced by the diversity, cross-cultural experience, foreign language skills, and management capabilities of its staff located in the Washington, DC headquarters, corporate offices in India and the Philippines, and project-dedicated offices around the world.

Avian Influenza: A Symposium Report

While world health experts focus on medical solutions to prevent a potential infectious avian flu pandemic, International Resources Group (IRG) and George Washington University (GWU) Medical Center have turned their attention to understanding the preparations required to assess and mitigate the social, economic, political, and environmental impacts of such an event. Development professionals responsible for ensuring preparedness and coordinating our response to a pandemic, whether as a result of the current or some future threat, will need to have information, tools, and strategies to understand its causes and mitigate its impacts.

On November 15, 2005, IRG and GWU Medical Center therefore held a symposium to discuss:

- The magnitude of the threats posed by emerging infectious diseases, particularly in regard to the current concern with avian influenza H5N1;
- The emergency response planning needed to mitigate the political, social, and economic impact of such pandemics;
- The need for increased capacity building, both to control the current crisis and guard against future outbreaks;
- The mechanisms for interagency/intergovernmental coordination necessary to ensure and maintain effective communication and the best use of resources;
- The strategies needed to contain the spread of emerging infectious agents.

Keynote Speakers

Dr. John Ragan

Keynote Speakers

On November 15, 2005, IRG and GWU Medical Center therefore held a symposium to discuss:

- The magnitude of the threats posed by emerging infectious diseases, particularly in regard to the current concern with avian influenza H5N1;
- The emergency response planning needed to mitigate the political, social, and economic impact of such pandemics;
- The need for increased capacity building, both to control the current crisis and guard against future outbreaks;
- The mechanisms for interagency/intergovernmental coordination necessary to ensure and maintain effective communication and the best use of resources;
- The strategies needed to contain the spread of emerging infectious agents.

To date, almost 90 countries and nine international organizations have agreed to support the principles of scientific cooperation, rapid reporting, and transparency outlined by the International Partnership on Avian and Pandemic Influenza.