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# AVIAN INFLUENZA: ARE WE PREPARED?

## HEARING

BEFORE THE

## COMMITTEE ON FOREIGN RELATIONS
## UNITED STATES SENATE

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# AVIAN INFLUENZA: ARE WE PREPARED?

**WEDNESDAY, NOVEMBER 9, 2005**

U.S. SENATE,
COMMITTEE ON FOREIGN RELATIONS,
*Washington, DC.*

The committee met, pursuant to notice, at 9:35 a.m., in room SD–419, Dirksen Senate Office Building, Hon. Richard G. Lugar (chairman of the committee) presiding.

Present: Senators Lugar, Chafee, Murkowski, Biden, Sarbanes, Dodd, Feingold, and Obama.

## OPENING STATEMENT OF HON. RICHARD G. LUGAR, U.S. SENATOR FROM INDIANA

The CHAIRMAN. This meeting of the Senate Foreign Relations Committee is called to order.

The committee meets today to examine the steps being taken by the United States Government and the private sector healthcare providers and the international community to prevent and to prepare for a possible human pandemic of avian influenza.

International health experts believe the stage is set for a possible worldwide influenza pandemic originating in Southeast Asia. A new strain of bird flu, H5N1, is killing millions of birds and Asian poultry flocks. This last Friday, another major outbreak was reported in China. The disease has killed about 60 people, or about half of those known to have been infected. Humans have no immunity to this strain. The only obstacle to a pandemic is that H5N1 has not yet mutated to a form easily transmissible from human to human.

If that happens, and if the new virus is roughly as contagious and lethal as the deadly 1918 Spanish Flu, as many experts fear, the disease could quickly sweep the globe. In a worst-case scenario, casualties would be in the millions in our country, and in the tens of millions worldwide. Hospitals and healthcare systems would be overwhelmed. Large numbers of workers could lose their jobs as customers stay home and economies contract, and governments around the world would be destabilized.

We cannot be certain that such a pandemic will occur, or predict its timing or its severity. If we are lucky, the H5N1 virus will not turn into a human pandemic. But experts say that based on historical patterns, we are overdue for a major flu pandemic outbreak. If it is not caused by H5N1, then some other pathogen may be the source. The human and economic consequences of a pandemic could be so severe that we cannot rely on luck. Prudence requires we prepare, in the short term, as if an H5N1 outbreak is probable. Fur-

thermore, we must rebuild our vaccine production and infrastructure, strengthen international health cooperation, and take other steps for the long term.

I am pleased the administration, last week, issued its long-awaited national pandemic plan. However, I am concerned that, up to that point, the administration's response to avian influenza had been underfunded and behind schedule. Five years have passed since the GAO recommended that the Department of Health and Human Services complete the national pandemic plan. It's been nearly a year since Tommy Thompson, as departing Secretary of HHS, expressed "grave concern" about avian influenza. Other countries, such as Canada and Japan, seem to be much farther along in their preparation and have had national plans in place for some time.

The President must make clear now who is in charge of mobilizing government preparedness efforts, and he must give that person his vocal and sustained support. The President will find many willing partners in Congress for this endeavor.

With no plan forthcoming, in February Senator Obama and I added $25 million to the State Department authorization bill for an avian flu initiative. In June, we coauthored an article in the New York Times calling for the Government to promptly take the leadership role. The Foreign Relations Committee staff has met with an array of experts, including Dr. Margaret Chan, the World Health Organization's lead pandemic official, and I have written to HHS Secretary, Mike Leavitt, asking for updates. Along with eight other Senators, I cosponsored Senator Obama's pandemic legislation, S. 969, one of several bills attempting to strengthen our response to the threat of avian influenza.

In September, still lacking a final plan from the administration, the Senate voted to add $3.9 billion for civilian pandemic preparedness to the Defense Department appropriations bill. Two weeks ago, to ensure that pandemic preparedness funds do not get sidetracked by procedural disputes, the Senate added $7.9 billion to the Labor-HHS appropriations bill—more than the $7.1 billion the administration said last week it would request.

The pandemic threat is a problem of many dimensions that will require coordination between many government agencies. Are the countries of Southeast Asia sufficiently equipped and motivated to stamp out the bird flu among their poultry populations, which would reduce the chance that the virus will mutate into a human pandemic form? We will need to know, as soon as possible, when the virus becomes easily transmissible between people. Do countries such as China, Burma, and Laos have reliable, countrywide disease reporting systems and laboratory facilities to make prompt diagnoses? How can we assist in this process?

If a human outbreak is detected, will it be feasible to contain it in a small area for a sufficient period of time to allow the rest of the world to take protective measures? What arrangements, if any, have been made for the international sharing of scarce antiviral drugs and the new, still unproven H5N1 vaccine? The administration's proposal does not appear to allocate much money for preventing or stopping pandemic influenza at its source, which as Dr. Donald Burke of Johns Hopkins University noted in an article last

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week, would be much more cost effective than waiting until it gets to our shores.

If the pandemic does reach the United States, how much medicine and vaccine will be available? Who will get priority? And how will these vaccines and treatments be physically distributed? What steps will the Government take to restrict the spread of the disease? Banning international travel, closing schools, canceling all public events, or declaring a national stay-at-home holiday period are among measures suggested by experts. If many thousands of people in a metropolitan area become very ill with flu over a short period of time, as some fear, how will hospitals and emergency rooms handle the overwhelming surge of patients?

In 2003, a SARS outbreak in Southeast Asia killed 800 people, a relatively small number compared to the casualties expected in a flu pandemic. Nevertheless, SARS caused great fear and a sharp economic downturn in several Asian nations. Are American businesses prepared if a large number of workers and customers don't show up for an extended period? Will workers be able to, or willing to, keep transportation, electricity, phone, and water systems operating and supermarkets stocked? In this era of globalization, how will international trade be affected? Have the many businesses that rely on regular deliveries of materials from overseas or elsewhere made plans for possible supply-chain disruptions?

We will try to answer some of these questions. We have assembled two distinguished panels to help assess the current state of preparedness and, more importantly, to discuss the next steps that our Government, the international community, businesses, and private individuals should take.

On our first panel, we welcome Dr. Paula Dobriansky, Under Secretary of State for Democracy and Global Affairs; Dr. Anthony Fauci, Director of the National Institute of Allergy and Infectious Diseases at the National Institutes of Health; Dr. Julie Gerberding, Director of the Centers for Disease Control and Prevention; and Mr. Andrew Natsios, the Administrator of the United States Agency for International Development.

On our second panel, we welcome Ms. Laurie Garrett, senior fellow for Global Health at the Council on Foreign Relations, and Mr. James Newcomb of Bio Economic Research Associates.

We thank all of our witnesses for coming this morning. We look forward to their insights.

Let me say that, at the time that Senator Biden comes to the hearing, he will be recognized for an opening statement, if he has one. The majority leader, Dr. Frist, is here.

Dr. Frist.

## STATEMENT OF HON. BILL FRIST, U.S. SENATOR FROM TENNESSEE

Senator FRIST. Thank you, Mr. Chairman. I'll be very, very brief. I did want to really come by to pay my respects for this committee, the leadership that you have shown, the leadership that both panels have shown, addressing an issue that we can't predict with any degree of accuracy. But we know the downside, the devastation, the destruction that can occur if we are not adequately prepared. And

today, in spite of all of the intentions and great work that everybody has done, we are not adequately prepared.

Last week, the President unveiled his plan to prepare the Nation against a threat of avian flu, and I want to thank the President and his Cabinet and the entire administration for their leadership in addressing this threat.

I also want to pay my respects and applaud the work of the Department of Health and Human Services, led by Secretary Leavitt. I am pleased with these initiatives on behalf of the administration.

During the address that Secretary Leavitt gave at the National Press Club, he used the illustration, or the analogy, of a spark in a dry forest. And I think that's an accurate analogy, a spark which, if you catch it early on, you can crush it, you can put it out; but if it's allowed to fester at all, it can leave and start lots of little sparks throughout that forest and take it down.

If we can, using that analogy, detect, early on, and identify and contain a pathogen, a virus before it spreads, we will be able to save millions of lives. And, again, we talk a lot about these huge numbers of lives that can potentially be lost, and they are real, and we need to address it right up front. That's why I thank you for having this hearing today.

H5N1 shows no signs of fading. We'll hear testimony today, the impact here. It's infected or caused the killing or culling of over 200 million birds. On Monday, we learned that two new human cases—a 19-year-old woman and an 8-year-old brother—have been infected, bringing the total number of human cases to 124, 63 of which have been fatal. That is because, in large part, it is a virus to which we have no immunity. Nobody in this room has immunity to this virus. I just got my flu shot earlier this morning, and I'm sure the first question people are asking, "Is that protective?" And the answer is, "No." And, indeed, we have no natural immunity to this H5N1 virus.

A second component is that infected hosts, we believe, are going to be contagious, or infectious, where they can spread the disease before they actually have symptoms; something very different than SARS or the other more recent viruses that we have addressed.

Today, we lack our best defenses. We lack ample surveillance, effective vaccines. We lack a robust antiviral stockpile. And until we address the current preparedness gaps and challenges, we're going to remain unprepared. And we'll hear a little bit today about how we must do that.

Several observations that I'd like to make is that we do have no single authority within the Federal Government responsible for advanced research and development of countermeasures. There is no clear coordination—or, I would say, there is inadequate coordination today among Government and industry and academia. Some good things going on, but, I think, inadequate to meet the real challenge that is out before us. The liability risk we'll be talking about, I'm sure, associated with manufacturing and administering the countermeasures prevent needed vaccines and drugs from being developed or deployed. And that's an immediate concern with H5N1 vaccine. If it hit today, how long would it take to produce 50 million doses of vaccine? And the answer is: Too long. In the

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Spanish flu, in 1918, more people died in 24 weeks than died in HIV/AIDS in its history, in 24 years of HIV/AIDS.

But I'm confident that, under the President's leadership and the bipartisan effort represented by this committee, that we can better prepare against these threats that we all know are out there, as well as new and emerging threats that we cannot yet predict.

The prices that are paid are more significant than have been outlined, I think, which is the importance of hearings like this. There's devastating loss of life, but, as the chairman mentioned, huge economic impact that we saw just a sampling of with SARS, where you have a shutdown both on the demand and the supply side of our economy with a fall in GDP, a potential donut hole taken out of the most productive people of our society.

The global pandemic, it's a global issue, and that's why it's important for it to be before this committee. In fact, in all likelihood, H5N1, nobody really knows, is not going to start here; it's going to start overseas somewhere, if you played the odds. This hearing is particularly timely. Other committees are working very hard. The Health, Education, Labor and Pension Committee, and, as you mentioned, other areas of appropriating appropriate funds, are being addressed.

So, I'm really here to support the work of this committee. I want to congratulate you and Ranking Member Senator Biden in putting this hearing together. And I think we all, at the end of the day, have to remember that there is no higher duty than—for Government—than to protect the health, well-being, and security of the American people.

[The prepared statement of Senator Frist follows:]

PREPARED STATEMENT OF HON. BILL FRIST, U.S. SENATOR FROM TENNESSEE

Mr. Chairman, Senator Biden, let me begin by thanking you for your efforts on this important topic.

Last week, the President unveiled his plan to prepare the Nation against the threat of avian flu. I want to thank the President for his leadership.

I also want to acknowledge the work of the Department of Health and Human Services led by Secretary Leavitt. I am pleased that both the President and Secretary Leavitt recognize the urgency of taking aggressive action.

During an address Secretary Leavitt made at the National Press Club, he used the following illustration: A vast dry forest only needs one spark to set it on fire. If we're close to where the spark ignites, we can stamp it out. But if it's allowed to spread, it will grow beyond containment, leaving the forest in smoldering ruins. In other words, if we can detect, identify, and contain a viral pathogen before it spreads, we'll save millions of lives.

This is why I have been proud to join you both in cosponsoring the Global Pathogen Surveillance bill that will be absolutely critical in this capacity.

H5N1 avian influenza shows no signs of fading. It has infected more people and more poultry than any previous strain. It continues to extend its geographic reach with outbreaks in 16 countries.

On Monday, we learned of 2 new human cases—a 19-year-old woman and her 8-year-old brother—bringing the total number of human cases to 124—63 of which have been fatal. And, hundreds of millions of birds have died or been culled. This is a virus for which we have no natural immunity. Infected hosts are contagious before they are symptomatic. And, as the virus mutates, the odds of human-to-human transmission multiply.

Yet, we lack our best defenses: Ample surveillance, effective vaccines, and a robust antiviral stockpile. And, until we successfully address our current preparedness gaps and challenges, we will remain unprepared.

- There is no single authority within the Federal Government responsible for the advanced research and development of countermeasures.

- There is no clear coordination and collaboration among government, industry, and academia.
- The liability risks associated with manufacturing and administering countermeasures prevent needed vaccines and drugs from being developed or deployed—an immediate concern with the H5N1 vaccine.
- And, the United States lacks strong domestic vaccine and antiviral manufacturing capacity. Focusing solely on avian flu, there is only one vaccine manufacturer with production facilities in the United States. And, this same company produces the regular influenza vaccine as well as some childhood vaccines.

I'm confident that with the President's leadership and a bipartisan effort here in Congress we can better prepare America to defend against the threats we know of, as well as new and emerging threats.

Failure carries a price more significant than most have fully considered—not only will it bring a devastating loss of life, but it will render a powerful blow to our economic and national security. Therefore, it is imperative that Congress consider these implications of a global pandemic and act boldly and decisively. I am proud to say that the Senate is heeding the warnings.

Today's hearing is particularly timely. And other committees are well along in considering policies to improve our preparedness and response capabilities.

For example, last month the Senate HELP Committee—under the steady leadership of Senator Burr—reported out comprehensive biodefense legislation. And we have passed two appropriations measures to bolster our antiviral stockpiles and vaccine development.

I continue to work with my colleagues on this critical piece of legislation and look forward to its swift consideration by the U.S. Senate.

Let us all remember: We have no higher duty than to protect the health, well-being, and security of the American people.

The CHAIRMAN. Well, Mr. Leader, we're really pleased and honored that you've come. It's a very, very important subject, one to which you've devoted, already, a good bit of your talents and your time. And we count on your leadership.

Yes, Senator Dodd.

Senator DODD. I had just a question for the Leader, because I think—your sense of the importance of the timing of all of this—obviously, you're here not only as a witness, but also as our leader—is there a sense of emergency about this that we ought to be grasping, as an institution?

Senator FRIST. Yes. I do believe that we absolutely must address—the difficulty is the lack of predictability——

Senator DODD. Right.

Senator FRIST [continuing]. As to when we're going to have a pandemic. We're going to have pandemics. But we are unprepared. So, whether it's going to happen in the next few months—and most people say, "Well, probably not"—again, just statistically. But it could.

Senator DODD. Yeah.

Senator FRIST. We're totally unprepared. And, therefore, knowing that, and knowing that our obligation, our first and foremost thing that we need to do—the security, mortality, death, life—when you have a threat this big——

Senator DODD. Yeah.

Senator FRIST [continuing]. That the scientific experts agree is going to be coming, we need to act. We need to act in—before we get out, Thanksgiving.

Senator DODD. Thanks.

The CHAIRMAN. Thank you very much, Senator Dodd, for your question, and for your response, long before we get to the hearing.

Senator DODD. I apologize, but——

The CHAIRMAN. No, it was timely, and we have work to do here, which I think our witnesses will stimulate this morning.

I'd like for you to testify in this order. First of all, Mr. Natsios, then Secretary Dobriansky and Dr. Gerberding, and then Dr. Fauci. And your statements will all be made a part of the record completely, so you need not ask for permission that occur; it will happen. And please summarize, perhaps within about a 10-minute period, but we'll not be restrictive.

Dr. Natsios, would you proceed, please.

**STATEMENT OF HON. ANDREW S. NATSIOS, ADMINISTRATOR, U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT, WASHINGTON, DC**

Mr. NATSIOS. Thank you, Senator.

I do have a much longer statement for the record, as you just mentioned.

Senator Lugar, Senator Dodd, Senator Frist, and members of the committee, I'd like to thank you for convening this important hearing on avian influenza and for inviting me and my colleagues to testify.

I do want to thank you, Senator Lugar and Senator Obama, for putting avian influenza into the—I believe it was the tsunami supplemental—$25 million to begin the effort. That did make a great deal of difference in our ability to begin the pilot programming and the program design that we are now going to scale up once the larger appropriation goes through.

H5N1 mainly affects birds. At the present time, the risk to human beings is low, because avian influenza viruses do not usually infect humans. However, there is growing concern that the virus could mutate and spread rapidly from human to human, placing millions of lives at risk. There is, as yet, no evidence of efficient human-to-human transmissions. Nevertheless, mounting an effective response at this stage is paramount to halting the spread of this virus in Asia, and, thus, preventing what could turn into a pandemic.

Under the leadership of Secretary Rice, my agency is helping countries prepare for a potential pandemic and respond to current animal outbreaks. Working in close coordination with our other U.S. Government partners, who are at the table, as well as the U.S. Department of Agriculture, USAID is supporting case detection and tracking animal outbreaks, so that we may act as rapidly as possible to put in place aggressive containment measures.

USAID has reached out to all of the countries where we have USAID missions, as well as to nonpresence countries. There are 80 countries where we have a mission, which means that there is at least one USAID Foreign Service officer on the ground, and another 40 countries—nonpresence countries—where there are NGOs or U.N. agencies, or contract agencies that are doing work, but there is no Foreign Service officer there. In terms of these programs, they're managed regionally.

To date, we have requested detailed reports from 110 countries for which USAID could potentially provide assistance. Of these, 102 have responded. The reports from our missions will serve as a baseline for measuring our programs operationally, and will guide

our efforts in the coming year in mounting effective strategies to meet the threat of avian influenza as it evolves.

Our response strategy is guided by the level of threat in each country. For instance, a country with animal infections, but no human infections, is at a lower level of threat than one with both animal and human infections. Countries with neither animal nor human infections are at the lowest level of threat. For example, in North and South America, there are no instances of any infection at this point; and so, they would be in category three, while the Asian countries are in category one, because they've had both human and poultry infections. So, they would be in the highest category. And then some European and Eurasian countries—Romania, Russia, Turkey, and Croatia among others—have now had some poultry infections, so they would be in category two, but there have been no human infections.

And the way in which we will allocate the $131 million for USAID that is in the President's supplemental budget is based on this formula of the degree of risk. Countries will change in categories based on circumstances. So, this is not a static list.

In support of the President's national strategy on pandemic influenza, the Agency is focusing on four key strategic principles. First is preparedness, second is surveillance, third is diagnostics and response, and fourth is public communication and public education.

We have moved quickly to operationalize programming in the field. We expect that by the end of January 2006, the start of the flu season in Southeast Asia, multisector country preparedness plans will have been developed with USAID assistance, working with international organizations and other donors in Vietnam, Cambodia, Indonesia, and Laos. Because of endemic animal infections and confirmed human cases, these countries represent the greatest risk for human health.

In addition, national communications campaigns promoting safe behavior will be underway in high-risk countries. By the end of February, early-warning systems and national response teams should be in place in the four countries to report outbreaks within 1 week of onset, and to confirm these outbreaks no later than 1 additional week. I might add that there are practices in some countries that facilitate spread of avian influenza—for example, in wedding ceremonies in certain Southeast Asian countries, ducks are slaughtered for cooking, and then they're given to the guests as just a ritual practice, and they drink, as a ritual matter, the duck blood. Well, that rapidly spreads the disease if the ducks are infected. And so, we need to educate the public that, while this is a traditional practice right now, it's very dangerous. And so, there's a series of measures, we hope, using the NGO networks we have and public communications and the Ministries of Health and U.N. agencies to get the message out on what behaviors need to change in order to reduce risk. For example, right now in Indonesia, USAID is connected into huge NGO networks. These are mostly local NGOs. There are 900,000 NGO workers who work for these NGO networks, and they are now going door to door in the agricultural areas of Indonesia to inform farmers about the best practices and safe behavioral patterns with respect to this disease.

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We project that a national program to vaccinate chickens and ducks will be completed by the end of February in Vietnam. Indonesia will benefit from the presence of an emergency team of experts, multiagency experts from the U.S. Government, as well as international institutions, from the establishment of local disease-control centers in hotspot areas. In addition to offering update information, these centers will train animal health technicians and veterinarians in how to expedite disease surveillance and control. With Indonesian authorities, they will help decide upon appropriate control measures, such as culling, vaccination, and biosecurity. They also provide support for animal health teams in their systematic house-to-house search for diseased birds, which I just mentioned.

By February, compensation options for farmers should be identified for Vietnam, Indonesia, Cambodia, and Laos. These options will help national governments, multilateral institutions, and others to design and fund programs to help farmers reduce the financial burden from losses to their flocks. Simply put, they are our first line of defense. Without farmers quickly reporting suspected deaths or cases of avian influenza, our efforts are handicapped from the outset at one of its most critical points. We are attempting to change the incentive here. The incentive right now is not to report it, because if they report one outbreak, all the animals are going to be killed, and the farmers will become impoverished. If we do not change that dynamic, people are not going to report information quickly. We need to change the incentive structure very rapidly.

Pandemic preparedness training in the affected countries will also begin in February. This will give local officials a better understanding of the importance of transparency and responsiveness in the handling of reports of diseases.

To date, USAID has obligated $13.7 million in FY 2005 to help prevent and contain avian influenza in Southeast Asia, where the largest impact of this epidemic has been felt. Ten million dollars of these funds were from the 2005 emergency supplemental, and I redirected $3.7 million from other USAID programs to this.

On October 1, 2005, the President requested $7.1 billion to Congress to fund a comprehensive response. These supplemental funds requested in 2006 will build on, and expand, activities that were started in 2005. Specifically, USAID will strengthen animal and human surveillance, focus on behavior-change communications and response capacity in the most affected countries: Cambodia, China, Indonesia, Laos, and Vietnam.

China is a significant poultry producer, which increases the risk of human infections, and they are on a major flyway of migratory birds. Let me just give you statistics that will show why we're at much greater risk than we were in the last pandemic.

In 1968, there were 13 million domesticated poultry in China. There are 13 billion today. Thirteen million to thirteen billion. That can tell you why the risk of rapid disease spread is so much greater. As China has become wealthier, they want more protein in their diets, and that has consequences, in terms of their agricultural system.

We'll also create a stockpile to contain outbreaks of H5N1 among birds and potential outbreaks among people. The stockpile will be managed by USAID's Office of Foreign Disaster Assistance, which has expertise in warehousing and in logistics systems, and will contain personal protective equipment, disinfectants, antibiotics, steroids, ventilators with oxygen supply, and materials and equipment for communications. The stockpile will be sufficient to respond to two simultaneous outbreaks of populations of 100,000 people each.

The first principle of good disaster preparedness and management is, that we may be allowed to hope for the best, but we must be prepared for the worst. This principle has guided our preparedness planning for the challenge of a potential outbreak. I would be happy to discuss with you in more detail the steps the agency has been taking since then.

[The prepared statement of Mr. Natsios follows:]

PREPARED STATEMENT OF HON. ANDREW S. NATSIOS, ADMINISTRATOR, U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT, WASHINGTON, DC

Chairman Lugar, Senator Biden, members of the committee, I would like to thank you for convening this important hearing on avian influenza (AI) and for inviting me to testify. As of today, H5N1 influenza strain mainly affects birds. There is, as yet, no evidence of efficient human-to-human transmission. Nevertheless, mounting an effective response at this stage is essential to halting the spread of this virus in Asia and preventing a pandemic.

Our technical experts in Washington and the field are working with nations, as well as regional and international organizations, to prepare for a potential pandemic. USAID has reached out to all of the countries where we have missions as well as to nonpresence countries to assess the readiness of regional programs to respond to avian influenza. To date, detailed reports have been submitted for 98 countries. These reports will serve as a baseline for measuring our programs and will guide our efforts in the coming year in mounting effective strategies to meet the threat of AI as it evolves.

The Agency is working in close coordination with U.S. Government partners, in detecting cases and tracking animal outbreaks so that we may act as rapidly as possible to put in place aggressive containment measures that can prevent the spread of the disease. In this regard, it is imperative that we raise the profile of avian influenza to host governments so that we can help them undertake efforts to prevent and contain the spread of the virus.

In support of the President's National Strategy on Pandemic Influenza, the Agency is focused on the following key principles:

- Preparedness;
- Surveillance;
- Diagnostics and Response; and
- Public Communication and Education.

STATUS OF THE DISEASE

To date, AI has been responsible for 124 confirmed human infections with 63 fatalities. More than 200 million domestic poultry in Asia and Eastern Europe have died as a result of this avian influenza, or been culled or killed. The present threat mainly stems from animal-to-human transmission and has been mostly confined to Southeast Asia and southern China. But trends are worrisome.

The recent expansion of AI into Russia and the Eurasia region by migratory birds underscores the sobering fact that the whole world is potentially at risk. During August 2005, the highly pathogenic H5N1 strain of avian influenza was confirmed in poultry in parts of Siberia, Russia, and in adjacent parts of Kazakhstan. Both countries have reported deaths of migratory birds in the vicinity of poultry outbreaks. In October 2005 the presence of H5N1 avian influenza was confirmed in samples taken from domestic birds in Turkey, Romania, Croatia, Kazakhstan, and Russia.

According to some experts, the migration of infected birds could possibly bring the virus to Africa in the coming weeks or months, as it follows migratory flight paths southwest from northern Russia to east Africa.

It is important to note that no human cases have been reported in any of these newer outbreaks, although it is possible that suspect human cases have gone unreported. At the present time, the risk to humans is generally low because avian influenza viruses do not usually infect humans.

Despite the limited spread of the virus from animals to humans, there is growing concern that this strain of the influenza A virus could evolve and spread efficiently from human to human, placing millions of lives at risk. If sustained human-to-human transmission occurs, our effectiveness in responding and containing the spread of the virus will be key to keeping the death toll at the lower end of projections.

SPECIFIC CHALLENGES

Success in containing AI requires limiting animal infections. However, it is extremely difficult to contain animal infections since 70 to 80 percent of poultry raised in Southeast Asia live on small, "backyard" farms. We are facing a lack of awareness about the threat the virus poses to animals and humans alike in the communities that raise these animals. The fact that 50 to 80 percent of poultry deaths are from non-AI infections poses a further problem in getting small farmers to recognize and report die offs. Farmers who live at subsistence levels are also reluctant to report sick birds for fear of losing their entire flock to culling.

The economic consequences of a tardy response could be devastating. The Asian Development Bank estimates that the SARS epidemic cost the business community some $60 to $80 billion in industries, hitting the airlines, manufacturing, and financial sectors particularly hard. The United Nation's Food and Agriculture Organization (FAO) estimates that AI has already cost private business as much as $10 billion. Should AI become easily transmissible between humans, the effects on business around the world would be disastrous.

To effectively meet these threats, USAID, is working in partnership with international organizations and governments to bolster disease surveillance and testing capacity, draw up preparedness plans, and take other preventive actions to contain outbreaks.

THE USAID RESPONSE

On May 11, 2005, President George W. Bush signed an emergency appropriations bill, which contained $25 million to prevent and control the spread of avian influenza. USAID was allocated a significant portion of this funding and is working in conjunction with the Department of Health and Human Services (HHS) and the U.S. Department of Agriculture (USDA) in developing nations around the globe to address the current H5N1 outbreaks within poultry and to prepare for a possible pandemic.

The Agency has moved quickly to operationalize programming in the field. We expect that by the end of January, the start of the flu season in Southeast Asia, multisector country preparedness plans will be developed with USAID assistance in Vietnam, Cambodia, Indonesia, and Laos. In addition, national communication campaigns promoting safe behavior will be underway in the high-risk countries. By the end of February, early warning systems and national response teams should be in place in the four countries to report outbreaks within 1 week of onset and to confirm these outbreaks no later than 1 additional week.

We project that a national program to vaccinate chickens and ducks will be completed by then in Vietnam. Indonesia will benefit from the presence of an emergency team of experts as well as from the establishment of local disease control centers in hotspot areas. In addition to offering up-to-date information, these centers will train animal health technicians and veterinarians in how to expedite disease surveillance and control. With Indonesian authorities, they will help decide upon appropriate control measures such as culling, vaccination, and biosecurity. They also provide support for animal health teams in their systematic, house-to-house search for diseased birds.

By February, compensation options for farmers should be identified in Vietnam, Indonesia, Cambodia, and Laos. These options will be for national governments, multilateral organizations, and other sources to examine as it is critically important to reduce their financial burden from losses to their flocks. Simply put, they are our first line of defense and without farmers quickly reporting suspected deaths or cases of AI, our efforts are handicapped from the outset at one of its most critical points.

Pandemic preparedness training in the affected countries are slated to begin in February. This will have local officials gain a better understanding of the importance of transparency and responsiveness in handling reports of disease.

Also, by early to mid-2006, the training of active case detection teams will have occurred in Vietnam, Cambodia, Indonesia, and Laos. They will provide logistical support and ensure quality control for sample collections from both animal and human populations. Health workers will have completed technical education on identifying cases and minimizing their own risks. This will strengthen disease surveillance and laboratory diagnosis capacity.

USAID is working closely with private sector partners as well as international organizations, including the World Health Organization (WHO) and the FAO. The Agency is also working with the office of the new U.N. coordinator for AI who will lead the efforts of the WHO and the FAO. We are helping assure that this global threat is met with a well coordinated and strategically appropriate global effort.

As a concrete demonstration of this interagency and collaborative approach to our work on this crucial subject, last month USAID Global Health Assistant Administrator, Dr. Kent Hill, joined Under Secretary of State for International Affairs, Paula Dobriansky, and HHS Secretary, Mike Leavitt, on a fact-finding mission to Southeast Asia that included stops in Thailand, Cambodia, Laos, Vietnam, and Indonesia. The delegation saw firsthand the challenges we face on the ground, and urged national government leaders at the highest levels to work with us, in a spirit of transparency and open sharing of information, to contain the H5N1 virus in animals and prepare for an eventual human influenza pandemic. They also saw programs that are beginning to be the beneficiaries of our recent investments.

In total, USAID obligated $13.7 million in FY 2005 to help prevent and contain avian influenza in Southeast Asia, where the largest impact of this epidemic has been felt. Ten million dollars of these funds were from the FY 2005 emergency supplemental and $3.7 million were redirected from other programs.

USAID's Office of Foreign Disaster Assistance (OFDA) has prepositioned personal protective gear for local health and agricultural staff in Cambodia, Laos, Vietnam, Indonesia, and Thailand to be used in the case of an AI emergency. Agency experts are also working with FAO and WHO to help strengthen planning for AI control and pandemic preparedness, and working with the business community to increase the resources, expertise, and financing available for this effort.

In addition, USAID is an active supporter of the International Partnership on Avian and Pandemic Influenza, which was announced by President Bush at the United Nations in September.

At USAID's headquarters, I chair the Agency's Avian Influenza Preparedness and Response Task Force which meets weekly to consider urgent policy and budget issues. It includes representation from all Agency bureaus.

In early October, I personally wrote to all of USAID's missions to signal avian influenza as the top agency priority, calling for each mission to engage national government and local partners on country-level preparedness and readiness.

I also established the Avian and Pandemic Influenza Management and Response Unit located in the Bureau for Global Health. This unit is responsible for day-to-day management and oversight of the Agency's AI activities, including providing direct technical and program support to the regional bureaus and field missions, liaising with other U.S. Government and international partners on AI, and identifying and reporting to the task force on key policy and budget issues that require senior level action.

In the field, USAID missions around the globe are moving ahead rapidly with plans to address AI. Many are supporting U.S. Government and ministerial task forces, collaborating with international organizations, and working with FAO on animal surveillance.

In addition to the multisector plans for Southeast Asia, USAID is also closely working with Ministries of Health and Agriculture and international organizations in Africa, Latin America and the Caribbean, and Europe and Eurasia to draft preparedness plans to include: Establishing sentinel surveillance sites for poultry flocks and wild birds; strengthening monitoring and reporting of human respiratory illnesses to rapidly identify unusual cases; reinforcing laboratory capacity to enable detection of AI, or identify labs, in nearby countries that can do testing.

USAID is working aggressively to address imminent risks in Africa, especially the East African countries of Ethiopia, Kenya, and Tanzania to increase surveillance especially along trade routes. USAID missions are helping host governments to convene donors, establish task forces, and develop pandemic preparedness plans. In addition, USAID is redirecting its disease surveillance program to include a strong focus on detecting and diagnosing AI. And while the threat in West Africa is marginal now, it will increase in the spring when wild birds from east Africa travel and meet with birds from Europe.

On October 31, Under Secretary of State for Global Affairs, Paula Dobriansky, joined USAID Africa Bureau Assistant Administrator, Lloyd Pearson, and Global

Health Assistant Administrator, Dr. Kent Hill, and Avian and Pandemic Influenza Management and Response Unit Director, Dr. Dennis Carroll, at a USAID-sponsored meeting with 12 African Ambassadors to provide an update on AI and discuss responses.

USAID's 16 missions in Latin America and the Caribbean are working with host governments and other partners to raise awareness and plan for a potential AI outbreak. This involves assessments of the pandemic preparedness of host countries, and technical consultations in cooperation with other U.S. Government agencies and the Pan American Health Organization (PAHO).

In recent weeks, USAID quickly responded with our other U.S. Government counterparts to AI outbreaks in animal populations in Eastern European and Eurasian countries. We are providing technical assistance to develop and strengthen preparedness plans, conduct disease surveillance, and determine immediate needs to head off further outbreaks in the region.

We are also beginning to work with the private sector on possible public/private partnerships. USAID's Global Development Alliance (GDA) is reaching out to corporations and talking to consumer product companies that employ community health advocates to incorporate AI information into their curriculum. Businesses can also help bring the message beyond the workplace, by educating communities where their facilities are located, and promulgating it through their distribution channels. USAID is in contact with companies in the poultry and animal feed industry to help them improve biosecurity measures and establish improved surveillance and control measures within their supply chains.

## NEXT STEPS

On November 1, 2005, President George W. Bush requested $7.1 billion from Congress to fund a comprehensive response to AI. The request includes $251 million in support of international efforts to detect and contain outbreaks before they spread around the world.

The budget request reflects a national strategy that is designed to meet three critical goals: First, detect and contain outbreaks that occur anywhere in the world; second, protect the American people by stockpiling vaccines and antiviral drugs, and improve the U.S. ability to rapidly produce new vaccines against a pandemic strain; and, third, to prepare for an effective response at the Federal, State, and local levels in the event that a pandemic reaches our shores.

The first part of our strategy is to detect outbreaks before they spread across the world. In the fight against avian and pandemic flu, early detection is our first line of defense. USAID, in partnership with HHS, USDA, and the Department of State has been charged to lead the international effort. One hundred thirty million dollars of the request to Congress is for USAID programs to help our foreign partners train local medical personnel, expand their surveillance and testing capacity, draw up preparedness plans, and take other critical actions to detect and contain outbreaks.

Specifically, USAID will strengthen animal and human surveillance, behavior change communications, and response capacity in the most-affected countries—Cambodia, China, Indonesia, Laos, and Vietnam. Because of endemic animal infections and confirmed human cases, these countries represent the greatest risk for human health.

USAID will also improve pandemic planning and animal surveillance in countries where H5N1 has been recently introduced or those at high-risk of introduction because of bird migration patterns. These activities would be focused in Eastern Europe, Eurasia, the Near East, and Africa. Activities in Central and South America will focus on pandemic planning.

We will also create a stockpile to contain outbreaks of H5N1 that have limited transmission among humans. The stockpile, to be managed by OFDA, will contain personal protective equipment, disinfectant, antibiotics, and steroids, ventilators with oxygen supply, and materials and equipment for communications. The stockpile will be sufficient to respond to two simultaneous outbreaks in populations of 100,000 people.

## CONCLUSION

It should be underscored that as of today there is no evidence of efficient human-to-human AI transmission. This is not a moment for complacency, however, as the distinguished members of this committee well know. We may be allowed to hope for the best but we must be prepared for the worst. This has been an operating principle at USAID when I made the issue of avian influenza the number one priority at the Agency in September.

The CHAIRMAN. Thank you very much, sir.

Secretary Dobriansky.

**STATEMENT OF HON. PAULA J. DOBRIANSKY, UNDER SECRETARY FOR DEMOCRACY AND GLOBAL AFFAIRS, DEPARTMENT OF STATE, WASHINGTON, DC**

Ms. DOBRIANSKY. Thank you, Mr. Chairman, Senator Dodd, Senator Frist, and committee members.

Since diseases do not respect borders, an effective global response is critical. No country can fight avian influenza alone. Nations must join together to prevent an outbreak while preparing to contain and respond if avian flu begins to spread among people. Indeed, dealing with avian influenza before it reaches our borders is a necessary form of forward defense.

Avian flu is not just a health matter, but an economic, security, and social issue. The social, economic, and political impacts of a virulent flu pandemic could be devastating. The 2003 SARS outbreak cost more than 700 lives and some $80 billion worldwide. This issue requires the involvement of not only Ministries of Health and Agriculture, but also Ministries of Foreign Affairs, Trade, executive offices of Presidents and Prime Ministers.

Our framework for action features measures to support surveillance, preparedness, and response and containment. During the high-level segment of the U.N. General Assembly meeting on September 14, President Bush announced the establishment of the International Partnership on Avian and Pandemic Influenza to combat the threat of avian flu and improve global readiness. The partnership is a voluntary coalition built on a set of 10 core principles which call for enhanced preparedness, surveillance, transparency in the form of rapid reporting and the sharing of data and samples, and cooperation among partners and with several key international organizations, including the World Health Organization, the Food and Agriculture Organization, and the World Organization for Animal Health.

The partnership is off to a good start. Senior officials from some 88 countries and 9 international organizations attended its inaugural meeting in early October and agreed to continue to exchange information and monitor progress in international efforts to combat avian flu. Three specific areas for further work were identified: Building stockpiles of drugs and supplies, with Canada in the lead; accelerating vaccine development and distribution, spearheaded by the United Kingdom with United States support; and implementing rapid response and containment measures with Japanese and Australian collaboration.

To build upon the outcome of the partnership's senior officials meeting, we have used a number of regional and international gatherings to sustain the high-level attention devoted to this issue, to monitor developments, and to take concrete actions. For example, in October, Canada held a meeting of Health Ministers and focused on vaccine development and stockpiles. Last week, Australia hosted an APEC meeting on containment and response at which delegates agreed to conduct an in-region tabletop exercise and to create an inventory of experts to be drawn upon for rapid response and containment. The WHO organized an experts meeting specifi-

cally on vaccine development. And presently, in Geneva these last days and today, the World Bank, the WHO, and other international partners are discussing donor coordination and outreach to help Southeast Asian countries, as well as African countries.

Diplomatic engagement is also important. The President has raised this issue, for example, with the Presidents of China, Indonesia, Russia, and the Prime Minister of Thailand, as did Secretary Rice at the United Nations G–8 ASEAN meeting and in her recent visit to Canada. In October, Secretary Leavitt and I traveled to Southeast Asia and met with senior government officials. And in the next week, APEC leaders will put forth several concrete actions.

The President has charged the State Department with leading international activities of the U.S. national strategic for pandemic influenza. In doing so, we collaborate closely with HHS, CDC, NIH, USAID, and USDA and other technical agencies on surveillance, preparedness, and response and containment.

Using the $37 million that HHS and USAID reprogrammed, we are already undertaking a series of activities. Just a few examples:

On surveillance, we're training veterinary experts to monitor the virus in domestic and wild birds, and will be providing additional monitoring assistance to Southeast Asian countries.

On preparedness, we are supporting the development of national pandemic preparedness plans and are helping governments conduct pandemic preparedness training and simulations.

And, finally, on response and containment, we are training animal and human health professionals on rapid containment and prepositioning protective gear.

These are just a few examples of our activities to date. We are planning to use the $250.8 million requested by President Bush for international activities to take further steps to detect and contain outbreaks before they spread around the world. We expect to use our international assistance to leverage additional funds from other donors.

In the 2 months since its creation, the International Partnership on Avian Pandemic Influenza has already heightened international awareness and made addressing this issue a priority for nations. It has fostered closer collaboration among Agriculture, Health, Economic and Foreign Ministries. It has accelerated the placement of monitors in high-risk countries, catalyzed the development and deployment of comprehensive surveillance networks, increased donor commitment and coordination. We believe that our message of cooperation and common cause has resonated with many countries. They realize that the cost of taking action now is significantly less than the cost of a pandemic.

At the meeting in Geneva this week, WHO Director General Lee estimated that some 120 countries now have, or have begun preparing, some form of avian flu preparedness plans. This is twice the number estimated just 1 month ago. Those plans will serve as the foundation on which national and regional surveillance networks will be built and strengthened. We are also hearing from the FAO and the OIE that at-risk countries are becoming increasingly transparent, sharing information and samples more readily than in

the past. We will build on this solid foundation as the partnership progresses.

Mr. Chairman, we look forward to working with you, your committee, and Congress on avian flu. I thank you for this opportunity to testify before the committee, welcome questions, and I, too, am submitting a longer version of my testimony for the record.

Thank you.

[The prepared statement of Ms. Dobriansky follows:]

PREPARED STATEMENT OF HON. PAULA J. DOBRIANSKY, UNDER SECRETARY FOR DEMOCRACY AND GLOBAL AFFAIRS, DEPARTMENT OF STATE, WASHINGTON, DC

INTRODUCTION

Mr. Chairman, thank you for the opportunity to discuss our efforts to create a global coalition, which seeks to improve global readiness against a possible outbreak of pandemic influenza. Since diseases do not respect borders, an effective global response is critical. No country can fight avian influenza alone. Nations must join together now to prevent an outbreak, while preparing to contain and respond if avian flu begins to spread among people. Indeed, dealing with avian influenza before it reaches our border is a necessary form of forward defense.

Avian flu is not just a health matter but an economic, security, and social issue. The social, economic, and political impacts of a virulent flu pandemic could be devastating. The 2003 SARS outbreak cost more than 700 lives and some $80 billion worldwide. The Department of State is involved because the only way to avoid the much higher potential toll of a flu pandemic is in concert with other nations. This issue requires the involvement of not only Ministries of Health and Agriculture but also Ministries of Foreign Affairs and executive offices of Presidents and Prime Ministers. Our framework for action is predicated on measures in support of surveillance, preparedness, and response and containment.

*The Partnership*

Recognizing this threat can only be averted through coordinated international effort, President Bush announced the establishment of the International Partnership on Avian and Pandemic Influenza in September during the high-level segment of the U.N. General Assembly meeting. The President's speech focused the attention of the world community on the need for timely and sustained high-level political leadership and concrete, cooperative action. Specifically, the Partnership's aim is to combat the threat of avian flu and improve global readiness by elevating the issue on national agendas; coordinating efforts among donor and affected nations; mobilizing and leveraging resources; increasing transparency and the quality of surveillance; and building local capacity to identify, contain, and respond to a pandemic influenza.

The Partnership is a voluntary coalition built on a set of 10 core principles, which call for enhanced preparedness, surveillance, transparency in the form of rapid reporting and the sharing of data and samples, and cooperation among partners and with several key international organizations, including the World Health Organization (WHO), Food and Agriculture Organization (FAO), and the World Organization for Animal Health (OIE). Through the Partnership, countries have agreed to work together to develop the capacity to plan for, detect, prevent, and rapidly respond to an incipient epidemic. Specifically, these international partners have led global efforts to heighten surveillance in poultry and die-offs in migratory birds and rapid introduction of containment measures. Members have developed, or are in the process of developing, national preparedness plans, setting up surveillance networks, and working closely with the WHO, FAO, and OIE in the detection of outbreaks.

I am pleased to report that the Partnership is off to a good start. In early October, the State Department hosted a well-attended meeting of the Partnership member countries. Senior officials from 88 countries and 9 international organizations participated actively in the plenary sessions and roundtables, and identified three priority areas for collaboration: Building stockpiles of drugs and supplies; speeding vaccine development and distribution; and implementing rapid response and containment measures. Several conclusions also emerged from these productive discussions: Recognizing that many countries lacked the capacity to prepare or respond to a pandemic, capacity-building is a priority. A number of participants stressed the need for communication and education strategies to raise public awareness and change behavior. Participants also emphasized the need for prompt reporting of suspected cases and for a coordinated international effort. They stated that, in addition to the

health impacts of the pandemic, we must prepare for the economic and social effects, ensuring continuity of business operations, for instance.

The Partnership is truly a cooperative effort. It includes not only U.N. agencies and international and regional organizations such as the World Health Organization, the Food and Agriculture Organization, the World Animal Health Organization, but the World Bank, the Asian Pacific Economic Cooperation forum, and the Association of Southeast Asian Nations. Significantly, a number of countries have taken leadership roles in several key areas. As a result of the Senior Officials Meeting, Canada agreed to spearhead follow-on discussions on stockpiling of vaccines and antiviral medicines as an important component of readiness. We undertook to work with the United Kingdom on a comprehensive strategy for vaccine research, development, and production. Australia and Japan agreed to collaborate on rapid response and containment, including the economic and social impacts of a pandemic. Since the October Senior Officials Meeting, all three of these working groups have moved forward.

*Stockpiles*

In late October, Canada held a meeting of Health Ministers in Ottawa and put on the agenda the topic of stockpiles of antiviral medicines and vaccines. At the conclusion of the Ottawa meeting, the Ministers endorsed a communique stressing the urgent need for strengthening surveillance, a global policy on vaccine development, and coordinated risk communication. HHS Secretary Leavitt told the assembly that the involved countries and relevant international organizations would need to agree on a proper doctrine to govern rapid response and containment as a prelude to getting national commitments to the creation of an international stockpile. In addition, he called for holding a tabletop exercise, including simulated drug delivery, to enhance international understanding and communication on this important topic.

*Rapid Response and Containment*

Australia used the Asia Pacific Economic Cooperation (APEC) avian influenza preparedness meeting on October 31 through November 1 to make progress on response and containment strategies. In addition to the 21 APEC members, WHO, FAO, ICRC and the World Bank attended the meeting. Participants ageed to establish communication and information-sharing networks among experts in the region, build an inventory of regional resources and capabilities that could be provided to expert multilateral organizations for rapid response in the event of an outbreak, and conduct a regional desktop simulation in the first half of 2006 to test regional communication during a potential pandemic outbreak. Given that an influenza pandemic is most likely to emerge from Southeast Asia, the work begun at this meeting in Brisbane to enhance a regional rapid response capability is essential.

*Vaccines*

On November 4–5, the World Health Organization hosted an experts meeting on the development of vaccines for pandemic influenza. This meeting afforded an opportunity for all countries working on a vaccine against avian influenza to share their progress and establish a way to share technical information in order to speed the development of a safe and effective human vaccine.

*Partnership's Next Steps*

This week in Geneva, the WHO, FAO, OIE, and the World Bank are hosting a partners meeting on avian influenza and human pandemic influenza. Specifically, as an outgrowth of our Partnership's Senior Officials Meeting, there were detailed discussions on focusing international efforts on short-term animal monitoring, surveillance, antiviral stockpiles, expanding vaccine production capacity, contingency planning to ensure continuity of operations if an outbreak occurs, and communications strategies. In addition there was agreement on the importance of working to help African countries—particularly those already overwhelmed by HIV/AIDS. One issue to be further addressed is donor coordination. In the discussions taking place now in Geneva, we are proposing that the WHO, the World Bank and other major donors, coordinate with us their assessments of country needs. This would allow us to come to a common understanding of what financial and technical assistance is necessary. A subsequent conference in January will provide an opportunity for donors to outline what they are, and will be, doing to help countries affected with avian influenza. And we will hold another meeting of the Senior Officials of the International Partnership on Avian and Pandemic Influenza in late January or early February to take stock of the progress being achieved and to determine what additional steps should be taken.

*Diplomatic Engagement*

The Bush administration has taken advantage of every possible bilateral and multilateral opportunity to stress the seriousness of the threat posed by avian influenza and the need for rapid action. The President is personally engaged and has raised this issue with the Presidents of China, Indonesia, and Russia as well as the Prime Minister of Thailand. Secretary Rice reiterated our concerns to ASEAN countries, meeting on the margins of the September High-Level Segment of the UNGA. She also devoted a significant portion of her recent Ottawa trip to a briefing on the progress of the Canadian health ministerial discussion on stockpiles of antiviral medicines and vaccines.

We are also advancing this issue at the highest levels in Asia. President Bush will attend the APEC Leaders meeting later this month in Korea and the topic of avian influenza is a centerpiece of those disussions. As the chair of the APEC Health Task Force, we are working with our key partners in APEC to strengthen the region's commitment to prepare for and prevent an influenza pandemic. In the ASEAN Regional Forum (ARF), we are encouraging participants to consider the security implications of a pandemic. Deputy Secretary Zoellick raised the threat of avian influenza and the need for preparation and planning in the ASEAN and ARF meetings in Laos this past July.

In addition, we are reaching out to the private sector to improve their regional capacity to respond and prepare for a pandemic. We will urge the APEC Business Advisory Council (ABAC) to look into using private sector health facilities to enhance epidemic surveillance and detection capabilities. We will also recommend that ABAC consider establishing a set of business community "best practices," including a checklist for emergency preparedness, paying special attention to small- and medium-sized enterprises.

During mid-October, I traveled to Southeast Asia—Thailand, Cambodia, Laos, Vietnam, Indonesia, Singapore, and Malaysia—with Secretary of Health and Human Services, Mike Leavitt, and representatives from the U.S. Department of Agriculture, USAID, the National Institutes of Health, and the Center for Disease Control, as well as Dr. Lee, the Director General of the World Health Organization (WHO), and representatives of the Food and Agriculture Organization (FAO) and the World Organization for Animal Health (OIE). We were very pleased that these countries had their Foreign or Prime Ministers meet with our delegation—an indication that we were succeeding in our efforts to raise the political profile of this issue. Malaysia, for instance, named a senior point of contact in its Foreign Ministry to enhance bilateral and multilateral communication. Vietnam offered, during our visit, to accept international monitors to augment their national surveillance efforts.

As a result of our visit, and additional assessments done by U.S. experts, we learned more about the needs of those countries. For example, Vietnam, Laos, Cambodia, and Indonesia are particularly in need of capacity-building. We stressed our desire to work with them to address these shortcomings and the administration has, in fact, already begun to fill these critical needs. I'd like to emphasize that this is truly an unprecedented interagency effort by the United States. The President has charged the State Department with leading the international activities of the U.S. National Strategy for Pandemic Influenza and, in doing so, we collaborate closely with our dedicated colleagues at HHS, CDC, NIH, USAID, USDA, and other technical agencies. With that in mind, let me provide some concrete examples of U.S. assistance in three key areas of our strategy—surveillance, preparedness, and response and containment. Our assistance targets the needs of the most affected countries with the least capacity such as Laos, Cambodia, Vietnam, and Indonesia. These activities are being designed and funded by USAID, HHS, and USDA as part of a coordinated interagency process.

On surveillance, we are providing training, financial, technical, and commodity support for national veterinary and other staff to monitor the disease in domestic and wild birds. We are increasing the capacity of national public health staff to detect new human infections and ensure timely and accurate diagnoses. We are working with the FAO on strengthening "early warning systems" and the ability to communicate rapidly about concerning cases. To give a country-specific example, we have provided the support of NAMRU2 (a U.S. military laboratory) to strengthen surveillance efforts in Indonesia.

On preparedness, we are supporting Ministries of Health as they develop national pandemic preparedness plans. We are helping Ministries in Asia to conduct pandemic preparedness training and simulations. We are purchasing equipment for experts in the region to test samples. With the FAO and WHO, we are engaging Agriculture, Health, and other Ministers to increase regional and international coordination. To give a country-specific example, the Vietnamese Ministry of Health has re-

ceived support from HHS and CDC for vaccine development and clinical trials and has solicited our assistance of monitoring.

Finally, on response and containment, we are establishing, training, and supporting rapid response teams through FAO to conduct containment measures in animal populations. We are building local capacity to cull and dispose of infected or exposed animals, and setting up in-country and regional emergency stockpiles of essential commodities. We are, for example, prepositioning protective gear in Southeast Asian countries to be used in case of an avian flu emergency.

*Funding*

These efforts are already underway because HHS and USAID were able to reprogram $37 million in fiscal year 2005 funds for this emerging policy priority. This is, of course, only the start. In conjunction with his November 1 announcement of the National Strategy, the President called for an additional $7.1 billion in emergency funding. This request includes $250.8 million to detect and contain outbreaks before they spread around the world; as the President rightly noted: "early detection is our first line of defense." Of the $250.8 million, the Department of State would receive a total of $38.5 million for international response coordination, involving foreign governments and nongovernmental organizations, diplomatic outreach, exchanges of U.S. and foreign medical personnel, and health support and protection of U.S. Goverment employees and families at U.S. missions overseas. Of the $38.5 million for the Department of State, $20 million would fund the potential evacuation of U.S. Government personnel and dependents from overseas missions.

From the total $250.8 million for international activities, the Department of State would receive $8.5 million; USAID would receive $131.5 million; HHS, $82.5 million; USDA, $18.3 million; and DOD, $10 million. The $131.5 million to be programmed by USAID will be used for prepositioned supplies and equipment to prevent and control the spread of the avian influenza virus; a communication campaign to increase awareness of risks and encourage behavior (such as culling bird flocks and avoiding crowds) to hinder the spread of the disease; improved surveillance and response systems; and accelerated international planning and preparedness. Through the Partnership, we expect to leverage additional funds from other donors.

CONCLUSION

In the 2 months since its creation, the International Partnership on Avian and Pandemic Influenza has already heightened international awareness and made addressing this issue a priority for nations; fostered closer collaboration among Agriculture, Health, Economic, and Foreign Ministries; accelerated the placement of monitors in high-risk countries; catalyzed the development and deployment of comprehensive surveillance networks; increased donor commitment and coordination. But there is still more that needs to be done.

We believe that our message of cooperation and common cause has resonated with many countries, particularly those hardest hit in Asia. Countries that lack the capacity to prepare for, and respond to, an influenza pandemic are showing growing understanding and increasing willingness to confront the problem. They realize that the cost of taking action now is significantly less than the cost of a pandemic. At the meeting in Geneva this week, WHO Director General Lee estimated that 120 countries now have, or have begun preparing, some form of avian flu preparedness plans; this is twice the number estimated just 1 month ago. Those plans will serve as the foundation on which national and regional surveillance networks will be built and strengthened. We are also hearing from the FAO and OIE that at-risk countries are becoming increasingly transparent, sharing information and samples more readily than in the past. These international organizations credit countries and their leadership for making this issue a priotity and laud the United States for helping to make this progress possible through the International Partnership on Avian and Pandemic Influenza and sustained high-level diplomacy. Even as we work with our partners to coordinate assistance, the United States has begun to assist the highest risk countries in the key areas of surveillance, preparedness, and response and containment. We will build on this solid foundation as the Partnership progresses. We look forward to working with you on avian flu and I thank you again for this opportunity to testify before this committee. I welcome any questions you may have.

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AVIAN INFLUENZA—INTERNATIONAL PARTNERSHIP TO MEET A GLOBAL THREAT

*"If left unchallenged, this virus could become the first pandemic of the 21st century. We must not allow that to happen. Today I am announcing a new international Partnership on Avian and Pandemic Influenza . . . It is essential we work together,*

*and as we do so, we will fulfill a moral duty to protect our citizens, and heal the sick, and comfort the afflicted."*—President George W. Bush

The U.S. Government is concerned that the ongoing outbreaks of avian influenza in birds have the potential to turn into a human influenza pandemic that would have significant global health, economic, and social consequences. President Bush has requested $7.1 billion in emergency funding to immediately begin implementing a national strategy for pandemic influenza. This funding includes $251 million to detect and contain outbreaks before they spread around the world.

WORLDWIDE PROBLEM

To date, outbreaks of the H5N1 strain of avian influenza have been confirmed among birds in Cambodia, China, Croatia, Indonesia, Kazakhstan, Laos, Mongolia, Romania, Russia, Thailand, Turkey, and Vietnam. Japan, Malaysia, and South Korea have also experienced outbreaks in the past. More than 60 deaths out of a total of over 120 human cases of the disease have been confirmed in Cambodia, Indonesia, Thailand, and Vietnam.

Avian influenza has occasionally spread from bird to human, but is not easily spread from human to human. A specific vaccine for humans that is effective against avian influenza has not yet been approved. Based upon limited data, the Centers for Disease Control have suggested that the antiviral medication Oseltamivir (brand name—Tamiflu) may be effective in preventing or treating avian influenza.

INTERNATIONAL PARTNERSHIP

President Bush announced the International Partnership on Avian and Pandemic Influenza during the U.N. General Assembly in September 2005. The first meeting of the Partnership took place October 6–7 in Washington, DC, hosted by the U.S. Department of State.

The meeting involved top foreign affairs, health, and agriculture officials from 88 countries, as well as representatives from eight international organizations, including the World Health Organization, the Food and Agricultural Organization, and the World Organization for Animal Health.

The meeting's main objective was to affirm the commitment of participating countries to work together in combating avian and pandemic influenza and to identify priority areas for further action. Three general topic areas were covered: Surveillance and prevention; preparedness, planning and outreach; and response and containment of avian influenza.

ASSISTANCE FOR AFFECTED COUNTRIES

The United States is implementing the $25 million that the President earlier signed in an emergency supplemental to prevent and control the spread of avian influenza in Southeast Asia, in addition to providing more than $13 million in technical assistance and grants to affected countries in Southeast Asia and to the World Health Organization for influenza pandemic preparedness in the past year.

U.S. DOMESTIC PREPAREDNESS

President Bush has released a national strategy that draws on the combined efforts of government officials and the public health, medical, veterinary, and law enforcement communities, as well as the private sector. The strategy is designed to meet three critical goals: Detecting human or animal outbreaks that occur anywhere in the world; protecting the American people by stockpiling vaccines and antiviral drugs while improving the capacity to produce new vaccines; and preparing to respond at the Federal, State and local levels in the event an avian or pandemic influenza reaches the United States.

GOALS OF THE INTERNATIONAL PARTNERSHIP

- Elevate the avian influenza issue on national agendas
- Coordinate efforts among donor and affected nations
- Mobilize and leverage resources
- Increase transparency in disease reporting and the quality of surveillance
- Build local capacity to identify, contain, and respond to an influenza pandemic

The CHAIRMAN. Well, thank you very much, Secretary Dobriansky. We appreciate the testimony.

Dr. Gerberding.

**STATEMENT OF DR. JULIE GERBERDING, DIRECTOR, CENTERS FOR DISEASE CONTROL AND PREVENTION, DEPARTMENT OF HEALTH AND HUMAN SERVICES, ATLANTA, GA**

Dr. GERBERDING. Thank you.

It's really a pleasure to be here to testify in front of this committee, Mr. Chairman, Senator Dodd. This is a very important, I think, node in our overall preparedness for avian pandemic, or any pandemic. And my role here in these opening comments is to just give you an update on some of the facts in the situation that we see it. My colleague from Health and Human Services, Dr. Fauci, will talk a little bit more about some of the countermeasures that we're developing.

Let me just make my first point on the next slide, which is basically the point that pandemics happen. We have had three important pandemics in the world over the last century. The 1918 Spanish Flu pandemic, which everyone is aware of, caused devastating consequences globally when one new strain, the H1 strain, of flu emerged. When H2 emerged, we developed the Asian pandemic. When H3 emerged, we developed the Hong Kong pandemic. Now we're in a situation where we have a smattering of avian isolates that have emerged, but it's the H5N1 that, obviously, we're so concerned about, because it's—it emerged, it's persisted, and it's expanding, and we have no global immunity to it. So, basically, everyone in the world is susceptible.

On the next slide, I have a picture that illustrates, today, what the status of the poultry outbreak is in the world. And we recognize that today H5N1 is primarily a bird pandemic; it is not a people pandemic at this point in time. But there are active outbreaks ongoing in many parts of Asia, extending now into Western Asia, Eastern Europe, and we still have countries like Malaysia, Laos, Burma, where we have no information about the overall status.

As we look at this bird epidemic, I think it's important to think, well, what can we do about the problem in birds? On the next slide, I've illustrated why it's so difficult to contend with the poultry outbreak. These are just some cultural practices, where, here, you see duck and geese, which carry the virus asymptomatically in the same market basket as the chickens, which are vulnerable and usually are the source of spread to people. We've got people in these markets working with raw materials, living literally in rice patties where the migratory birds are swimming or—and children swimming in these canals have picked up the virus from the water.

And the next slide illustrating, again, just the close proximity of humans with sick birds. One very poignant story that we heard when we were traveling in Asia together was a little boy who had a pet chicken who developed the avian virus. And, of course, he was comforting his chicken and, sadly, picked up the virus and died as a consequence of that exposure. So, a tremendously difficult challenge with those 13 billion chickens just in one Asian country.

On the next slide, we've illustrated the flyways, and it is really the migratory bird flyways that we feel are what is contributing to the spread of this virus throughout Asia and into Europe. And we are just one flyway away from having this virus enter the flyways into the United States. So, we need to be prepared for the expecta-

tion that sooner or later a duck or a goose or some other migratory bird is going to bring this virus into the United States.

Fortunately, here, our surveillance and our poultry containment procedures aren't like they are in Asia, and we think our commercial poultry industry is very hardened. Many, many steps are in place here, but, nevertheless, it's not going to be surprising if we see birds bring this virus into the United States.

The next slide illustrates the status overall, which is to say we've checked off widespread prevalence in migratory birds and many, many birds are involved. We see continued outbreaks ongoing in domestic poultry, despite culling, despite vaccination, despite improvements in animal husbandry. We're still seeing these outbreaks emerge.

We know this virus can infect mammals, particularly cats. We have evidence from Indonesia that it's affected pigs. This is important, because it means the bird virus can efficiently move to animals. And we know that the virus is evolving. The Vietnam virus, that we have the prototype vaccine to, has evolved already over the last year to a new form that is now causing infection in Indonesia and elsewhere.

We've had more than 120—I think, this morning, 125 cases of avian spilling over primarily from poultry into people, mostly young people, 50 percent mortality rate, a horrible clinical disease. This is very much like the flu that we saw in 1918. It's absolutely a destructive lung infection. It causes all kinds of organ complications.

What we haven't checked yet, on this box, is the sustained person-to-person transmission. That's, obviously, what we're concerned about. We haven't seen it. Hopefully, we'll never see it. But it is the reason why right now we are putting so much attention on this particular situation, because we've checked the other five boxes.

On the next slide, I'm just going to summarize for you what the Department of Health and Human Services, in conjunction with the whole Cabinet of agencies and government and our international partners are doing about this. Our doctrine, as Secretary Leavitt has very effectively and consistently articulated is that if there is a threat of avian flu anywhere, we have to assume that there is a threat everywhere, and act accordingly. So, our strategy is to, first of all, invest heavily in detection and containment, wherever it emerges. And that means the kinds of activities that we traditionally do at CDC as, sort of, the front line of international health protection to support programs in the field, to support disease detectives, to support training, and the laboratory support necessary to diagnose and isolate the initial patients. The international stockpile will help us use antiviral drugs for containment. And if that spark that Senator Frist and Senator Leavitt talk about, goes off in a place where we have these resources in place, we have a very good chance of being able to contain this. But in the rest of the region, if that spark goes off, we are very concerned that we will be dealing with a much more deadly situation.

Dr. Fauci's going to talk about antivirals and vaccine, but I want to emphasize what you've already heard about the importance of transparency. We have seen dramatic improvements in transparency. But for us at CDC, where we have to be the front line of

getting the virus, knowing what's going on, tracking the progress, we have to get the specimens to our agency, and we have to know that the infection is spreading so that we have access to those. So, this requires us to work collaboratively with a whole range of international and domestic organizations, but, in particular, with the World Health Organization, the OIE, and the FAO, and, I think, importantly, to continue our investment in communication.

On my last slide, I just wanted to describe for you very briefly our vision of a global health protection network. By building on the existing investments that CDC has in 43 countries, the USAID investments for development, the Department of Defense laboratories, which, by the way, are absolutely critical, the lab in Jakarta, the lab in Cairo are the way we get flu specimens for ordinary flu, but also our new quarantine stations at our borders here in the United States. CDC traditionally had only eight quarantine stations. This year, we've added 10, and, by the end of next year, we'll have 25 fully equipped stations at ports of entry at our airports, where we can screen, isolate, and quarantine people, if necessary, to prevent introduction of this problem into our country.

And then, last, the hardening of our communication networks through broadband, secure communications, as well as IT infrastructure development, so that we can rapidly disseminate advice and information through our global network.

So, these, and other, measures, we think, will certainly help us be more prepared, but, obviously, we have a long way to go. And we appreciate your interest and your help.

Thank you.

[The prepared statement of Dr. Gerberding follows:]

PREPARED STATEMENT OF DR. JULIE L. GERBERDING, DIRECTOR, CENTERS FOR DISEASE CONTROL AND PREVENTION, DEPARTMENT OF HEALTH AND HUMAN SERVICES, ATLANTA, GA

INTRODUCTION

Mr. Chairman and members of the committee, I am pleased to be here today to describe the current status of avian influenza around the world; the consequences of a possible human influenza pandemic; and international and domestic efforts to prepare for, and respond to, such a pandemic, including the HHS Pandemic Influenza Plan. Thank you for the invitation to testify on influenza pandemic planning and preparedness which Department of Health and Human Services (HHS) Secretary, Mike Leavitt, has made a top priority. The Centers for Disease Control and Prevention (CDC) and other agencies within HHS are working together formally through the Influenza Preparedness Task Force that Secretary Leavitt has chartered to prepare the United States for this potential threat to the health of our Nation. We are also working with other Federal, State, local, and international organizations to ensure close collaboration.

As you are aware, the potential for a human influenza pandemic is a current public health concern with an immense potential impact. Interpandemic (seasonal) influenza causes an average of 36,000 deaths each year in the United States, mostly among the elderly and nearly 200,000 hospitalizations. In contrast, scientists cannot predict the severity and impact of an influenza pandemic, whether from the H5N1 virus currently circulating in Asia and Europe, or the emergence of another influenza virus of pandemic potential. However, modeling studies suggest that, in the absence of any control measures, a "medium-level" pandemic in which 15 percent to 35 percent of the U.S. population develops influenza could result in 89,000 to 207,000 deaths, between 314,000 and 734,000 hospitalizations, 18 to 42 million outpatient visits, and another 20 to 47 million sick people. The associated economic impact in our country alone could range between $71.3 and $166.5 billion. A more severe pandemic, as happened in 1918, could have a much greater impact.

There are several important points to note about an influenza pandemic:

- A pandemic could occur anytime during the year and could last much longer than typical seasonal influenza, with repeated waves of infection that could occur over 1 or 2 years.
- The capacity to intervene and prevent or control transmission of the virus once it gains the ability to be transmitted from person to person will be extremely limited.
- Right now, the H5N1 avian influenza strain that is circulating in Asia among birds is considered the leading candidate to cause the next pandemic. However, it is possible that another influenza virus, which could originate anywhere in the world, could cause the next pandemic. Although researchers believe some viruses are more likely than others to cause a pandemic, they cannot predict with certainty the risks from specific viruses. This uncertainty is one of the reasons why we need to maintain year-round laboratory surveillance of influenza viruses that affect humans.
- We often look to history in an effort to understand the impact that a new pandemic might have, and how to intervene most effectively. However, there have been many changes since the last pandemic in 1968, including changes in population and social structures, medical and technological advances, and a significant increase in international travel. Some of these changes have increased our ability to plan for and respond to pandemics, but other changes have made us more vulnerable.
- Because pandemic influenza viruses will emerge in part or wholly from among animal influenza viruses, such as birds, it is critical for human and animal health authorities to closely coordinate activities such as surveillance and to share relevant information as quickly and as transparently as possible.

THE CURRENT STATUS OF H5N1 VIRUS IN ASIA

Beginning in late 2003, new outbreaks of lethal avian influenza A (H5N1) infection among poultry and waterfowl were reported by several countries in Asia. In 2005, outbreaks of H5N1 disease have also been reported among poultry in Russia, Kazakhstan, Turkey, and Romania. Mongolia has reported outbreaks of the H5N1 virus in wild, migratory birds. In October 2005, outbreaks of the H5N1 virus were reported among migrating swans in Croatia. In 2004, sporadic human cases of avian influenza A (H5N1) were reported in Vietnam and Thailand. In 2005 additional human cases have been reported in Cambodia, Indonesia, Thailand, and Vietnam. Cumulatively, 124 human cases have been reported and laboratory confirmed by the World Health Organization (WHO) since January 2004. These cases have resulted in 63 deaths, a fatality rate of about 51 percent.

Almost all cases of H5N1 human infection appear to have resulted from some form of direct or close contact with infected poultry, primarily chickens. In addition, a few persons may have been infected through very close contact with another infected person, but this type of transmission has not led to sustained transmission.

For an influenza virus to cause a pandemic, it must: (1) Be a virus to which there is little or no preexisting immunity in the human population; (2) be able to cause illness in humans; and (3) have the ability for sustained transmission from person to person. So far, the H5N1 virus circulating in Asia meets the first two criteria but has not yet shown the capability for sustained transmission from person to person.

The avian influenza A (H5N1) epizootic (or animal) outbreak in Asia that is now beginning to spread into Europe is not expected to diminish significantly in the short term. It is likely that H5N1 infection among birds has become endemic in Asia and that human infections resulting from direct contact with infected poultry will continue to occur. So far, scientists have found no evidence for genetic reassortment has been found. Reassortment can occur when the genetic code for high virulence in an H5N1 strain combines with the genetic code of another influenza virus strain which results in easy transmission. However, the animal outbreak continues to pose an important public health threat, because there is little preexisting natural immunity to H5N1 infection in the human population.

In mid-October 2005, I accompanied Secretary Mike Leavitt when he led a delegation of U.S. and international health experts on a 10-day trip to five nations in Southeast Asia. The purpose of this trip was: (1) To learn from countries that have had firsthand experience with avian influenza; (2) to emphasize the importance of timely sharing of information in fighting the disease; and (3) to determine the best use of our resources abroad to protect people in the United States. We learned several important lessons. First, international cooperation is absolutely essential; an outbreak anywhere increases risk everywhere. Second, surveillance, transparency, and timely sharing of information are critical. The ability of the United States and

the world to slow or stop the spread of an influenza pandemic is highly dependent upon early warning of outbreaks. Finally, it is vital to strengthen preparedness and response capabilities in Asian countries and other parts of the world. The delegation also concluded that pandemic preparedness and preparation must be both short and long term in scope. These critical elements form the basis of the administration's diplomatic engagement strategy through the International Partnership on Avian and Pandemic Flu launched by the President in September, and drive our efforts with the international health community to effectively prepare for a pandemic. As I stated earlier, there is no way to know if the current H5N1 virus will evolve into a pandemic. However, we do know that there have been three pandemics in the past 100 years, and we can expect more in this century.

HHS ROLE IN INTERNATIONAL PREPAREDNESS

The Secretary's and my trip reaffirmed the value of several actions undertaken by HHS and its agencies over the last few years. It is vital to monitor H5N1 viruses for changes that indicate an elevated threat for humans, and we are continuing to strengthen and build effective in-country surveillance, which includes enhancing the training of laboratorians, epidemiologists, veterinarians, and other professionals, as well as promoting the comprehensive reporting that is essential for monitoring H5N1 and other strains of highly pathogenic avian influenza. In collaboration with international partners, HHS is also pursuing a strategy of active, aggressive international detection; investigation capacity; international containment; and laboratory detection support.

In the past year, working with the World Health Organization (WHO) and other international partners, HHS and its agencies has made significant progress toward enhancing surveillance in Southeast Asia. However, this initiative needs to continue at both national and international levels if we are to sustain our progress, expand geographic coverage, and conduct effective surveillance. These efforts to build international and domestic surveillance are essential for detecting new influenza virus variants earlier and for making informed vaccine decisions about interpandemic influenza. With the ever-present threat of a newly emerging strain that could spark a human pandemic, we need to know what is happening in commercial poultry farms and the family backyard flocks found in Southeast Asia, as well as migrating birds and animal populations elsewhere throughout the world.

Earlier this year, Congress passed and the President signed the Fiscal Year 2005 Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Tsunami Relief. This legislation includes $25 million in international assistance funds for HHS, the U.S. Department of Agriculture, and the United States Agency for International Development (USAID) to prevent and control the spread of avian influenza in Asia. With these funds, HHS and its agencies are working to assist in developing regional capacity in Southeast Asia for epidemiology and laboratory management of pandemic influenza. Strategies include developing and implementing an avian influenza curriculum for epidemiologists and laboratorians, training for public health leaders to develop a national network of public health field staff, and training for local allied health personnel to detect and report human cases of influenza. HHS is assigning staff to Vietnam, Cambodia, and Laos to facilitate improvements in the detection of influenza cases and to provide technical assistance in investigating cases as well as in developing national preparedness plans by the Ministries of Health, with the assistance of WHO and other partners.

We are also working with the U.S. Agency for International Development (USAID) WHO Secretariat, its Regional Offices and Ministries of Health in these countries to increase public awareness about the human health risks associated with pandemic influenza, and to advise countries concerning prevention or mitigation measures that can be used in the event a pandemic occurs.

HHS through CDC is vigorously working to increase laboratory capacity in the region and to provide laboratory support for outbreak investigations, including: (a) Testing clinical samples and influenza isolates; (b) diagnosing the presence of avian influenza in humans by supplying necessary test reagents to the region and globally; and (c) developing vaccine seed stock to produce and test pandemic vaccine candidates. The HHS National Institutes of Health (NIH) and Office of Public Health Emergency Preparedness are also providing technical assistance to the Government of Vietnam as it proceeds with the development of a human H5N1 vaccine, including support for clinical trials.

CDC is one of four WHO Global Influenza Collaborating Centers. In this capacity, CDC conducts routine worldwide monitoring of influenza viruses and provides ongoing support for the global WHO surveillance network, laboratory testing, training, and other actions. HHS also supports the WHO Headquarters in Geneva and the

WHO Regional Offices in Manila and New Delhi for pandemic planning, expansion of global influenza surveillance, shipment of specimens, training, and enhancing communications with agricultural authorities. Several of the top flu specialists on the WHO staff are HHS personnel on loan, another demonstration of our strong commitment to international collaboration in the fight against the threat of a pandemic influenza.

In addition to our partnership with USAID under the tsunami supplemental appropriation, HHS also partners with other U.S. Government departments in its international collaboration such as with the Department of Defense Naval Medical Research Unit Two (NAMRU2) in Indonesia and Naval Medical Research Unit Three in Cairo (NAMRU3). These collaborations support training, the expansion of influenza surveillance networks to countries where none exists, the enhancement of the quality of surveillance in other countries to enhance outbreak detection, seroprevalence studies in populations at risk for avian influenza such as poultry workers, and enhanced outbreak response.

SCIENTIFIC RESEARCH

Federal agencies have been very active in scientific research on avian influenza. Scientists at HHS (CDC and NIH) and the U.S. Department of Agriculture (USDA), and the National Institutes of Health (NIH) have collaborated to successfully reconstruct the influenza virus strain responsible for the 1918 influenza pandemic. The findings from this research will greatly advance preparedness efforts for the next pandemic. Previously, influenza experts had limited knowledge of factors that made the 1918 pandemic so much more deadly than the 1957 and 1968 pandemics. One of the most striking features of the 1918 pandemic was its unusually high death rate among otherwise healthy people aged 15 to 34. In reconstructing the virus, the researchers are learning which genes were responsible for making the virus so harmful. This is an important advance to strengthen preparedness efforts, because knowing which genes are responsible for causing severe illness can help scientists develop new drugs and vaccines that focus on the appropriate targets.

Additionally, researchers at CDC have conducted studies on the incidence of adamantane resistance among influenza A viruses isolated worldwide from 1994 to 2005. Adamantanes are antiviral drugs that have been used to treat influenza A virus infections for many years. However, their use is rising worldwide, and viral resistance to the drugs has been reported among influenza A viruses (H5N1) strains isolated from poultry and humans in Asia. This data raises questions about the appropriate use of antiviral drugs, especially adamantines, and draws attention to the importance of tracing emergence and spread of drug resistant influenza A viruses. It is important to note that, although at present the H5N1 viruses isolated from people in Asia during the past 2 years appear to be resistant to adamantanes, they remain sensitive to neuraminidase inhibitors such as oseltamivir (Tamiflu®).

DEVELOPMENT AND MANUFACTURE OF VACCINE

Another important research area is vaccines: Seeking improved strategies to enhance their development, manufacture, distribution, and delivery. The development and role of a pandemic influenza vaccine is a principal component of the HHS Pandemic Plan, which I will describe later in the testimony. During an influenza pandemic, the existence of influenza vaccine manufacturing facilities functioning at full capacity in the United States will be critically important. We assume the pandemic influenza vaccines produced in other countries are unlikely to be available to the U.S. market, because those governments have the power to prohibit export of the vaccines produced in their countries until their domestic needs are met. The U.S. vaccine supply is particularly fragile; only one of four influenza vaccine manufacturers that sell in the U.S. market makes its vaccine entirely in the United States; one other makes some of its vaccine in the United States.

Another important factor is that public demand for influenza vaccine in the United States varies annually. Having a steadily increasing demand would provide companies with a reliable, growing market that would be an incentive to increase their vaccine production capacity. In FY 2006, CDC will direct $40 million through the Vaccines for Children (VFC) program to purchase influenza vaccine for the national pediatric stockpile as additional protection against annual outbreaks of influenza. These funds to purchase vaccine can be used if needed during annual influenza seasons or possibly in a pandemic situation. HHS has also signed a $100 million contract with Sanofi Pasteur to develop cell culture vaccines. In addition, the President is requesting $120 million in FY 2006, an increase of $21 million, to encourage greater production capacity that will enhance the U.S.-based vaccine manu-

facturing surge capacity to help prepare for a pandemic and further guard against annual shortages.

Funds from the Strategic National Stockpile (SNS) have purchased approximately 2 million bulk doses of unfinished, unfilled H5N1 vaccine. This vaccine has not yet been formulated into vials, nor is the vaccine licensed by the HHS Food and Drug Administration. Clinical testing to determine dosage and schedule for this vaccine began in April 2005 with funding from NIH. Initial testing shows that, in its current form, a much higher volume of vaccine, up to 12 times as much as originally predicted, will be needed to produce the desired immune response in people. HHS, therefore, is supporting the development and testing of potential dose-sparing strategies that could allow a given quantity of vaccine stock to be used in more people. These strategies include developing adjuvants, substances added to a vaccine to aid its action, and the possibility of using intradermal rather than intramuscular injections. Such studies are currently underway, funded through the NIH. Additionally, HHS recently announced the award of a contract to the Chiron Corporation for the development of an H5N1 vaccine.

One of the main efforts by HHS in pandemic preparedness is to expand the Nation's use of influenza vaccine during interpandemic influenza seasons. This increase will help assure that the United States is better prepared for a pandemic. Influenza vaccine demand drives influenza vaccine supply. As we increase annual production efforts, this should strengthen our capacity for vaccine production during a pandemic. We are also developing strategies to increase influenza vaccine demand and access by persons who are currently recommended to receive vaccine each year.

DOMESTIC PREPAREDNESS

*HHS Pandemic Influenza Plan*

On November 2, 2005, the HHS Pandemic Influenza Plan was released. The HHS Plan is a blueprint for pandemic influenza preparedness and response and provides guidance to national, State, and local policymakers and health departments with the goal of achieving a national state of readiness and quick response. The HHS plan also includes a description of the relationship of this document to other Federal plans and an outline of key roles and responsibilities during a pandemic. In the event of a pandemic and the activation of the National Response Plan, the CDC has a critical role to support the Department of Homeland Security in their role of overall domestic incident management and Federal coordination. The President is requesting additional FY 2006 appropriations for HHS totaling $6.7 billion in support of the HHS Pandemic Influenza Plan. In seeking this funding, the goals are: To be able to produce a course of pandemic influenza vaccine for every American within 6 months of an outbreak; to provide enough antiviral drugs and other medical supplies to treat over 25 percent of the U.S. population; and to ensure a domestic and international public health capacity to respond to a pandemic influenza outbreak.

In addition to outlining the Federal response in terms of vaccines, surveillance, and planning, the HHS Pandemic Influenza Plan makes clear the role of individual Americans in the event of an influenza pandemic. The importance of such ordinary but simple steps as frequent hand washing, containing coughs and sneezes, keeping sick children (and adults) home until they are fully recovered are widely seen as practical and useful for helping control the spread of infection. The plan also describes options for social-distancing actions, such as "snow days" and alterations in school schedules and planned large public gatherings. While such measures are, ordinarily, unlikely to fully contain an emerging outbreak, they may help slow the spread within communities.

*State and Local Preparedness and Planning*

All states have submitted interim pandemic influenza plans to CDC as part of their 2005 Public Health Emergency Preparedness Cooperative Agreements. Key elements of these plans include the use of surveillance, infection control, antiviral medications, community containment measures, vaccination procedures, and risk communications. To support the Federal and State planning efforts, CDC has developed detailed guidance and materials for States and localities, which is included in the HHS plan. CDC will work with States to build this guidance into their plans. CDC has taken a lead role in working with the Advisory Committee on Immunization Practices (ACIP) and the National Vaccine Advisory Committee (NVAC) to recommend strategic use of antiviral medications and vaccines during a pandemic when supplies are limited.

CDC is working to: (1) Ensure that States have sufficient epidemiologic and laboratory capacity both to identify novel viruses throughout the year and to sustain surveillance during a pandemic; (2) improve reporting systems so that information

needed to make public health decisions is available quickly; (3) enhance systems for identifying and reporting severe cases of influenza; (4) develop population-based surveillance among adults hospitalized with influenza; and (5) enhance monitoring of resistance to current antiviral drugs to guide policy for use of scarce antiviral drugs.

Collaboration with the Council for State and Territorial Epidemiologists (CSTE) has considerably improved domestic surveillance through making pediatric deaths associated with laboratory-confirmed influenza nationally notifiable, and by implementing hospital-based surveillance for influenza in children at selected sites. CDC will continue to work with CSTE to make all laboratory confirmed influenza hospitalizations notifiable. Since 2003, interim guidelines have been issued to States and hospitals for enhanced surveillance to identify potential H5N1 infections among travelers from affected countries, and these enhancements continue. Special laboratory training courses to teach State laboratory staff how to use molecular techniques to detect avian influenza have been held. In the past year, CDC trained professionals from all 48 States that desired training.

*Healthcare System*

If an influenza pandemic were to occur in the United States, it would place a huge burden on the U.S. healthcare system. Medical surge capacity may be limited, and could be vastly outpaced by demand. Healthcare facilities need to be prepared for the potential rapid pace and dynamic characteristics of a pandemic. All facilities should be equipped and ready to care for a limited number of patients infected with a pandemic influenza virus as part of normal operations as well as a large number of patients in the event of escalating transmission. Preparedness activities of healthcare facilities need to be synergistic with those of other pandemic influenza planning efforts. Effective planning and implementation will depend on close collaboration among State and local health departments, community partners, and neighboring and regional healthcare facilities. However, despite planning, in a severe pandemic it is possible that shortages in staffing, beds, equipment (e.g., mechanical ventilators), and supplies will occur and medical care standards may need to be adjusted to most effectively provide care and save as many lives as possible.

CDC has developed, with input from State and local health departments, and healthcare partners, guidance that provides healthcare facilities with recommendations for developing plans to respond to an influenza pandemic and guidance on the use of appropriate infection control measures to prevent transmission during patient care. Development of, and participation in, tabletop exercises over the past 2 years have identified gaps and provided recommendations for healthcare facilities to improve their readiness to respond and their integration in the overall planning and response efforts of their local and State health departments. The healthcare system has made great strides in preparation for a possible pandemic, but additional planning still needs to occur.

*Antiviral Drugs*

A component of the HHS Pandemic Influenza plan is acquiring, distributing, and using antiviral drugs. To date, CDC has been working to procure additional influenza countermeasures for the CDC Strategic National Stockpile (SNS). Because the H5N1 viruses isolated from people in Asia during the past 2 years appear resistant to one class of antiviral drugs but sensitive to oseltamivir (Tamiflu®), the SNS has purchased enough oseltamivir (Tamiflu®) capsules to treat approximately 5.5 million adults and has oseltamivir (Tamiflu®) suspension to treat nearly 110,000 children. The SNS also includes 84,000 treatment regimens of zanamivir (Relenza®). WHO recently announced that the manufacturer of Tamiflu®, Roche, has donated 3 million adult courses. These will be available to WHO by mid-2006.

*Enhancement of Quarantine Stations*

CDC has statutory responsibility to make and enforce regulations necessary to prevent the introduction, transmission, or spread of communicable diseases from foreign countries into the United States. This effort includes maintaining quarantine stations. Quarantine stations respond to illness in arriving passengers, assure that the appropriate medical and/or procedural action is taken, and train immigration, customs, and agriculture inspectors to watch for ill persons and imported items having public health significance. Currently, CDC's quarantine stations are actively involved in pandemic influenza preparedness at their respective ports of entry. CDC's goal is to have a quarantine station in any port that admits over 1,000,000 passengers per year. We are expanding the Nation's quarantine stations; staff now have been selected for 18 stations and are on duty at 17 of these stations.

HHS and the Department of Homeland Security (DHS) have recently concluded a Memorandum of Understanding setting out the roles and responsibilities of the two agencies. DHS will assist in keeping communicable diseases from entering the

U.S. borders; HHS/CDC will be providing training and other necessary support and helping to prevent disease from entering the United States.

*Informing the Public*

Risk communication planning is critical to pandemic influenza preparedness and response. CDC is committed to the scientifically validated tenets of outbreak risk communication. It is vital that comprehensive information is shared across diverse audiences, information is tailored according to need, and information is consistent, frank, transparent, and timely. In the event of an influenza pandemic, clinicians are likely to detect the first cases; therefore messaging in the prepandemic phase must include clinician education and discussions of risk factors linked to the likely sources of the outbreak. Given the likely surge in demand for health care, public communications must include instruction in assessing true emergencies, in providing essential home care for routine cases, and basic infection control advice. CDC provides the health care and public health communities with timely notice of important trends or details necessary to support robust domestic surveillance. We also provide guidance for public messages through the news media, Internet sites, public forums, presentations, and responses to direct inquiries. This comprehensive risk-communication strategy can inform the Nation about the medical, social, and economic implications of an influenza pandemic, including collaborations with the international community. We are working through the International Partnership on Avian and Pandemic Influenza, established by President Bush in September, and with the WHO Secretariat to harmonize our risk-communication messages as much as possible with our international partners, so that, in this world of a 24-hour news cycle, governments are not sending contradictory or confusing messages that will reverberate around the global to cause confusion.

CONCLUSION

Although much has been accomplished, from a public health standpoint more preparation is needed for possible human influenza pandemic. As the President mentioned during the announcement of his National Strategy last week, our first line of defense is early detection. Because early detection means having more time to respond, it is critical for the United States to work with domestic and global partners to expand and strengthen the scope of early-warning surveillance activities used to detect the next pandemic. To monitor H5N1 viruses for changes indicating an elevated threat for people, we must continue to strengthen and build effective in-country surveillance. This must include continued enhancement of training for laboratorians, epidemiologists, veterinarians, and other professionals, as well as promotion of the comprehensive and transparent reporting that is essential to monitor H5N1 and other strains of highly pathogenic avian influenza.

The outbreaks of avian influenza in Asia and Europe have highlighted several gaps in global disease surveillance that the United States must address in conjunction with partnering nations. These limitations include: (1) Insufficient infrastructure in many countries for in-country surveillance networks; (2) the need for better training of laboratory, epidemiologic, and veterinary staff; and (3) the resolution of longstanding obstacles to rapid and open sharing of surveillance information, specimens, and viruses among agriculture and human health authorities in affected countries and the international community. The International Partnership the President established is also looking at how best to solve these challenges.

During an influenza pandemic, the presence of influenza vaccine manufacturing facilities in the United States will be critically important. The pandemic influenza vaccines produced in other countries are unlikely to be available to the U.S. market, because those governments have the power to prohibit export of the vaccines until their domestic needs are met. The U.S. vaccine supply is particularly fragile. Only one of four influenza vaccine manufacturers selling vaccine in the U.S. market makes its vaccine entirely in this country. It is necessary to ensure an enhanced and stable domestic influenza vaccine market to assure both supply and demand.

Although the present avian influenza H5N1 strain in Southeast Asia does not yet have the capability of sustained person-to-person transmission, we are concerned that it could develop this capacity. CDC is closely monitoring the situation in collaboration with WHO, the affected countries, and other partners. We are using its extensive network with other Federal agencies, provider groups, nonprofit organizations, vaccine and antiviral manufacturers and distributors, and State and local health departments to enhance pandemic influenza planning. Additionally, the national response to the annual domestic influenza seasons provides a core foundation for how the Nation will face and address pandemic influenza.

Thank you for the opportunity to share this information with you. I am happy to answer any questions.

The CHAIRMAN. Well, Doctor, we thank you very much for your testimony.

Let me ask my colleague, could we have the testimony of Dr. Fauci, and then I then——

Senator BIDEN. Oh, please.

The CHAIRMAN [continuing]. I would return to the ranking member.

Senator BIDEN. I apologize. I'm a daily commuter, and sometimes the schedule doesn't agree with me, and I apologize, Mr. Chairman, for——

The CHAIRMAN. Thank you.

We'll proceed, then, with Dr. Fauci.

**STATEMENT OF DR. ANTHONY S. FAUCI, DIRECTOR, NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES, NATIONAL INSTITUTES OF HEALTH, DEPARTMENT OF HEALTH AND HUMAN SERVICES, BETHESDA, MD**

Dr. FAUCI. Thank you very much, Mr. Chairman, Senator Biden, Senator Dodd. I appreciate the opportunity to discuss pandemic influenza preparedness with you at this hearing this morning.

As you see on this first visual, we have reproductions of the President's national strategy for pandemic influenza side by side with the pandemic influenza plan that was, as you know, released just last week, following the President's announcement by Secretary Leavitt. There are six major components of this: International surveillance, domestic surveillance, vaccines, antivirals, communications, and then State and local preparedness. As Dr. Gerberding mentioned, I will focus my remarks exclusively on the vaccine and antiviral component of this.

As you may have heard through announcements that occurred from the end of August to the present time, about a year and a few months ago, we isolated a virus from a Vietnamese patient who was infected by a chicken with H5N1, and, from that, developed a seed virus for a vaccine for which we contracted with two manufacturers, Sanofi Pasteur and Chiron. We had results this past summer from the first stage of the Sanofi Pasteur trial, which tested the H5N1 vaccine in 450 healthy adults. The results had very encouraging news and some sobering news. The encouraging news is that it appears to be safe, and it was capable of inducing an immune response that you would predict would be protective. The sobering news is that the dose that was required to get to that level of immunity was substantially higher than the dose that we generally use for the seasonal flu. This compounds the issue of our global deficiencies in production capacity. However, in parallel with those studies, they were studies using a compound called an adjuvant, which has the capability of expanding the body's immune response to whatever you stimulate it with—in this case, the vaccine. The Chiron company has some preliminary encouraging results with adjuvants used in an H9N2 vaccine, a similar bird flu, but not the one that we're concerned with at this time. The reason I tell you this is that, in January of this year, we will be testing the H5N1 adjuvanted vaccine with Sanofi Pasteur and with Chiron. This is going to have implications as to the pace with which we can get to where we want to go.

Now, when you talk about vaccines, you talk about stockpiles and strategies. First, the stockpile. As I mentioned, because of the dose requirement, our stockpile currently is relatively small. But, also as you might recall, just this past month, a $100 million contract was signed with Sanofi, and $62 million with Chiron, to build up the stockpile. The ultimate strategy is to manufacture 20 million courses of what we call prepandemic vaccine; namely, the H5N1 that we have in hand right now, but to simultaneously create the manufacturing capacity—and that's one of the major matrices of the pandemic flu preparedness plan that's encompassed in the $7.1 billion President's request—namely, to get the capacity to manufacture 300 million courses of vaccines within 6 months of a pandemic outbreak. This gets to Dr. Gerberding's point about the need for surveillance and transparency and why it's so important to get samples to the CDC in real time as the virus evolves, because it will be those samples that will guide us to the next generation of the vaccine that would be needed.

In addition, we are developing adjuvants and cell-culture-based techniques, which are the technology of the future. We currently are confined to egg-based production methods. It is a tried-and-true way of making influenza vaccine, but, for scale-up, we're going to rely on the future, on cell-based.

Very quickly, moving over to antiviral therapies for influenza, there are two major categories. They are aimed against two separate components of the virus. The one of great interest right now is the class that is directed against the neuraminidase component of the virus, and the drug in question is Tamiflu, even though Relenza, which is of the same class, is likely also a useful drug against the H5N1.

Again, we talk stockpile and strategy. The stockpile right now is relatively small. We had, originally, 2.75 million courses, but recently we have brought that up to 4.3 million treatment courses of Tamiflu. The strategy is important. We have information from Roche, the manufacturer. They will be able to get us, by the end of 2006, 20 million treatment courses, and, by mid-2007, enough to cover 25 percent of our population, which is about 75 million people, plus an additional 6 million in order to contain an initial outbreak.

And then, finally and importantly, at the NIH we are accelerating the development of promising new antivirals, because we are somewhat concerned that the effectiveness of a Tamiflu-type drug may not necessarily be all that people think it is, in the sense of being the major way that you can put the lid on a pandemic. We do know that Tamiflu is effective in seasonal flu in shaving off a day and a half or so of symptoms, but we have no concrete evidence that it will have a major effect when you have an overwhelming pandemic that brings a lot of sick people to emergency rooms and clinics.

Let me close by this very familiar slide, which tells us of the worst-case scenario.

You hear of the preparedness now and what we talk about, the strategies, a robust budget that has been proposed by the Senate as well as by the President, and we're often asked, "Is this overkill? Are we really making something out of an issue what may not ac-

tually be that bad?" We in the field of public health know that it is entirely unpredictable when you come to issues like influenza, but history tells us that there has been a worst-case scenario, which is exemplified by this slide. And we feel, from a public-health standpoint, that we must assume in our preparedness the worst-case scenario, because if we do not do that, that will be irresponsible.

Thank you, Mr. Chairman.

[The prepared statement of Dr. Fauci follows:]

PREPARED STATEMENT OF DR. ANTHONY S. FAUCI, DIRECTOR, NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES, NATIONAL INSTITUTES OF HEALTH, DEPARTMENT OF HEALTH AND HUMAN SERVICES, BETHESDA, MD

Mr. Chairman and members of the committee, thank you for the opportunity to discuss with you the current global outbreak of avian influenza in fowl, the threat of pandemic influenza in humans, and the activities of the Federal Government in preparing to meet this threat.

An influenza virus strain capable of causing the next human influenza pandemic could emerge with little or no warning in almost any part of the world. Three influenza pandemics occurred in the 20th century, in 1918, 1957, and 1968. The pandemics of 1957 and 1968 were serious infectious disease events that killed approximately 2 million and 700,000 people worldwide, respectively. The 1918–19 pandemic, however, was catastrophic: It killed more than 500,000 people in the United States and more than 40 million people worldwide. The possibility that a new influenza virus could emerge to cause a similar pandemic among human beings is a very real threat for which we must be prepared.

Of known influenza viruses, the H5N1 avian influenza strains that are spreading in domestic and migratory fowl in Asia and possibly Eastern Europe currently are of greatest concern. Although the H5N1 virus is primarily an animal disease, has not yet demonstrated the ability to spread efficiently from animals to humans and is very inefficient in spreading person to person, it has infected more than 120 people in Asia. Approximately half of the people diagnosed with H5N1 avian influenza infection have died. Because the virus is now endemic in many wild bird species in several countries in Asia, and likely elsewhere, eradication is probably not feasible. The feared human pandemic could become a reality if the H5N1 virus mutates further, remains highly virulent, and acquires the capability to spread as efficiently from person to person as do the commonly circulating virus strains that produce seasonal influenza epidemics. Even if H5N1 does not evolve into a pandemic strain, the possibility that a human influenza pandemic will occur at some time in the future is real.

On November 1, 2005, the President announced the National Strategy for Pandemic Influenza, and the next day U.S. Department of Health and Human Services (HHS) Secretary, Michael O. Leavitt, released an integral component of the National Strategy, the HHS Pandemic Influenza Preparedness and Response Plan. Together, these two documents provide a blueprint for a coordinated national strategy to prepare for and respond to a human influenza pandemic. The National Institutes of Health within HHS, and the HHS/NIH National Institute of Allergy and Infectious Diseases (NIAID), in particular, have the primary responsibilities for conducting scientific research and conducting clinical trials to foster product development to prepare our Nation for a potential human influenza pandemic.

In my testimony today, I will tell you more about the scientific research and development efforts of the Federal Government, the academic community, and the private sector to counter the threat of pandemic influenza. In particular, I will focus on projects and programs that will help ensure that effective influenza vaccines and antiviral drugs will be available to counter any human influenza virus with pandemic potential that could emerge.

BASIC SCIENCE AND SURVEILLANCE

HHS/NIH/NIAID supports numerous basic research projects intended to increase our understanding of how animal and human influenza viruses replicate, interact with their hosts, stimulate the immune response, and evolve into new strains. These studies lay the foundation for the design of new antiviral drugs, diagnostics, and vaccines, and are applicable to seasonal epidemic and pandemic strains alike.

Each year, as influenza viruses circulate through the human population, their surface proteins undergo small changes. As these small changes accumulate, the in-

fluenza virus gains the ability to circumvent immunity created by prior exposure to older circulating influenza viruses or by vaccination.

This phenomenon, called "antigenic drift," is the basis for the well-recognized patterns of human influenza disease that occur predictably every year, and is the reason, with the help of the World Health Organization (WHO), we must update influenza vaccines each year. Influenza viruses also can change more dramatically. For example, viruses can emerge that can jump species from natural reservoirs, such as wild ducks, to infect domestic poultry, farm animals, or humans. When an influenza virus jumps species from an animal, such as a chicken, to infect a human, the result is usually a "dead-end" infection that cannot readily spread further in the human population. However, mutations in the virus could develop that allow human-to-human transmission. Furthermore, if an avian influenza virus and another human influenza virus were to simultaneously coinfect a person or animal, the two viruses might swap genes, which could result in a virus that is readily transmissible between humans, and against which the population would have no natural immunity. These types of significant changes in influenza viruses are referred to as "antigenic shift."

H5N1 and H9N2 are two avian influenza strains that have jumped directly from birds to humans, and which have significant pandemic potential. In 1998, 1999, and 2003, H9N2 influenza caused illness in three people in Hong Kong and in five individuals elsewhere in China, but the virus did not spread further among humans, and, reportedly, caused no deaths. At this time, H5N1 influenza appears to be a significantly greater threat than H9N2. In addition to the high fatality rate seen in people with H5N1 influenza, H5N1 viruses are evolving in ways that increasingly favor the start of a pandemic, including becoming more stable in the environment and expanding their host-species range. Moreover, two highly probable cases of human-to-human transmission of the H5N1 virus have occurred, and it is possible that other such transmissions have occurred.

An understanding of the diversity of influenza viruses—in the wild, in domestic animals, and in humans—as well as close surveillance for the emergence of new strains are important components of the scientific program to prepare for a pandemic. HHS/NIH/NIAID supports major research programs that are important in this regard. One is a long-standing program based in Hong Kong to detect the emergence of influenza viruses with pandemic potential. Dr. Robert Webster and his team from St. Jude Children's Research Hospital conduct extensive surveillance of influenza viruses in animals in Asia, analyze new influenza viruses when they are found, and generate candidate vaccines against them. Another effort, the Influenza Genome Sequencing Project is a collaborative project of HHS/NIH (NIAID, the Institute for Genomic Research and the National Library of Medicine), the Wadsworth Center, the U.S. Department of Defense Armed Forces Institute of Pathology, St. Jude Children's Research Hospital, and several other organizations. Its purpose is to rapidly provide complete genetic sequences of thousands of influenza virus isolates to the scientific community. This program has enabled scientists to better understand how influenza viruses evolve as they spread through the population, and to match viral genetic characteristics with virulence, ease of transmissibility, and other clinical properties. A high priority of HHS is to further enhance international and domestic influenza surveillance systems so they can reliably detect an outbreak and to determine accurately the lethality and transmissibility of influenza strains.

VACCINES

Vaccines are an essential tool for the control of influenza. Unfortunately, current domestic capacity for the manufacturing of influenza vaccine can meet only a small fraction of the need projected for a pandemic response. For this reason, $4.7 billion of the $6.7 billion in the President's fiscal year 2006 supplemental appropriations request for the implementation of the HHS Pandemic Influenza Plan is intended to increase U.S.-based pandemic influenza vaccine-production capacity, vaccine stockpiles, and vaccine research. The goal is to have the capacity to produce sufficient pandemic influenza vaccine to protect every American within 6 months of an outbreak.

With regard to the development of an H5N1 vaccine, we have made rapid progress. HHS/NIH/NIAID-supported researchers at St. Jude Children's Research Hospital obtained a clinical isolate of a highly virulent H5N1 virus in Vietnam in early 2004, and used a technique called reverse genetics to create an H5N1 vaccine reference strain from this isolate. HHS/NIH/NIAID then contracted with Sanofi Pasteur and Chiron Corporation to manufacture pilot lots of 8,000 and 10,000 vaccine doses, respectively, of the inactivated virus vaccine, for use in clinical trials. The

Sanofi Pasteur vaccine is now undergoing clinical testing in healthy adults and healthy elderly people, and will soon begin evaluation in children.

Preliminary results from these trials provide both good and sobering news. The good news is that the vaccine is safe, and induces a vigorous immune response that augurs well for protecting people against the H5N1 virus. The sobering news is that two large doses of the Sanofi product were needed to elicit an immune response likely to be protective. However, preliminary results from a phase I clinical trial of an H9N2 influenza vaccine candidate made by Chiron indicate that addition of an adjuvant—a vaccine component that increases the immune response—can reduce the required dose substantially. Clinical trials of H5N1 candidates using adjuvants and other strategies to reduce the necessary dose are ongoing or imminent.

In addition to these inactivated virus vaccines, HHS/NIH/NIAID is collaborating with industry to pursue several other vaccine strategies. These include recombinant subunit vaccines, in which cultured cells are genetically engineered to produce influenza virus proteins that are then used in a vaccine, and DNA vaccines, in which scientists inject influenza genetic sequences directly into the vaccinee to stimulate an immune response. In addition, from the mid-1970s to the early 1990s, HHS/NIH/NIAID intramural and extramural researchers developed a cold-adapted, live attenuated influenza vaccine strain that later became the influenza vaccine marketed as FluMist®, licensed by the HHS Food and Drug Administration (FDA). Today, HHS/NIH/NIAID intramural researchers are working with colleagues from Medlmmune, Inc., under a Cooperative Research and Development Agreement to produce and test a library of similar vaccine candidates against all known influenza strains with pandemic potential.

HHS also has awarded over $162 million in contracts to Sanofi Pasteur and Chiron to produce bulk inactivated H5N1 vaccine for the Strategic National Stockpile to ensure the manufacturing techniques, procedures, and conditions used for large-scale production will yield a satisfactory product. Moving to large-scale production of the vaccine in parallel with clinical testing of pilot lots is an indication of the urgency with which we have determined we must address H5N1 vaccine development. We could use the doses of H5N1 vaccine we have ordered, as necessary, to vaccinate healthcare workers, researchers, and, if indicated, the public in affected areas.

In addition to creating a safe and effective vaccine candidate, it is imperative we have the ability to produce large quantities of vaccine quickly, in the United States. To accomplish this, HHS is pursuing a multifaceted strategy to create domestic influenza vaccine manufacturing capacity capable of producing 300 million vaccine courses within 6 months of the onset of a human influenza pandemic.

The initial component of this strategy is to increase the number of domestic manufacturers of traditional egg-based influenza vaccines; only one currently exists within the United States. Doing so will allow the United States to manufacture a 20-million-course prepandemic vaccine stockpile by 2009, without disrupting the production of annual seasonal influenza vaccine. In the event a pandemic appears imminent—or earlier if circumstances warrant—we could use this prepandemic vaccine to immunize healthcare workers, frontline responders, vaccine-manufacturing personnel, and others critical to the pandemic response. With the addition of the domestic infrastructure required to produce the prepandemic vaccine, egg-based production capacity will be able to provide an additional 60 million courses of vaccine within 6 months of the emergence of a pandemic.

Egg-based production alone, however, cannot bring us to our goal of having the surge capacity in the United States to produce 300 million courses of vaccine in a 6-month timeframe. Instead, the best hope for acquiring a vaccine manufacturing capacity in the United States—we could ramp up rapidly on short notice—lies in expanding and accelerating our investment in non-egg-based technologies, specifically cell-based influenza vaccines. Much of the investment in vaccines outlined in the HHS plan goes toward this initiative. The proposed investments will allow creation of new domestic facilities that would provide the surge capacity to manufacture approximately 240 million vaccine courses within 6 months of a pandemic outbreak.

The HHS plan also calls for upgrading existing domestic manufacturing facilities to enable the production of pandemic influenza vaccine in an emergency. To that end, HHS will work with HHS/FDA to establish contingency arrangements with vaccine manufacturers that will allow them to quickly adapt their facilities either to produce influenza vaccines or to carry out other critical functions, such as repackaging bulk vaccine produced by other manufacturers.

It is important to note, however, that while the technology for producing influenza vaccine in cell cultures is promising, successful development of the production methods and licensure of the product are years in the future, and by no means guaran-

teed. Moreover, how quickly we reach our production goals will depend on the development of adjuvants and other dose-sparing techniques that could reduce the amount of vaccine needed to protect the U.S. population, and on whether required incentives for industry can be successfully implemented.

Recognizing the urgent need to create and expand vaccine-manufacturing capacity, we must remove or mitigate deterrents to participation in the vaccine enterprise by companies with substantial industrial capacity and experience. Accordingly, the administration is proposing limited liability protections for vaccine manufacturers and providers, except in cases of willful misconduct. We believe this proposal will reduce the liability risks that dissuade companies from producing pandemic countermeasures, while retaining appropriate access by the American public to reasonable and justified court remedies.

Under the International Partnership on Avian and Pandemic Influenza the President launched in September, we are also beginning to coordinate our vaccine research with that undertaken by other nations and the private sector outside the United States. The World Health Organization Secretariat this week sponsored the first of what we hope will be a series of meetings to allow us to exchange information with, and learn from, our colleagues in other countries who are in various stages of research on human vaccines against the H5N1 virus. HHS/NIH/NIAID and the Office of Public Health Emergency Preparedness are also providing technical assistance to the Government of Vietnam as it proceeds with the development of a human H5N1 vaccine, including support for clinical trials.

ANTIVIRALS

Antiviral medications are an important counterpart to vaccines as a means of controlling influenza outbreaks, both to prevent illness after exposure and to treat infection after it occurs. Four drugs currently are available for the treatment of influenza, three of which HHS/FDA has also licensed for influenza prevention for certain populations. HHS/NIH/NIAID supports research to identify new anti-influenza drugs through the screening of new drug candidates in cell-culture systems and in animal models. In the past year, we have identified seven promising candidates. Efforts to design drugs that precisely target viral proteins and inhibit their functions also are under way. In addition, HHS/NIH/NIAID is developing novel, broad-spectrum therapeutics that might work against many influenza virus strains. Some of these target viral entry into human cells, while others specifically attack and degrade the viral genome.

Efforts also are under way to test and improve the existing anti-influenza drugs. Researchers have determined that currently circulating H5N1 viruses are resistant to two older drugs—rimantadine and amantadine—but are sensitive to a newer class of drugs, called neuraminidase inhibitors. This class of drugs includes oseltamivir (marketed as Tamiflu®), approved by HHS/FDA for treatment of individuals older than 1 year. Studies to further characterize the safety profile of oseltamivir for very young children are in the advanced planning stage. Studies are also in progress to evaluate novel drug targets, as well as long-acting next-generation neuraminidase inhibitors. In addition, development and testing in animals of a combination antiviral regimen against H5N1 and other potential pandemic influenza strains are under way.

If a human influenza pandemic were to occur, a sufficient supply of stockpiled antiviral drugs to treat and care for infected individuals would be critical. Therefore, the HHS plan requests an investment of $1.4 billion to increase the availability of these drugs. These funds would help us achieve the President's goal of having available 81 million courses of antivirals, which would be sufficient to treat 25 percent of the U.S. population (75 million courses) and also allow for a reserve supply (6 million courses) we could use to contain an initial U.S. outbreak. Funding would also accelerate the development of promising new antiviral drug candidates in collaboration with academia and industry, since there is a possibility that none of the antivirals available today will be fully effective against whatever strain sparks a pandemic influenza among humans.

The planned acquisition by the U.S. Government of up to 81 million courses of antiviral drugs will enable manufacturers to make significant expansion in U.S.-based manufacturing capacity, and thereby position the United States to meet future demands much more readily than is currently possible. HHS also will work with its State partners to encourage them to acquire antivirals for rapid use for their populations.

CONCLUSION

In closing, Mr. Chairman, I want to reiterate that the threat from pandemic influenza, whether from an H5N1 influenza virus or another influenza virus still unknown, is real and growing. Along with Under Secretary Dobriansky and Dr. Gerberding, I participated in the trip that Secretary Leavitt led to Southeast Asia last month, and what I saw confirmed this belief. Although we do not know when the next human influenza pandemic will occur, or how devastating it will be, we can be certain that a new influenza virus ultimately will emerge. And the historical precedent of the 1918 pandemic clearly demonstrates that a newly emerging influenza virus can wreak catastrophic damage worldwide in a matter of months.

The world is obviously very different today than it was in 1918. In some ways we are more vulnerable. Travel that took weeks in 1918 only takes hours today. Our globalized economy is exquisitely sensitive to the disruptions that would inevitably occur during a pandemic. Many parts of the world have weak public health and healthcare delivery systems, and poverty and overcrowding are widespread, as we witnessed in Southeast Asia. Science and medicine, though, have progressed dramatically, and we now have tools such as sophisticated viral surveillance techniques, effective vaccines, antibiotics to treat secondary bacterial infections, and antiviral drugs against influenza that should aid in our response to an emerging influenza pandemic. These tools, however, will be of little use if we cannot bring them to bear when we need them. For that to occur, we must take all possible measures now to ensure that our public health and pharmaceutical manufacturing infrastructure is equipped to respond to a pandemic.

Thank you for this opportunity to testify before you today. I would be pleased to answer any questions that you may have.

The CHAIRMAN. Thank you very much, Dr. Fauci.

We'll have, at this point, a 10-minute round of questions, and I'll ask Senator Biden to take more than that, as he requires, for his opening statement, as well as questions, as his turn comes.

Let me begin, though, by asking you, Dr. Fauci, as we've related already this morning, there are multiple Federal departments and agencies involved in planning related to the prevention situation. These range from Health and Human Services, the Department of Agriculture, the State Department, and USAID, among others. In your judgment, who is in charge? If you have an idea of how this ought to be run, can you relate that to the committee this morning?

Dr. FAUCI. When you talk about the health component of it, the things that I spoke of and that Dr. Gerberding spoke of, there is no question that that responsibility rests with the Department of Health and Human Services, Under Secretary Leavitt. But the broad picture that involves multiple agencies—as you said, State Department, Transportation, Commerce, or what have you—that falls under the auspices of the Homeland Security Council and the Department of Homeland Security.

The CHAIRMAN. Well, who over there is in charge?

Dr. FAUCI. In the Homeland Security Council, it's Fran Townsend who is in charge of that council and is the person responsible for coordination. When you involve multiple agencies that operate through the Department of Homeland Security, obviously it's Secretary Chertoff.

The CHAIRMAN. Now, would Ms. Townsend or Secretary Chertoff relate to what we understood, to reach out internationally? Homeland defense implies what it means here at home, but how about the thought that our best bet might be to go to the source and to work with these other countries abroad?

Dr. FAUCI. That is State Department. International clearly is under the auspices of the State Department.

The CHAIRMAN. And——

Dr. FAUCI. As you know—as Dr. Gerberding has mentioned, many of the on-the-ground activities that we have with the CDC, and the point about getting samples, also crosses over with the Department of Health and Human Services, because many of the CDC's activities, and even the NIH, we have people who are doing molecular analysis of the evolution of the viruses, but when you're dealing with interactions among countries, that's State Department.

Mr. NATSIOS. We established, some time ago, at a technical level, a coordination council of career officers who meet weekly, or biweekly, from HHS, from CDC, NIH, USDA, State Department, and AID. We divided the workload up. I'm talking about the operational level, exactly what has to get done internationally. And it's working very, very well. And I think it's organized the way it should be. That doesn't always happen, but, in this particular case, it has.

The CHAIRMAN. Secretary.

Ms. DOBRIANSKY. If I may just add, the White House chairs, through the Homeland Security Council and also the Domestic Policy Council, they have chaired a series of meetings, right from the beginning, coordinating with all agencies. The Department of Health and Human Services has been in the lead on health-related matters, with the focus on domestic issues and health-related matters. The State Department has been charged with international activities. We, ourselves, at the State Department, have an interagency meeting, which does bring all of the players, from the domestic side to the international side, together.

And I'll just add—Andrew had mentioned the operational level—when we sent out assessment teams—for example, to evaluate the needs on the ground in, for example, Laos, Cambodia, Vietnam, and through Thailand, and then, later, to China and to Indonesia—it was HHS, State Department, USDA, which is also a player in this, the United States Department of Agriculture, and then AID. But it is the White House that chairs the formal interagency process that brings all of the pieces together.

The CHAIRMAN. Well, now, at the White House level, then, what comment would you make, Mr. Natsios, about the thought that the FAO, which is working to control the influenza, says it needs $425 million for the task, but, so far, has received pledges of only $30 million? Or, Secretary Dobriansky, some critics have said that President Bush's $251 million request for all international activities is too small. Now, in this White House Council, as you've described, to discuss these things, are you—do you take a look at this cosmic picture in which somehow the money isn't forthcoming?

Ms. DOBRIANSKY. Let me take the second half of your question. These matters have been discussed, and those moneys are derived from—the $251 million, to round it off—are derived from not only the assessments that have occurred by the interagency process, but also it is derived from the trip which I took with Secretary Leavitt, which included CDC, NIH, WHO, FAO, OIE, all of the multiple players in this process, assessing the needs on the ground.

But, specifically, I think the answer to the critics is the fact—number one, that amount is the largest contribution made by any country for international activities, number one, which the United States has put forward. Second, we are using these moneys, the

$251 million, to leverage contributions from other countries. I mentioned in my statement that right now the World Bank and the WHO are holding, in Geneva, meetings which are focused on this. We have spoken about what we see to do. We want to encourage other countries to come forward and contribute, as well, and to identify, collectively, the needs.

And, finally, I would say that the $7.1 billion also relates to, and includes, vaccine development and production. That not only relates to, I think, us, domestically, but we are working with many other countries on this very crucial issue, and I think the moneys vested there, also, it's an investment, more broadly.

The CHAIRMAN. Well—yes, Mr. Natsios, do you have a——

Mr. NATSIOS. Yeah, let me deal with the budget issue first——

The CHAIRMAN. Yes.

Mr. NATSIOS [continuing]. Just from our perspective. As I understand it, from the White House and from OMB, the $7.1 billion, which is principally for domestic purposes, is basically what we're going to spend on this. It's frontloaded to be able to be spent now. The international section of it, which is $250 million of the—$251 million of the $7.1 billion, is not the end of what we've—of what we're going to request; that is only—we got $25 million, because the Congress was so helpful in the tsunami, that amendment that you offered, Senator, with Senator Obama; then we have the $131–$251 million that's in this proposal. We expect additional money to be in the 2007 budget.

Right now—and so, in terms of—there's a distinction, in terms of whether—what's—how comprehensive each of the respective proposals are for the domestic versus the international. One is frontloaded, the other is being spent, but it is not at the end of what we're going to propose.

In terms of the strategy, operationally, we have two strategies. I have worked in this for 16 years now, and the United Nations and the World Bank and other international institutions do very well at certain things, but all U.N. agencies are not the same. Some are very well run, some of them are actually not very well run. Some are well run in certain regions of the world; in other regions, they are very poorly run; there isn't even consistency between—within the same institution, sometimes. We are not going to put, in AID, all our money into any institution—I'm not going to mention specific ones—and then hope that they can spend it properly. We are going—we—the first money we gave, before anything else, was $2 million to WHO and $2 million to the FAO. And we programmed it with them, specifically, exactly what we wanted, jointly, to do, in which countries. And they're doing very well on that. And we will continue to support the international efforts.

However, international institutions tend to move more slowly because of their disbursement mechanisms. It's simply a matter of getting consensus among donors. If multiple people give money, they all want to participate in it. We can move bilaterally much more rapidly. And so, we want to combine our strengths to move more rapidly between CDC and AID and USD on the operational things, with the very important international consenus-building and operational elements of U.N. agencies.

So, we're going to have a two-pronged institutional approach toward implementation. One is multilateral, and one is bilateral. And I think what we'll do is complement each other's strengths and weaknesses.

The CHAIRMAN. Well, we have to hope that our generosity will spur others, that they understand the same problem you're discussing today, and that there are urgent hearings going on in their Parliaments, because, at this stage, somebody indicating we've been the most generous will not cut it. In fact, there needs to be something happening out there at the source that keeps it from flying in here.

Senator Biden.

## OPENING STATEMENT OF HON. JOSEPH R. BIDEN, JR., U.S. SENATOR FROM DELAWARE

Senator BIDEN. Thank you, Mr. Chairman.

I find the answer about leveraging other countries a little bit like negotiating the Law of the Seas Treaty or some bilateral agreement relating to trade. But we don't have time, it seems, based on what we've been told, to let what other countries might or might not do dictate what has to be done.

We begin this effort—as you have said, Doctor, from CDC's point of view—with a degree of confidence in our capabilities, but also the knowledge that there are a lot of serious difficulties ahead here. We have no vaccine with assured effectiveness against the H5N1 flu. We—and we won't know what strain to combat until it shows up and it's transmitted among humans and it begins to spread, if I understand you correctly. How quickly we learn of that event is going to depend upon disease surveillance and reporting capabilities in less developed countries that are hard-put to keep track of outbreaks. And it's going to take, at least as I understand it, from my meetings prior to this hearing, at least 6 months from that point to begin full-scale vaccine production. I realize I'm reviewing some of what's been said. All of our major vaccine producers are foreign owned. The production process is complicated and depends upon eggs, that are also imported. Developers of new methods of vaccine production are still years away from FDA approval. So, that initial human-to-human outbreak will not be treated with vaccines, and the country where it occurs will need medicines, instead, if we're going to avoid the pandemic outbreak crossing our shores.

One class of antiviral medicines you've spoken about is less than fully effective on H5N1, perhaps because medicines were used in livestock in Asia, is what I'm told. The effective antiviral medicines—Tamiflu, which you've mentioned, Doctor—is made only by Roche, a Swiss firm, and the U.S. production line for Tamiflu will begin operations shortly, but the United States, as I understand it, has yet to put in its order, and it could soon lose its place in line, as I understand it. I may be mistaken, but I am told that we have to the end of the month, or the end of next month, to decide whether or not we are going to place our order.

Roche has contributed 3 million courses of Tamiflu treatment to the WHO, but you need to begin taking Tamiflu, as I understand it—if it works the way hoped—within 48 hours of exhibiting symp-

toms. So we need an excellent worldwide disease surveillance and reporting, and we need a system to get Tamiflu immediately to people near the initial outbreak.

And, as I understand from your testimony, and testimony I read of two who couldn't be here, these capabilities are vital to buying time for the production of a targeted vaccine to save the rest of the world.

So, you've all spoken to that, to some degree, but I hope we'll speak a little bit more about funding and whether we need to enact new foreign assistance legislation before we adjourn. And I heartily commend to all of you the written statement, which I'm sure you're familiar with, of Dr. Margaret Chan, Assistant Director of the World Health Organization, who was unable to be here because the WHO is hosting, today, a major avian flu conference in Geneva. Her statement is forthright and, I think, pretty sobering. But let me get to a couple of the questions that I have. I was going to start with different questions, but, for some continuity, I'd like to follow on what the chairman asked about.

One of the things that has become, I think, more front and center even than it was for all the years that I've dealt with Federal agencies, which I strongly support, like AID, is, who's in charge and who has what capacity and what capabilities? Now, Ms. Fran Townsend and Michael Chertoff are really good people, but, to the best of my knowledge, they have absolutely no background in fighting an epidemic, let alone a pandemic.

Has there been any thought given to bringing back somebody like D.A. Henderson, who was responsible for wiping out smallpox—to coordinate the avian flu efforts? Does it make sense to have somebody like that, who knows a helluva lot more than the two people we're talking about, about these kinds of things?

Anyone.

Ms. DOBRIANSKY. I'll make a comment. The structure that is set up is meant to provide coordination and to reach out to the expertise rendered by other institutions. And I think, critically, here it has been HHS with the expertise of CDC, NIH, there are a number of resident experts working very closely with Secretary Leavitt, which I think both of you can even address more specifically on that, who have been working very closely and, I think, providing that kind of assistance from, particularly, the health-related area——

Senator BIDEN. No, look—excuse me for interrupting—I got it.

Ms. DOBRIANSKY. OK.

Senator BIDEN. I understand that. I've been here 33 years. I got it. But, at the end of the day, someone pulls the trigger. And I want a person pulling the trigger who understands all the information they've got, who is fully conversant with it, who knows what in the hell they're talking about, who has had some experience. We had the same coordination at FEMA. Look, this is not a smack at the bureaucracy. I've been defending Federal bureaucracies for all my adult life here. We have incredible people. But you will forgive us all if we're mildly unimpressed by the coordinating capabilities demonstrated by the operations that have been in place of late. And so, there is a degree of skepticism about having somebody who knows what all of it means, not a very bright and talented former

judge, not a well-informed U.S. Senator, not a—you know, whomever. We need somebody who gets it all and says "Boomp, this is my recommendation, Mr. President. Bang." That's why I'm asking the question.

Yeah, anybody.

Dr. FAUCI. Senator, I appreciate your concern on that, but when you talk about pulling the trigger, you're talking about a health event. When do you decide that you are going to do something like switch the production of the seasonal flu to the production, all out, of a vaccine that would approach the——

Senator BIDEN. Right.

Dr. FAUCI [continuing]. The potentially pandemic flu. I would, submit to you that that—the expertise for those decisions are very well ensconced in the Department of Health and Human Services under the leadership of Secretary Leavitt. So, although Secretary Leavitt is not a physician or a public-health person, he understands very well the situation and literally, on a daily basis, consults with the health people, myself, and Dr. Gerberding and others, including the consultation that we get not infrequently from D.A. Henderson. So, I think the leadership——

Senator BIDEN. Let me get to a specific. Am I right about the option relating to Tamiflu and us being able to purchase the first major batch? Am I right about that? Is that technically correct? I'm not sure I'm right about it.

Yes, Doctor.

Dr. GERBERDING. Sir, right now, in the strategic national stockpile, we have 4.3 million treatment courses of Tamiflu. That's up by 2 million from a month ago.

Senator BIDEN. Right.

Dr. GERBERDING. We cannot order additional Tamiflu for the stockpile until we have an appropriation. So, the appropriation that's been proposed to augment the stockpile to get to the 81 million treatment courses is the step that needs to be taken.

Senator BIDEN. We can do that in a heartbeat. You tell us. Who says, "Do it. Pull the trigger. Congress, we need the money now"? I promise you, if someone we trust says, "We need it now," this will happen in a heartbeat.

Dr. GERBERDING. Well, we're here to tell you that we need it now. That's what the President's——

Senator BIDEN. So, you——

Dr. GERBERDING [continuing]. Proposal does. [Laughter.]

Senator BIDEN. All right. So, you're saying that's what we should do? We should ramp up to $80 million now. Is that—now are you speaking for the administration?

Dr. GERBERDING. That was what the President's budget proposal contained.

Dr. FAUCI. The President's budget has $4.7 billion for vaccine, $1.4 billion for antiviral, and a——

Senator BIDEN. And that will take care of what we're talking about. That's encompassed. So, you need that now.

Dr. FAUCI. Yes.

Dr. GERBERDING. We need that now.

Senator BIDEN. Good. That's all I have.

The CHAIRMAN. Very well.

[The prepared statement of Senator Biden follows:]

PREPARED STATEMENT OF HON. JOSEPH R. BIDEN, JR., U.S. SENATOR FROM DELAWARE

Mr. Chairman, today's hearing deals with a terrible threat that is, to a degree, inevitable. And you are to be praised, Mr. Chairman, for holding this hearing and forcing all of us to focus on the very real and large challenges that we face.

Someday, Mr. Chairman, a pandemic will wreak worldwide havoc. It may well be an outgrowth of the avian influenza that is currently moving into Europe from Asia; or it may be something else. But, clearly—

- It will come;
- We may not be prepared for it;
- Many other countries will be desperately unprepared or unable to respond to such terrible events; and
- Their lack of preparedness will harm us, as well the rest of the world.

We are talking about a risk of social and economic disruption on a scale that our country has not endured since the Spanish flu epidemic of 1918–19, or perhaps since the Civil War.

Last week, the administration and the Department of Health and Human Services issued a Pandemic Influenza Strategy and Plan. I am pleased that they did so, and the plan is very sensible, as far as it goes.

I am also pleased that four high-ranking officials, who will implement the administration's plan, will present the plan and answer our questions. This is not a time for sitting quietly.

- It is a time to probe;
- It is a time to gain understanding, and
- It is a time to take action, before it's too late.

We do not know when avian flu will become readily transmitted between humans, or how deadly it will be when that occurs. But we know that we must prepare for the worst.

We begin this effort with confidence in our capabilities, but also with knowledge of the serious difficulties we face:

- We have no vaccine with assured effectiveness against avian flu, and we won't know what strain to combat until it shows up and is transmitted among humans.
- How quickly we learn of that event will depend upon disease surveillance and reporting capabilities of less developed countries that are hard put to keep track of outbreaks.
- It will take at least 6 months from that point to begin full-scale vaccine production.
- All our major vaccine producers are foreign owned.
- The production process is very complicated and it depends upon eggs that are also imported.
- The developers of new methods of vaccine production are still years away from gaining FDA approval.
- So that initial human-to-human outbreak will not be treated with vaccines. The country where it occurs will need medicines, instead, if we are to avoid the outbreak becoming a pandemic.
- One class of antiviral medicines is less than fully effective on H5N1, perhaps because the medicines were used on livestock in Asia.
- The effective antiviral medicine Tamiflu is made only by Roche, a Swiss firm.
- A U.S. production line for Tamiflu will begin operation shortly, but the United States has yet to put in its order and could soon lose its place in line.
- Roche has contributed 3 million courses of Tamiflu treatment to the WHO.
- But you need to begin taking Tamiflu within 48 hours of exhibiting symptoms.
- So we need excellent worldwide disease surveillance and reporting and we need a system to get the Tamiflu immediately to people near the initial outbreak.
- Those capabilities are vital to buying time for the production of a targeted vaccine to save the rest of the world.

I hope our witnesses will speak in some detail to what we are doing to create those capabilities.

I hope they will also address the question of funding, and whether we need to enact new foreign assistance legislation before we adjourn.

And I heartily commend to them the written statement submitted by Dr. Margaret Chan, Assistant Director General of the World Health Organization, who was

unable to be here because the WHO is hosting today a major avian flu conference in Geneva. Her statement is forthright and sobering.

I also have two questions of particular, personal interest.

The first relates to disease surveillance. I have urged, for over 3 years, that the United States help train and equip foreign countries to recognize disease outbreaks that might be the result of bioterrorism. If we are going to help countries detect avian flu—and we absolutely must do that—then why not also train those people to recognize other new or emerging diseases, including those that might be the result of bioterrorism?

My second concern relates to avian flu as a threat to commercial poultry production in the United States. That's a big thing in Delaware, as well as elsewhere.

I want to make sure that we defend the United States against the economic impact of avian flu. It's reaching Europe now and someday it will get here, even if that first wave affects only birds, and not people.

- What are we doing to monitor its spread among birds?
- What should American producers do to limit the risk to their flocks?
- Should live markets be shut down or more tightly controlled in the United States?
- Should U.S. birds be vaccinated? If so, when?
- What will all this cost?
- And how will we ensure that everybody is included—not just the big companies, but also the mom-and-pop operations?

That's a lot to ask, and I will ask more during the question period. But if ever there was an issue on which we needed to be educated, this is it. Many lives hang in the balance.

Thank you, Mr. Chairman.

The CHAIRMAN. Senator Chafee.

Senator CHAFEE. Thank you, Mr. Chairman. Welcome, distinguished panel.

The World Health Organization, is that the lead international body that's going to be overseeing all these efforts? And I guess I'll ask Secretary Dobriansky, How's our relationship with the Health—WHO? And are there still issues of—I remember back in SARS outbreak, the PRC did not want Taiwan even to have observer status. Are these some of the complications, as we look ahead, to the WHO being the lead international organization at this—on this challenge?

Ms. DOBRIANSKY. We are all working very closely with the WHO. The WHO is part of the international partnership on avian and pandemic influenza, as is the FAO and the OIE and other international organizations. They are not only working closely with us, meaning the State Department and USAID, but also with the Department of Health and Human Services, CDC, NIH, in addition to the FAO and the OIE, on animal health, working with USDA. We have a close relationship. They're part of the partnership.

Dr. Lee, in fact, has not only traveled with us. We all went to Southeast Asia together, along with Dr. Margaret Chan, to evaluate the needs on the ground, to take stock of what are the most pressing needs and priorities and how we, in turn, can fund it. As I also mentioned before, we're working very closely with the WHO and the World Bank on funding, and not only just on, you know, the issue of what we're putting in, but what others are putting in. So, I will say to you that, yes, we have a very close relationship. They're the ones who also have been looking at national preparedness plans. There's a lot of exchange and give and take on these issues technically, from a donor standpoint, and also one of the crucial needs, as mentioned in our partnership, is providing them with access, to be able to get epidemiological samples, to be able to also,

you know, be provided for support in the conduct of their activities abroad. And, toward that end, we have worked closely.

Last comment I'll make. You raised the issue of Taiwan and China. We have the APEC meeting, which is coming up next week, of which Taiwan, Hong Kong, China, other countries, APEC members, are present. We expect a number of concrete initiatives to come forth very relevant to surveillance needs, especially in preparedness needs.

Senator CHAFEE. In this——

Mr. NATSIOS. If I could just add one——

Senator CHAFEE. Yeah, if you could just answer the old issue of Taiwan. And I remember, during the SARS outbreak, as I said, the PRC was adamant about not even granting Taiwan observer—not even observe status at WHO, if my memory serves me right. Is that still going to be an issue?

Mr. NATSIOS. Well, there are going to be issues like that with any international organization. And that is why we need a bilateral approach and a multilateral approach. Because there are things the United Nations cannot do quickly and easily because of these kinds of complications, but we can do bilaterally. So, we need to do both.

I've been talking to my developed Minister colleagues and other Western donor governments about coordinating the things that we can do the best, and then supporting the United Nations to do things that they do best.

I might add that it can't just be a human health response. WHO has the lead on the human health part of it. But right now the biggest risk is actually in the animal population—is the poultry population. That's a responsibility of two other U.N. agencies. So, Secretary Annan has set up a task force in his Secretariat in New York and taken Dr. David Nabarro, seconded him from WHO, to head that task force. I've met with him. I told him if he needed more staff, more money, more technical assistance, he needed fast disbursement mechanisms, USAID has them, we will do whatever he needs. And he said he will be calling on us as he needs things. We will provide that kind of support.

So, it has to be multiagency, it can't be just one agency—not just in the U.S. Government, but internationally, as well—because the disease does not manifest itself simply as a human disease, as you know.

Senator CHAFEE. And back to the original question. If the WHO is this lead international organization, they're the top of the pyramid. There seems to be this critical gap in—between Taiwan, as I said, and the Secretary saying, at the APEC meetings, this will be discussed. How will it be resolved? If there's an outbreak in Taiwan and they're not even part of this lead organization, it——

Mr. NATSIOS. They've had——

Senator CHAFEE [continuing]. Seems like a critical gap——

Mr. NATSIOS [continuing]. An outbreak already a couple of years ago of something related to this, and they eradicated it very rapidly. Their Ministry of Health doesn't actually need much outside help. It's very competently run, very well staffed, and very well funded. It's a developed country, Taiwan; and so, it's good to have coordination with them, and we need to do that, and get samples

transferred and tested. But they don't need a lot of technical help from the outside.

Senator CHAFEE. It's always good to have the coordination through the lead organization, I would think, though.

Mr. NATSIOS. Yes.

Senator CHAFEE. Is it just done as a de facto member, everybody just recognizes the political issue and works around it?

Ms. DOBRIANSKY. You asked the question if their membership is still being blocked. Yes, that is the case. And that's why I think, as my colleague indicated, there are different ways of dealing with these challenges internationally. There are also a number of closed societies which are difficult in getting information about, and how we have to work through a variety of means, it might not be just one single means, through an international organization. That's why there is a partnership. We felt it was crucial to have a partnership, to bring not only countries together, but international organizations, and to try to work as effectively as we can when we know of cases.

Senator CHAFEE. Thank you very much.

Senator Biden was asking about the funding and the amount needed. We had an outbreak of bird flu in Rhode Island, believe it or not, and the farmer was asked to euthanize his chickens. And I was involved in trying to get him some reimbursement through the Animal and Plant Health Inspection Service from the Department of Agriculture, and it took the longest time to get the $80,000 he wanted to compensate him for his losses. And if we're having that problem in an economically robust and advanced country like the United States—and that's the key; if a farmer is going to know that he's going to get some compensation before he reports any kind of sickness in his flock; swiftness of the reporting, I think, is key here—if there's not that incentive they're going to know they're going to get some compensation, I think we're going to be in trouble. Does this money include compensation for farmers?

Mr. NATSIOS. There's no funding in this $250 million for that. That is something that countries themselves are going to do. But what we're doing, working with the Food and Agriculture Organization of the United Nations, in the four most at-risk countries, is testing some new incentive systems for the farmers to see which ones work, to make sure that they are transparent and rapid in their response.

I think there is a psychological element to this. The flu that you saw in Rhode Island was not H5N1.

Senator CHAFEE. Right.

Mr. NATSIOS. It did not have the kind of frightening prospect that this virus, has. And if you read the newspapers, which we do every day in Southeast Asia, this is on the front page of every newspaper in that region. It is frightening people. And people are paying attention to it now, not just in the Ministries, but at the grassroots level. People are very, very nervous about this. Every one of these human infections is on the front page of the newspapers. I think that will help us to convince farmers and people that they need to cooperate on this, or this could get out of control. And that is going to facilitate—without creating panic—facilitate the whole effort to move this incentive system along. We're testing

it, and I think by February we should have a system in place that actually does work from field tests in those four countries that are most at risk.

Senator CHAFEE. And is it in our personal interest here to have a fund that might help if some of these developing countries cannot afford to have compensation programs? Isn't it in our interest to have a fund that can address some of the——

Ms. DOBRIANSKY. If I may address that, at this——

Senator CHAFEE [continuing]. Funding shortfalls?

Ms. DOBRIANSKY [continuing]. At this meeting in Geneva, this has been the very topic of discussion with the World Bank, with developed countries. Countries—the developing countries have, in fact, literally made statements about how they see their particular needs. And they even have given rough figures as to what they see as what they are in need of, moneywise. That particular meeting has discussed this quite tangibly, that there is a need. There may very well be, in about, I'd say, approximately about a month time, a month and a half time, where there will be a meeting that will be held to actually bring countries together to make pledges. We are hoping to get these pledges beforehand.

When Senator Biden mentioned the issue of leveraging, the only reason I raise it is because we do want others to come forward and to contribute. There is an urgency, and there's a need to do this. And this has been the topic of the day at this meeting.

Senator CHAFEE. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you very much, Senator Chafee.

Senator Sarbanes.

Senator SARBANES. Thank you very much, Mr. Chairman. I want to join my colleagues in welcoming this distinguished panel.

I've been listening carefully to the questions and answers, and it's still not clear to me who the coordinator is in the executive branch of the U.S. Government on this issue. Now, I'm told, it's the White House. At least at one point, the response was the White House. I have difficulty getting my mind around the concept of "the White House," as an entity, coordinating. I want to know who the person is that is coordinating. Is there such a person.

Dr. GERBERDING. Yes, there is.

Senator SARBANES. Who is it?

Dr. GERBERDING. We have all, at this table, been at the White House with the President and the Vice President, Secretary Leavitt and the Cabinet Secretaries, time and time again, where the issue of pandemic preparedness and the national strategy for that preparedness has been discussed. The President, himself, is very much engaged in setting the national strategy here, and I believe he would probably own the strategy, but he was also very clear that Secretary Mike Leavitt had the accountability for developing the plan for the health components of it, and, should we have a pandemic where we needed to mobilize all of our national resources, from transportation, commerce, et cetera——

Senator SARBANES. You mean a pandemic in the United States.

Dr. GERBERDING. If a pandemic occurs anywhere, it's an issue of national health and security and economic concern domestically. So, if there is a global emergence of a pandemic strain, we, in the United States, will be responding as if there was a health emer-

gency on our shores, even if it hasn't arrived. And Homeland Security, in that context, will have the accountability for mobilizing all the other support resources necessary for the Secretary to execute the health plan.

Senator SARBANES. So, who's the person? The Secretary of Health and Human Services?

Dr. GERBERDING. Secretary Mike Leavitt, under the National Response Plan, is accountable for managing the health consequences——

Senator SARBANES. Now, is he accountable for dealing with this problem of compensation for the farmers in these four affected countries, where I understand there is no plan, at the moment, for compensation? And who's responsible for that——

Ms. DOBRIANSKY. It also——

Senator SARBANES [continuing]. In our structure?

Ms. DOBRIANSKY [continuing]. It also indicates that the Department of State—and USAID is part of the Department of State—is discharged with—or charged with international activities, so the specific matter that you just raised falls to the Department of State, USAID. We work——

Senator SARBANES. Are you——

Ms. DOBRIANSKY [continuing]. With the others.

Senator SARBANES [continuing]. Are you the responsible person in the Department of State on this issue?

Ms. DOBRIANSKY. I am the point person at the Secretary—Under Secretary level, and I work very closely with the Secretary of State and the Deputy Secretary of State. That is correct.

Senator SARBANES. But is it your charge, on a daily basis, to——

Ms. DOBRIANSKY. It is my charge——

Senator SARBANES [continuing]. Follow this issue.

Ms. DOBRIANSKY. It is my charge, on a daily basis, internationally, to work this issue in the Department of State.

Senator SARBANES. OK.

Ms. DOBRIANSKY. And I work——

Senator SARBANES. Now, Andrew is it——

Ms. DOBRIANSKY [continuing]. Very closely with Andrew.

Senator SARBANES. Is it held at your level at AID, or is it somebody at a lesser rank?

Mr. NATSIOS. I have appointed one of our senior epidemiologists, Dr. Dennis Carroll, to head the USAID Task Force on this, and I had in my testimony exactly what our plan is for the next 5 months, how we're going to program the $131 million we expect to get, what measures we're taking now, what we've already done, what we're planning to do, and what's going on right now.

I meet with them once a week, and I bring everybody from all over the agency in on the task force with Dr. Carroll, and we sit down and go over what's been accomplished in the preceding week. Dr. Kent Hill would be here himself, but he's in Geneva at the WHO meeting on this issue. He's the Assistant Administrator of the Global Health Bureau, equivalent to an Assistant Secretary. So, within USAID, it's very clear what we're doing. We have weekly meetings at the technical level, at Dr. Carroll's level, with Paula's staff and with CDC and HHS.

Senator SARBANES. Well, now, who in CDC is responsible?

Dr. GERBERDING. I am accountable.

Senator SARBANES. You're directly responsible?

Dr. GERBERDING. Yes, I am.

Senator SARBANES. Now, when these groups all meet, who coordinates that meeting? Who calls that meeting?

Dr. FAUCI. That's the Homeland Security Council at the White House, together with the National Security Council, Domestic Policy Council. But the Homeland Security Council is the lead coordinator at the level of the White House. So, as we've said, when you're talking about health issues, the issues that we're talking about—vaccines, therapies, et cetera—there's no question, Secretary Leavitt is in charge of that. When the situation involves multiple agencies that are coordinated under the White House, the Homeland Security Council, under Fran Townsend, is the person and organization that coordinates that.

Dr. GERBERDING. You know, if I could just add to this, because in the time that I've been the CDC Director, I've personally been involved in 25 public-health emergencies, and all of them have involved complicated coordination with a lot of other agencies, ranging from the DOD to the Department of State and everyone in between. And I think one of the lessons that we've learned is that there are two really critical components of this. One is strategy, and if you can get the agencies to have a clear understanding of what is the strategy—in this case, the strategy—if there's a threat anywhere, it's everywhere; we will contain, if possible; we will slow; if we can't, we'll get countermeasures developed—that's the national strategy. Executing that strategy has to be a distributed function to the agencies with the technical expertise and the capacity to do that. CDC has specific responsibilities. NIH has specific responsibilities. USAID has specific responsibilities. I think when you learn how to work in this complicated——

Senator SARBANES. Who is overseeing or riding herd on those specific responsibilities amongst the agencies?

Dr. GERBERDING. It depends on what level you're talking about. Operationally at CDC, I am. If you're talking about the——

Senator SARBANES. No, above you.

Dr. GERBERDING [continuing]. Overall health plan, Secretary Leavitt.

Senator SARBANES. I mean, I asked you who at the White House, and I'm told you met with the President and the Vice President.

Dr. GERBERDING. It's the President.

Senator SARBANES. But presumably they don't do it day to day, do they?

Dr. GERBERDING. The President has had multiple meetings with the high Cabinet officials, and he has specifically tasked Secretary Leavitt to specifically brief——

Senator SARBANES. So, you're telling me the President is the coordinator on this issue?

Dr. GERBERDING. I am telling you that the President is accountable for the strategy, and he has delegated the authority to brief Cabinet Secretaries one by one to charge them to prepare their cabinets. Dr. Fauci and I have both gone with Secretary Leavitt to every single Cabinet Secretary and sat down and walked through

the national strategy so that everyone understands what their contribution needs to be.

Ms. DOBRIANSKY. Senator, if I may just add something. Because I mentioned, earlier, the White House. There is a formal structure of the Homeland Security Council in conjunction with the—what's known as the Domestic Policy Council.

Senator SARBANES. And the National Security Council.

Ms. DOBRIANSKY. And the NSC, correct—which has brought together, in a coordinative way, all of the agencies. There is high-level engagement on this at each of the agencies. You asked at the State Department—I work very closely with both the Secretary of State on this issue and the Deputy Secretary of State on the—on this issue, as well as those that have technical expertise below.

Senator SARBANES. The four of you are here today. Senator Lugar, in his wisdom, has brought you together. When was the last time the four of you were together to meet on this issue?

Ms. DOBRIANSKY. Just last week. We've traveled to Southeast Asia together, we have sent missions to conduct assessments——

Senator SARBANES. And who convened the meeting at which the four of you were together? I'm just trying very hard to find out where the point person is here——

Ms. DOBRIANSKY. We have had——

Senator SARBANES [continuing]. And I'm still struggling and trying to do the——

Ms. DOBRIANSKY [continuing]. Meetings with the President—in fact, directly—in which we have discussed what each of us are doing and our accountability in different areas. The last meeting——

Senator SARBANES. The President's not going to ride herd on this day to day. The President's out traveling across the country most days, as best I can tell. He's not going to ride herd on this. Who rides herd on this, day to day?

Ms. DOBRIANSKY. It is the Domestic Policy Council and the Homeland Security Council—Fran Townsend——

Senator SARBANES. Well, who is that?

Ms. DOBRIANSKY [continuing]. And Claude Allen, who was the former Deputy Secretary of HHS, and the National Security Council, in Steve Hadley.

Senator SARBANES. Well, they need a council to coordinate the councils, from the sound of it. Let me ask you a strategy question.

This proposal of the President's for $7.1 billion for preparedness surveillance and containment programs, of which $250 million is for international spending—although Administrator Natsios pointed out that that's not the end of it, that's just the beginning—but, still, less than 4 percent of the money is going to international spending. The Washington Post had an editorial recently saying, "Both the plan and the funding proposal ignore the benefits to Americans of working with countries in Asia and possibly Africa, where the virus could break out first and be halted or slowed before it gets here."

What about that observation, in terms of how we address our resources in order to try to stop this virus at the earliest possible time?

Mr. NATSIOS. Senator, let me just answer that, because we're exclusively focused internationally, we have no domestic responsibilities, as you know. I have written, which I have not done on any other issue, to all of our mission directors all over the world and said, "This is now the number one priority for the agency, above all other issues." I read John Barry's book, "The Great Influenza," and I had our senior staff read it, and other books, and it was so frightening to me, the potential for this, that I said, "We must take the steps now."

We have done—we've just got in, now, reports from 102 of 110 countries that we've asked for comprehensive reviews of what status they have, in terms of knowing what they need to do, what plans are in place, whether they have stockpiles. We can show that to your staff, if you'd like to see it. So, 102 of the 110 countries we've surveyed. Who are the countries that are most at risk or that are the poorest countries that don't have the infrastructure to deal with this. In the field, in the developing world, USAID is the predominant by far, bilateral aid institution. We work with our other colleagues—I meet with them, I talk to them every day—all over the world, from other donor governments. And so, we have an operational plan in place. We're working with the Ministries of Health, the Ministries of Agriculture, the Ministries of Finance in these countries. Bob Zoellick has—and under the orders of the Secretary—informed the American Ambassadors abroad they are responsible—our mission directors report to the Ambassadors—and to take this as their priority, as well.

And so, in the field, the best defense we have—which is the best defense for the country—is in the developing world. It's not on our borders. I mean, that's the next line of defense. And the best line of defense that we have are USAID missions. Three-quarters of our staff are not in Washington, they're in the field. We have 5,200 Foreign Service nationals that work for us, we have 1,100 Foreign Service officers arrayed in these missions, who have now realized how dangerous this is to the countries they work in and to the United States and to the whole global economy. So, I've told them they are responsible for this. The Ambassadors have been told the same thing by Secretary Zoellick, on orders from Dr. Rice.

So, that is our best line of defense. Now, we're working bilaterally, but we're also working multilaterally, through the international institutions. As I said, I think before you came in, our first contributions were to the World Health Organization and to the Food and Agriculture Organization. They're the two first obligations we made from the money you generously gave us in the supplemental budget. Because we regard that as a critical element of this. And we will continue to support them in every way we can, work with them on a daily basis, second staff, use our contracting mechanisms, if that's useful to them. Because this has to be a world international effort. It can't be just one country doing it.

The CHAIRMAN. Thank you very much, Senator Sarbanes.

Senator Dodd.

Senator DODD. Thank you very much, Mr. Chairman. Mr. Chairman, thank you for holding this hearing today. I want to thank all of you for being here.

We've had the opportunity to have all of you here at one time or another over the years on various subject matters, and I watched the other day, I think, all of you, or maybe with the exception of Mr. Natsios, in front of the House committees dealing with these issues, along with Mike Leavitt, who was there. I found it an interesting hearing. It was very, very worthwhile.

I raise the first question for you as a sense of emergency. I raised the issue when Majority Leader Frist was here, at the outset of the hearing, about the sense of crisis—maybe that's not the right word, but there is a—there's a sense of emergency about this, I gather. Senator Frist certainly made that point. His intention is to have legislation before us before our departure here for Thanksgiving. And I gather, reading the testimony of all of you here, that there's a real sense that we're in a major issue. In fact, you, Mr. Natsios, have written to all of your offices globally that this is the number one issue. Dr. Fauci, your testimony, and, Dr. Gerberding, your testimony, as well, give us some sense of this. I'd like to get some sense of proportionality here about the sense of emergency here. I know you've talked about the epidemics of 1917–18, 1957, so forth. Tell us what we're looking at here, potentially. And to what extent is there a likelihood that, in fact, we're going to face a pandemic at one point or another in the relatively near future?

Dr. GERBERDING. No, we've worked really hard to get a precise answer to that question, and there just isn't one. We know pandemics happen. We know we're due for one. We look at this situation, and we see very worrisome components of the overall global status of this H5N1 virus. We know the fragility of our vaccine and our antiviral production system right now. So, we're vulnerable if one happens.

I would characterize it as probably low statistical probability but enormously high consequences, and that's really why we're in a situation right now where we feel compelled to take these large-scale urgent actions, because we've got only one more box to check on the list before we truly do have a pandemic.

We've looked at models. We've looked at the virus itself. We can say that this H5N1 virus has the characteristics of the 1918 virus. That was another worrisome observation in the last couple of weeks. All the signs are worrisome. And yet, you know, it hasn't happened yet, and it might not ever happen. I think one point that I would like to make in that context is that while there will be some who will say exaggerating a concern, crying wolf, overemphasizing this for the sake of a budget proposal, whatever, I don't think that's all an appropriate assessment. And, in fact, whatever we do with these investments, we're going to end up with fixing the vaccine supply problem. We will fix the antiviral supply problem. We will have international surveillance, and we'll have some peace of mind.

Senator DODD. Dr. Fauci, put some mean on this for me, will you?

Dr. FAUCI. If you look, just historically—and that's what we can go by—and look at the 20th century, there were three pandemics. That means that it's a virus to which we've never had any exposure to, and, therefore, we were quite vulnerable.

The spectrum of severity of that was enormous. The mother of all pandemics was 1918. Probably the worst public health catastrophe that our civilization has ever experienced. In 24 weeks or a few months, there were 40 to 50 million deaths worldwide. In the same century, in 1968, we had another pandemic, which, by pandemic standards, really wasn't particularly severe, although the potential was there that it could have been.

So, when you're talking about preparedness, and you're looking at the fact that, from a pure temporal standpoint, if you average about three per century, then we're temporally overdue. But that's sort of like saying you're going to have an earthquake. What does that mean? Put it into the context of what's going on in Southeast Asia now where there are very troublesome signs because you're having a virus that's actually jumping species from chicken to human in a very inefficient way. In the big picture of life, 125 cases and 64 deaths is not a lot, but it tells us that the potential exists for that to change a lot.

And, as I said in the last comment in my opening statement, which you didn't hear, but I'll repeat it for you, because I think it answers, directly, your question. You must assume the worst-case scenario, even though in pure statistical analysis, the way Dr. Gerberding said, it's unlikely that that would happen. If you don't assume that, then I think it borders on irresponsibility.

So, the way the plan has been fashioned is that even if nothing happens, we will have built up the vaccine production capacity, we will have had a greater number of drugs to use against this——

Senator DODD. Yeah.

Dr. FAUCI [continuing]. So that when we do face, in the future with these threats, we don't want to start from such a low baseline. We're at a very low baseline right now, because the influenza vaccine production capacity has been fragile for years and years and years. And only when you're now faced with a potential global catastrophe do you realize you have to fix it. So, if nothing else comes of all of this, and we just fix that capacity that we have, I think we will have done a very good thing for the public health.

Senator DODD. Well, let me just—because I notice that in today's CQ, quoting some of the House leadership, Republican leadership, one Member there compared this situation, I'm quoting, "There is a preparedness gap for the Martians attacking us," the suggestion being that we ought to have offsets here and take our time on this. Without getting into the details, that's the comment on specific Members. That attitude of comparing what we're talking about here to the Martians landing, what's your reaction to that?

Dr. FAUCI. Well, I was at that hearing. I was testifying at that hearing. With all due respect, I think that that—yeah, it was a great hearing, Senator——

[Laughter.]

Dr. FAUCI. I don't think that appropriately describes the situation right now.

Senator DODD. Would it be irresponsible for us to be dragging our feet here, in terms of the resources necessary, to respond to the very facts, situation, you've just described?

Dr. FAUCI. I believe so, Senator Dodd. I believe that we must treat this as an imminent worst-case scenario, even though, statis-

tically, it's unlikely that it would happen next month or a few months from now. We have to treat it like the worst-case scenario.

Senator DODD. But is there a likelihood, looking back over the charts and the graphs you put here, where you have 1917–1918 period, and then, of course, late 1950s and 1960s, and then you point out, in this period here, there have been smaller incidences of these H1 variations that haven't developed, at least into the pandemic situation. I presume that if one went back and looked at those periods between 1917–1918 and 1950s, there were also smaller incidences that did not develop into pandemics if we had the ability to detect them in those days. Is that true?

Dr. FAUCI. Yes, but we didn't have the situation we're in now—what's so different about now, November 2005, is that we have, going on in Southeast Asia, an extraordinarily pervasive virulent bird flu that is involving migratory birds, that is now continuing to infect——

Senator DODD. Yeah.

Dr. FAUCI [continuing]. Flocks in a highly virulent way. This is unprecedented, to have so much of that going on the same time. So, when you get back to what we were alluding to before——

Senator DODD. Yeah.

Dr. FAUCI [continuing]. About what the probability is, as you get more chickens infected and——

Senator DODD. Yeah.

Dr. FAUCI [continuing]. More people exposed to chickens, you have more of a chance of people getting infected. The more people that get infected, the greater chance the virus has to evolve into something much more formidable than it is.

Senator DODD. What I'm getting at here, in a sense, or driving—I'm going to get to it quickly—is, looking ahead into the 21st century at all, what we're seeing here, what's happened here, given globalization, given the expansion of markets and so forth—the comment someone made of 13, was it, million to 13 billion poultry in this relatively short period of time, for instance, are we looking at more of this kind of a problem emerging, in your view, in the 21st century than we've seen, because of all of these other factors?

Dr. FAUCI. Well, I think emerging and reemerging infectious diseases is something that we've been speaking about to this committee—I see Senator Biden shaking his head, because I've testified before you, Senator, several times about emerging and reemerging infections—they'll always be a threat. And the fact that we live in a global community——

Senator DODD. Right.

Dr. FAUCI [continuing]. Makes it even more problematic. And when you have something that could have the public health impact of an influenza which is very unique—one, in its ability to spread, and, two, in the fact that it makes people very sick; it's not a trivial disease—living in a global economy, you could have economic disruptions that you would never have imagined——

Senator DODD. Yeah.

Dr. FAUCI [continuing]. Because we live in a just-in-time society. I mean, you——

Senator DODD. I'd like you to comment——

Dr. FAUCI [continuing]. Cut off imports, we're in real trouble.

Senator DODD [continuing]. I'd like you to comment, then, on the capacity. I was—looked down the number of the—the companies here. You're talking about Roche, you're talking about—I may be mispronouncing these names—Sanofi or Chiron——

Dr. FAUCI. Sanofi Pasteur, right.

Senator DODD. Yeah. At least two of those companies are international companies, not——

Dr. FAUCI. Right.

Senator DODD [continuing]. Not located in the United States. What's the argument for talking about some sort of governmental capacity here? I mean, we're relying here—which does a very good job, by the way, generally speaking, on the private sector, the drug industry producing vaccines and antivirals—but what you've just described here is something far more sinister in many ways. And if we're going to be dependent upon a private sector industry here to produce the vaccines and the antivirals, that seems to me to sort of be dragging our feet a bit. Is there an argument here that you think is worthy of exploring to talk about a governmental capacity, where we could develop these vaccines far more rapidly than depending upon the vagaries of a private sector that may want to respond?

Dr. FAUCI. Yeah. With all due respect, Senator, I don't agree with that. I think we need to continue to rely on the extraordinary expertise and capabilities of industry. And that's one of the reasons why, in this plan, we talk about building the capacity and sharing some of those risks so that we can get companies to build their plants here in the United States and to have a stable market for influenza vaccines so that you link it to what we do on a seasonal basis so——

Senator DODD. Let me just ask one more question of all of you. Well, I want to know whether or not, first of all, just quickly on this, we're talking about companies overseas—compensation. As we know, over the years, we've talked about compensation programs, where we encourage people to take vaccines. We saw it with smallpox and first-responders, where there was a feeling that compensation wouldn't be there, and, therefore, there was a difficult problem we had, at least initially, in getting first-responders to take the vaccines. In any program we develop here in the coming days, should there be a comprehensive compensation program for people who will have adverse reactions to any vaccines we may develop, in your view?

Dr. FAUCI. I think that's something that certainly needs to be discussed.

Senator DODD. Well, are you in favor of it or——

Dr. FAUCI. Yeah, you know, I can't say that, because that's not my area of expertise——

Senator DODD. Well, Dr.——

Dr. FAUCI [continuing]. To look at compensation——

Senator DODD [continuing]. Gerberding, is——

Dr. FAUCI [continuing]. But I would——

Senator DODD [continuing]. That your expertise——

Dr. FAUCI [continuing]. Think it certainly needs to be discussed.

Senator DODD [continuing]. What is your view on that?

Dr. GERBERDING. I certainly feel that, from the standpoint of the smallpox vaccination program, that the absence of a compensation program that was acceptable to the people we were hoping to vaccinate was the major barrier. And I think we've learned some lessons from that. I'm not sure what the best solution is, as we look forward to the kind of circumstances we'd be operating in a pandemic, but I know Secretary Leavitt is committed to having those discussions and figuring out a solution.

Senator DODD. Yeah. And are we prepared to share, by the way, any of these vaccines that we develop for antivirals—if you have an pandemic explode in some Asian country, are we prepared, then, to share these products with these other people around the world?

Dr. GERBERDING. In fact, the plan includes a budget proposal to do a vaccine trial in Vietnam to make sure that the products we're developing here could be used in other populations, as well.

Senator DODD. Thank you.

Thank you, Mr. Chairman. I apologize.

Senator SARBANES. Can I just ask a clarifying question?

The CHAIRMAN. Senator Sarbanes.

Senator SARBANES. Secretary Dobriansky, am I to understand that the Secretary of State has sent out instructions or an alert to all Ambassadors comparable to what Administrator Natsios sent out to all AID mission directors? Is that correct?

Ms. DOBRIANSKY. What we have done is, we have sent out an ALDAC cable, which goes to all of our posts worldwide. And, in this case, not only addressing the broader issue, the policy ramifications, but alerting all of our posts through the Med Units and also Consular Affairs, as well as all of the Ambassadors. So, to answer your question, yes, we have.

The CHAIRMAN. Thank you.

Senator Obama.

Senator OBAMA. Thank you, Mr. Chairman.

Thanks to all of you for taking the time to be here. You know, I have heard many of you in previous settings, panels, and am struck by your seriousness and knowledgability about these issues.

I want to follow up on, I guess, a point that's already been made by Senator Biden and Senator Sarbanes. And let me just not beat around the bush. Why don't we just have one person in charge of these efforts? All of you are busy. All of you have other responsibilities. All of you are managing large operations. It's not as if USAID has nothing to do, other than prepare for avian flu. It's not as if the CDC is without any other responsibilities. As capable as you all are, it seems to me that identifying an individual to be responsible would make sense. And I have to tell you, you know, Dr. Gerberding, I am always impressed with your testimony, but the notion that the President of the United States is, on a day-to-day basis, carefully scrutinizing these issues, monitoring them, and is in the position to operationalize them and be the key decisionmaker on these issues just defies credulity. He's got a lot of things to do, too.

Dr. GERBERDING. But let me clarify, because I don't think that's what I said, or what I meant to imply.

Senator OBAMA. Well, but it was, sort of—the response that you gave to Senator Sarbanes was—I mean, he kept on pressing, "Who's in charge?" And your——

Dr. GERBERDING. Let me——

Senator OBAMA [continuing]. You kept on repeating, "The President's in charge."

Dr. GERBERDING. Let me reply to that. What I said was that there is strategy and there's operations. And, in terms of defining the Nation's strategy, which are the five or six bullets that I mentioned, that decision was reached with a great deal of input from experts across the U.S. Government and outside of the Government, and the President made a policy decision that this is the U.S. strategy. And he has met with us periodically, as that strategy was developed and——

Senator OBAMA. I——

Dr. GERBERDING [continuing]. Then to discharge the responsibility for executing it primarily to Secretary Mike Leavitt, and the coordination functions at the strategic level, as we've already discussed, with the—Homeland Security having the lead, Domestic Policy——

Senator OBAMA. But I——

Dr. GERBERDING [continuing]. And Security Council——

Senator OBAMA [continuing]. I'm sorry, that doesn't make sense to me. Now, I understand the President's the ultimate decision-maker, the same way that he makes the decision to go to war in Iraq. But then, you know, he's not looking over the maps on a daily basis, trying to make determinations, in terms of how to prosecute that war.

Dr. GERBERDING. The person——

Senator OBAMA. Now, Secretary—let me just finish, because I want to respond to what you said—I understand what you said with respect to Secretary Leavitt being responsible for the health issues involved. But the point I think that this panel is making is that there are multiple functions that have been described by this panel. There are functions related to health. Who's going to be responsible for deciding that a quarantine, in some circumstances, is warranted? OK, that's you. Who's in charge of calling for, and implementing, border closings or restricting flights? Is that you?

Dr. GERBERDING. Secretary Leavitt would make that——

Senator OBAMA. OK.

Dr. GERBERDING [continuing]. Recommendation.

Senator OBAMA. Who's in charge of managing, you know, economic shocks, such as supply-chain disruptions? Is that Secretary Leavitt, as well?

Dr. GERBERDING. If we are in a situation where those operational decisions need to be executed, we will be functioning under the National Response Plan, in which case Secretary Leavitt would have the responsibility for health, and the other people defined under that plan for those border decisions or the logistic decisions would have their respective Cabinet responsibilities.

Senator OBAMA. OK. So, you don't think that it makes any sense to have somebody whose full-time job is to think about how all these multiple functions are being carried out. You don't think that that is a sound management approach, but it makes more sense to

have everybody responsible for these various functions, with the President sorting through——

Dr. GERBERDING. I really——

Senator OBAMA [continuing]. These various issues.

Dr. GERBERDING. I have to object to that characterization, because that's really not what I said. I do think the President—and, to my amazed relief, as a person in public health who, for decades, has been trying to get people to pay attention to this—that our leaders are concerned and are engaged in and——

Senator OBAMA. I am not——

Dr. GERBERDING [continuing]. Are participating——

Senator OBAMA [continuing]. I'm not challenging——

Dr. GERBERDING [continuing]. In the policies——

Senator OBAMA [continuing]. Whether they are concerned or engaged. What I'm asking is that—you know, if we have some sense of who—what I'm asking is, Do you think that this structure that you described that, frankly, many of us on this panel still don't understand, after, what five sets of questions from Senators—do you think that that is the optimal approach? Or do you think it would make sense to have yourself or Dr. Fauci or others, somebody, who was saying, "You know what? I am keeping track of all this stuff. I'm calling these various council meetings together. I'm making sure that each agency is working in a clear sense. If the President has a question, he knows the person to call," that——

Dr. GERBERDING. I——

Senator OBAMA [continuing]. You don't think that would be——

Dr. GERBERDING [continuing]. I think what——

Senator OBAMA [continuing]. Preferable approach?

Dr. GERBERDING [continuing]. You're hearing from us is that we think we have that. We think that Fran Townsend is the point person who's coordinating for the——

Senator OBAMA. Fran Townsend is——

Dr. GERBERDING [continuing]. White House——

Senator OBAMA [continuing]. The person.

Dr. GERBERDING [continuing]. As the head of the Homeland Security Council. And so, the coordination and the strategic collaboration necessary to bring all these Cabinets together, that's the logical place for that——

Senator OBAMA. So, is——

Dr. GERBERDING [continuing]. To occur.

Senator OBAMA [continuing]. Is Fran Townsend reporting to Michael Leavitt?

Dr. GERBERDING. Fran Townsend reports to the President.

Senator OBAMA. OK. So, Fran Townsend is the person in charge?

Dr. GERBERDING. Fran Townsend is the person in charge of the coordination at the White House level for the administration in assuring that the Cabinets have clearly defined execution strategies so that we're all able to execute the administration's policy around pandemic preparedness.

When it comes to the technical content of that policy as it pertains to health, Mike Leavitt is accountable. And he's also accountable for assuring that the technical execution operational plans from the other Cabinets make sense and are integrated with the overall health policy.

Now, it is a very complicated situation. I don't think we've ever faced a health challenge as complicated as this one. The balance between getting the people who have the technical and operational capability to be coordinated across such a broad range of functions is a very difficult challenge.

We went to the Department of Defense, myself, from a CDC perspective, to understand how could this be done, what is the best way. And what we are learning from those who have far more operational execution capability than we do is that when you've got to manage a network as broad and as complicated as this one, coordination at the top is very, very important. These are coordinating mechanisms to try to bring the top leaders together to understand, "What is it that we need to do? Who's doing what? Now go out and get it done." And, in our case, Mike Leavitt has the accountability for going out and getting the vast majority of this done, which is the health piece. But if we had a pandemic, just as if we had any other national disaster, other people from other agencies would have to know and understand their specific contributions. Our Government has made the decision that the coordination of that should lie with the Department of Homeland Security, so that is the plan that we are operating under.

Senator OBAMA. OK. I have to say I'm now confused again. I'm—but I don't want to—I don't want another explanation of it. I thought Michael Leavitt was in charge. Now you're telling me the Department of Homeland Security is in charge.

Dr. GERBERDING. I think we would be happy to——

Senator OBAMA. And then there's this person, Fran——

Dr. FAUCI. Senator, can I just make——

Senator OBAMA. Please.

Dr. FAUCI. I hope I can help. I know this has been a—obviously, a back and forth, confusing issue. In reality, we're talking about something that's overwhelmingly a health issue.

Senator OBAMA. Right.

Dr. FAUCI. There are other things that will come in, like border closings and things like that, that will involve other agencies.

Senator OBAMA. OK.

Dr. FAUCI. But this is overwhelmingly a health issue.

Senator OBAMA. Understood.

Dr. FAUCI. In this regard, the President has delegated Secretary Leavitt to be in charge of the health issues. When there are other issues that might involve other agencies of the Federal Government, that is coordinated. A policy has been made, if this happens, this agency does that, and that agency does that. That coordination is under the Homeland Security Council in the White House under Fran Townsend. But the health issues about vaccines and isolating isolates from Vietnam and getting it to be a vaccine has little to do with Fran Townsend, it has everything to do with Secretary Leavitt.

Senator OBAMA. OK. I guess I would just say this, that if it takes this much time to describe what the structure is—I mean, you're a scientist, and, generally, you know, the—simplicity is not always the best solution, but it strikes me, just organizationally, my experience has been that a streamlined process in which somebody is in charge is particularly important precisely when you have major

complicated decisions with a lot of aspects to it that may be—where decisions may have to be made in the situation in which there is a breakdown and there's a significant crisis. And so, I am deeply concerned about this. I think this is a—this is not the optimal structure.

Mr. Chairman, I know that my time is up, but, since I'm the last guy, could I maybe ask one more question, just real quickly, please?

The CHAIRMAN. Yes.

Senator OBAMA. You know, Senator Lugar and myself, you know, appropriated $25 million in the emergency supplemental several months ago, and I'm glad to see that we're making some progress. I think the majority of that money is going to AID for some of the work that you've just discussed. Can you talk a little bit—and this is—you know, this may be a question that's more geared toward the scientists, although I'll be interested in figuring out how it's being coordinated internationally—can you describe to me, sort of, some of the concerns that may arise as a consequence of vaccination of poultry, as opposed to vaccination—developing, you know, individual vaccinations for humans? You know, there—I was getting reports that, for example, China was engaging in large-scale vaccinations, and those may end up eroding how effective they are. Whether antiviral distribution in the four countries that have been targeted as most significant concerns are part of the package and how helpful that is in stopping the spread, if there was human-to-human transmission. And then, I guess the—this was sort of a tricky—there were actually three questions here, but I snuck 'em into one—and then, finally, how are we dealing with countries that are far more secretive? I guess China would be included in this, but I'd also—you know, I think about a country like Myanmar, where we generally don't have good government-to-government relations—how responsive have they been, and how much concern have they shown toward this issue? So——

Dr. GERBERDING. I could take the vaccine question and defer to my colleagues for the other answers.

We actually have conflicting information about the vaccination programs in some of these countries and the efficacy of the vaccine. And when we were in Vietnam together, there was a vaccine clinic in progress, and what happened at the vaccine clinic was some—lots of chickens and some ducks were brought up in, and, while they were vaccinating them, a few of the ducks got out and ran away. There was no method to really identify which birds had been vaccinated and which hadn't. The sense was that this would be a very incomplete and ineffective method for truly protecting the poultry population. If it was done compulsively and compliantly with an effective vaccine, it might be a helpful solution, but the practical application of it has raised some questions about its utility. And the worrisome aspect about it is that if it actually disguises the illness in the chicken, but allows the virus to be present and grow and evolve, might actually be covering up the ongoing spread and evolution of the H5N1. So, we aren't in a position right now to make any recommendations about its use or nonuse, but it's something that we need more science and more research to evalu-

ate. So, I think it's one of the big question marks that we still have on our plate.

Dr. FAUCI. The use of antivirals in chickens is quite dangerous, and that's what we're really concerned about. And that has been done in China, years ago, of using Rimantadine and Amantadine, which, unfortunately, then led to the emergence of resistance of the virus to that. So, it's pretty clear cut when it comes to antivirals that that's something you've got to be very careful about.

Senator OBAMA. And this is something that the countries are aware of, that——

Dr. FAUCI. They are certainly aware of that now.

Ms. DOBRIANSKY. On the question about secrecy and how one deals with situations like Burma, North Korea. In the case of Burma, we have worked very closely with ASEAN countries. Burma is part of ASEAN. And it has been through many of the neighboring ASEAN partners that have engaged Burma. Also, our own mission on the ground is present there, working with as many as one can to get rapid information, and render information.

I want to mention, in the case of North Korea—I don't think you mentioned it, but looking at that case, there was actually a report this last April, an indication that they thought it—there was a report of H5N1. We worked with the FAO and the OIE. They have representatives in-country to try to discern that immediately. And it was working through them, in that particular case. So, there are various means in such situations where we try to get as rapid information and cooperate.

Senator OBAMA. Thank you.

Senator Chafee [presiding]: Senator Murkowski.

Senator MURKOWSKI. Thank you, Mr. Chairman.

And I apologize to the members of the panel that I was not here to hear your testimony earlier. There's many conflicting hearings going on this morning.

I had a very interesting briefing yesterday by a doctor that is affiliated with the Alaska Native Tribal Health Consortium, Dr. Kim Berner, who has been working on an initiative amongst the Alaska natives in conjunction with the University of Alaska in doing what we can do to help identify and track the flus, the influenzas, that are associated with the migratory waterfowl that come through Alaska. And I had—I turned this into an educational opportunity last night for my teenage sons, as we talked about the migratory patterns of the birds coming out of Asia and coming out of the European Continent and coming to gather in Alaska. A wonderful story, except if there is the possibility to transmit this very lethal strain of avian influenza.

It raised the question, in terms of what it is that we can do to track and monitor and to surveil what is going through the State of Alaska in some very, very remote areas. We don't have the population. We don't have the ability to really put the scientists out there that we need. But we have a lot of local people with a great deal of local knowledge that are ready and willing to help us in this effort.

But I raised the question to Dr. Berner about, How are we educating the Alaska natives about the dangers and the threats? Because they go out, and they hunt, and then they eat the duck and

the geese and everything else that they have hunted. What are we doing with the education effort? How can we use the educational effort that we're utilizing up in Alaska to—and spread this same effort into regions of Southeast Asia? And what more can we do from the perspective of using Alaska as the laboratory here to understand more about how the influenza will travel and how we can deal with it.

So, I throw that out to you. Doctor, it looks like you're poised to take it.

Dr. GERBERDING. Thank you.

We're actually very grateful to the University of Alaska for the work that they are doing in the bird surveillance and their outreach, because it's really part of the front line around detection. And I am a little bit nervous about bringing up integration with other agencies, but we do work with the Department of Agriculture and the Department of the Interior, because all of us have a different frame on issues related to human/animal health interface. The—I was pleased, because I've been concerned about this issue in Alaska, but also the issue with just hunters more generically in the United States, that when we begin to see new viruses emerge in avian species, those people who are having close contact with blood and with secretions, potentially, from these birds would be at the highest risk, just as they are in Asia. There is a great deal of useful practical information that's been created about the safe handling of birds. What do you do if you find a dead bird? What do you do if you're a hunter? All of these information resources are actually available on the Web site that you can get to from pandemicflu.gov.

But what I can't answer for you today is, What is the communications strategy for moving that nice Web-based information out to the remote areas of the people who need it the most? I can find out. CDC has a field station in Anchorage with the Arctic Investigations Program, and we've done a lot of this with other emerging infectious diseases, including hepatitis and so forth. So, I will specifically get back to you with what we are doing, or what else we could do, to be sure that that information is being moved forward. I'm sure the Health Department in Alaska is engaged, but this is a real important potential gap.

Senator MURKOWSKI. Well, it's something that, if we can do it effectively in remote areas of Alaska, like we're talking about, we ought to be able to translate that to other countries. You know, look at a country like Mongolia. I want to be able to know that we can share this information, and share this educational effort.

A second question, on a different note, in terms of the dollars that will be required, where do we put the priority? Is it on stockpiling a vaccine here in the United States that may or may not be effective against a mutated strain? Or do we put it in containment activities—for instance, over in Southeast Asia—to slow down the potential outbreak? If you have to prioritize one over the other, where do you go?

Dr. FAUCI. Yeah. Well, first of all, we have to say, Senator, that we do have a balanced program that includes public health, antivirals, and vaccine, but very, very clearly the bedrock and the foundation of the preparedness strategy is to develop the vaccine

production capacity to be able to scale up and have doses of the relevant vaccine available were we to have a pandemic, and to have it within a reasonable period of time.

So, everything you see in the plan hits one or the other of the components of preparedness. But, fundamentally—and the dollars speak to it—of the $6.7 billion that's in the Department of Health and Human Services, $4.7 billion of it is in the vaccine area, much of that to build up the vaccine capacity so that we can scale up when we need to. Getting an isolate, getting it to the point where you could put it in a vaccine is not terribly difficult. The big stumbling block what we're facing is our vaccine manufacturing capacity.

Senator MURKOWSKI. Let me ask one more question, if I may, Mr. Chairman. This was a question that I had asked yesterday, and wasn't able to get an answer to. But, as I understand, one of the ways that the avia flu is transmitted is through pigs. The ducks or the domestic—the domestic ducks, the chickens are in contact with the pigs, the pigs have an immune system similar to the humans, and then it can migrate or mutate, whatever, in a form that is deadly to humans. The question that I had asked was whether or not we're doing any testing on pigs to determine if they have been infected, and what the risk of spreading the influenza through the pigs is.

Dr. GERBERDING. We are very interested in pigs. There are two ways that flu typically evolves. One is through incremental changes in the virus, which we are seeing right now with the H5N1. The other way it emerges, typically, is that a bird virus infects a pig, a human virus infects a pig, they mix their genes up, and the new virus that emerges has got a new set of genes that makes it very transmissible in people. That hasn't happened yet, but that's another concern we have in Asia right now. So, the pigs are being checked.

In the Mekong Delta, we have not found evidence of pig infection, but in Indonesia, there has been very well-defined evidence of at least one barnyard full of pigs that had the virus in their tissues. Which could just mean they were in areas where the infected chickens were and they picked up transiently, but their bodies also had an immune response to the virus, which indicates true infection. So, in a reliable laboratory in Hong Kong, it was documented that, at least some pigs in Indonesia have been infected with the H5N1 strain. That's worrisome because, again, you can get that virus into the pigs, get the human seasonal viruses into the pig, it just creates another whole set of incubators for change and evolution and potentially in an ominous direction.

Senator MURKOWSKI. And then back to the educational effort here in this country, Are our farmers being advised that it's not wise to have your pigs and chickens in close proximity?

Dr. GERBERDING. Yeah, in the United States the animal husbandry practices are, as you know, light years away from what they are in Asia. And I—we visited a commercial chicken production facility in Thailand that was using Western standard of biocontainment. But here in the United States, not only do we use those biocontainment, but animals are actually screened periodically and checked for the presence of a number of viruses. So, our

food production is much safer here because of our animal husbandry practices, like you've said, but also because of the additional requirements that USDA has worked through State veterinary associations and so forth.

So, I would never say there's no threat. We've seen, as one of the Senators pointed out, that occasionally we do have small outbreaks of avian flu. Not this highly pathogenic form. But by going in—these are typically recognized very early, and, very early on, the appropriate biocontainment steps are taken and, effectively, simply quenched the problem. So, our opportunities here are obviously drastically different than they are in these other areas in the world.

Senator MURKOWSKI. We need to get out to the 4–H Clubs, too. Thank you, Mr. Chairman.

Senator CHAFEE. Thank you, Senator Murkowski.

And I'd like to thank the first panel for their expert testimony and generous contribution of their time and information. Have a good day.

Welcome, the second panel.

[Pause.]

Senator CHAFEE. I'd like to welcome James Newcomb, who is the managing director of research for the Bio-Economic Research Associates, in Cambridge, MA. And I think we can get started. And we also welcome Laurie Garrett, who's a senior fellow for global health for the Council on Foreign Relations in New York City.

So, we'll start with Mr. Newcomb. Welcome.

**STATEMENT OF JAMES NEWCOMB, MANAGING DIRECTOR OF RESEARCH, BIO ECONOMIC RESEARCH ASSOCIATES, CAMBRIDGE, MA**

Mr. NEWCOMB. Thank you, Senator Chafee, members of the committee.

I'm pleased to have the opportunity—is that better?

Senator CHAFEE. And, if I could, I might also suggest that we have our comments limited to 5 to 7 minutes.

Mr. NEWCOMB. All right, thank you.

Senator CHAFEE. Thank you.

Mr. NEWCOMB. I'm pleased to have the opportunity to address the committee this morning regarding the potential economic implications of an influenza pandemic. I'm especially grateful to the committee for calling attention to global economic and trade-related issues that are closely conjoined with questions of how governments and other public and private institutions can better prepare for, and respond to, the risk of pandemic. Economic, social, and environmental problems are part of the issues we face, and they must be a part of the solution.

At bio-era, my colleagues and I have been studying the economic implications of H5N1 for more than 2 years. We agree with most other economic analysts that the economic implications of an influenza pandemic would entail significant shocks to the global economy, with costs ranging upward of $500–$800 billion worldwide, depending on the severity of the disease. Perhaps more importantly, cascading disruptions of economic systems triggered by fear-based reactions of consumers, investors, and governments could im-

pair our ability to combat the disease itself to the extent that these disruptions affect our ability to deliver essential goods and services during a pandemic. Coordination preparation by governments, multilateral institutions, and private companies can significantly reduce the risk that such a pandemic of fear might spiral out of control.

Numerous efforts have been made to estimate the potential costs of a pandemic. For example, the World Bank has estimated that the costs of—to the global economy of a relatively mild pandemic could exceed $800 billion. The Department of Health and Human Services has estimated that direct and indirect health costs alone of a pandemic similar to the relatively mild 1968 pandemic could cost the United States $181 billion. Their analysis of a worst-case scenario reported costs of more than $450 billion in the United States. The Asian Development Bank has estimated costs in Asia, excluding Japan, could range to—from $100–$300 billion, assuming relatively mild pandemic circumstances.

All of these estimates must be considered, at best, to be scenarios based on critically sensitive assumptions. None are able to accurately predict the implications of unprecedented disruptions to trade that could ensue. SARS cost the global economy $30–$50 billion, even though it caused only around 8,000 infections worldwide. A pandemic could infect billions.

While estimates that the costs of a pandemic are highly speculative, measuring the cost of H5N1 in the affected economies in Asia and parts of Europe today are much more concrete. These costs have struck a heavy blow to poor rural farmers least able to respond in a growing number of countries. H5N1, in the months ahead, is likely to expand its range geographically, potentially affecting some of the world's poorest countries.

It is worth noting that our attention to H5N1 falls in the context of a broader trend toward rising economic costs of emerging infections in livestock worldwide. The emergency of foot-and-mouth disease among cattle in Brazil in recent months has the potential to further compound the challenges already facing the global meat industry and the developing world. Other costly disease events are likely to emerge at the intersection of human, livestock, and wildlife health.

So, how can we respond to the threat posed by H5N1 in ways that reduce the risk of disease emergence and improve the resilience of our economies? In terms of the economic implications, we learned several important lessons from the SARS experience.

First, the wave of economic reactions moves much faster than the disease itself. Even if we have a crash program that promises to reliably produce a vaccine within months, the economic consequences of emerging disease will be felt immediately around the world.

Second, public fears from SARS were amplified by concerns that governments were withholding information about the spread of the disease.

Third, the most open economies were the hardest hit.

Fourth, the secondary effects of the disease caused surprisingly significant and unanticipated disruptions to global supply chains.

Fifth, control measures asserted at national borders had little measurable impact on the spread of the disease, but they had significant economic consequences.

And, sixth, once SARS was contained, the economic rebound was swift.

In the face of the risk of H5N1 influenza pandemic, the SARS experience underscores the fact that the economic implications of emergence are extremely sensitive to the behaviors of governments, companies, and key actors well in advance of the spread of the disease itself. Should it occur, the emergence of H5N1 as a pandemic can be expected to trigger swift reactions in financial markets around the world, to heighten public fears, and to provoke immediate calls for government actions. How governments respond in this initial period of just days or weeks could have far-reaching implications economically.

What we can now do is to prepare at several levels.

First, public and private institutions should continue to work to reduce the risk of pandemic emergence at its source by lowering the incidence of H5N1 in birds and improving capabilities for responding quickly to disease outbreaks where they occur. This means, for example, better biosecurity in poultry operations worldwide. Some United States companies operate best-of-class livestock operations in a variety of countries, including Asia and other developing parts of the world. These practices significantly reduce the risks to humans, to wild birds, and to poultry from these diseases. Moreover, better disease surveillance and monitoring for humans, livestock, and wildlife, will entail better integration of human and animal disease activities, as is already beginning to occur. Efforts by the Wildlife Conservation Society to collect samples from wild birds in Mongolia earlier this year yielded H5N1 sequences that are now being used to develop human vaccines. Additional funding through both multilateral and bilateral channels is essential to support these types of efforts.

Second, private companies can strengthen supply-chain planning and operational capabilities to respond to alternative disease scenarios. A group of leading companies in food and agriculture, for example, has recently launched a collaborative initiative to coordinate and strengthen response capabilities for these risks. These types of efforts in the private sector can be further enhanced by greater clarity about potential Government policies, in particular with respect to border control and restrictive measures that would affect trade and transportation under various contingencies. The private sector can better prepare if it knows what it's preparing for with respect to government policies in this area.

Third, Government plans should anticipate and respond to fear-driven consumer behaviors such as hoarding. Ensuring adequate supplies of basic medical and hygienic products, and strengthening public-health capabilities would be important complements to stockpiling vaccines and antiviral drugs.

Finally, international coordination of border-control policies to avoid misunderstandings and to promote coordination would be essential to managing the economic disruption caused by the disease in its earliest stages.

To the extent that these policies are transparently based on expert scientific and medical advice from institutions such as the World Health Organization and the CDC, and that these policies are widely and jointly communicated to the public in advance, the foundation of public reassurance and international cooperation will be solidly established.

Thank you, Mr. Chairman. I look forward to your comments.

[The prepared statement of Mr. Newcomb follows:]

PREPARED STATEMENT OF JAMES NEWCOMB, MANAGING DIRECTOR FOR RESEARCH, BIO ECONOMIC RESEARCH ASSOCIATES, CAMBRIDGE, MA

Good morning, Mr. Chairman, distinguished members of the committee, invited guests. I am pleased to have the opportunity to address you today regarding the potential economic implications of an influenza pandemic. I am especially grateful to the committee for calling attention to the global economic and trade-related issues that are closely conjoined with questions of how governments and other public and private institutions can better prepare for and respond to the risk of pandemic.

At bio-era, my colleagues and I have been studying the economic impacts of H5N1 avian influenza for more than 2 years. We agree with most other economic analysts that the emergence of highly virulent, pandemic influenza would be accompanied by significant shocks to the global economy, with costs ranging upward of $500–$800 billion worldwide, depending on the severity of the disease. Table 1 provides a comparison of various institutions' estimates of the economic costs of a pandemic. The bottom line is that a pandemic could affect our highly integrated global economy in a way that has no real precedent in recent decades. While we know that human societies and economies are highly resilient in the long run, the economic disruption caused by a pandemic in the short run could exacerbate the problem of responding to the disease.

TABLE 1.—ESTIMATES OF HUMAN LOSS AND ECONOMIC DAMAGE FROM A PANDEMIC

| Source | Estimated economic damage from a pandemic | Comments |
|---|---|---|
| U.S. Centers for Disease Control (Meltzer, Cox, Fukuda; 1999). | • Cost to U.S. economy $71–$167 billion (1995 dollars); $88–$206 billion in current dollars. | Widely cited in the press and by other analysts; based on estimates of primary costs derived from case numbers, hospitalizations, and deaths, and the associated costs for each of these events. Assumes 89,000–207,000 deaths and 314,000–734,000 hospitalizations in the U.S. |
| U.S. Health and Human Services (Pandemic Influenza Strategic Plan; November 2005). | • $181 billion in direct and indirect health costs alone (not including disruptions in trade and other costs to business and industry) for a moderate pandemic with no interventions. | Earlier press reports indicated that HHS estimated costs of a ''worst case scenario'' (1.9 million deaths and 8.5 million hospitalizations) to be $450 billion for the U.S. economy. |
| Asian Development Bank (November 2005). | Asian Implications:<br>• Mild shock: $99 billion in lost consumption, $14 billion in death and incapacity; losses equal 2.6% of GDP.<br>• Severe shock: $297 billion in short-term losses or 6.8% of GDP. | Both cases assume a relatively mild pandemic, with an infection rate of 20% and a case fatality of 0.5%. In the more severe scenario, the psychological impact on demand and consumption is greater. |
| World Bank (Brahmbhatt; November 2005). | • Total costs to the world economy could reach $800 billion. | Assumes a case fatality rate of less than 0.1% in the U.S. |

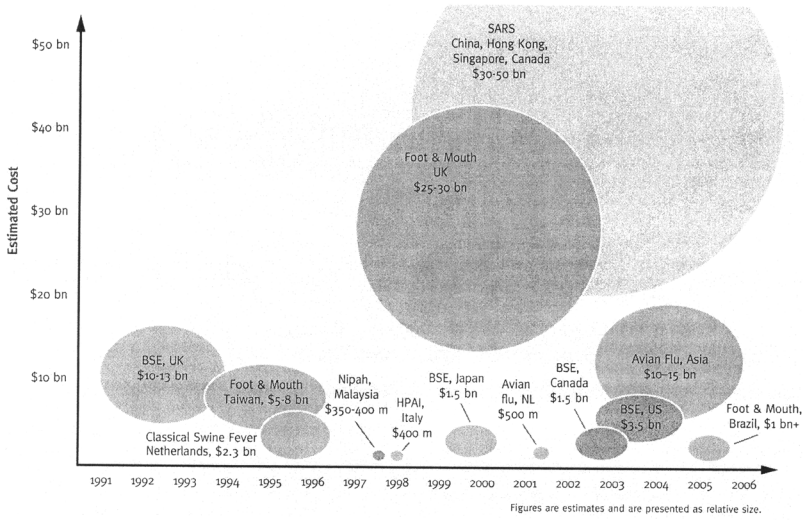
TABLE 1.—ESTIMATES OF HUMAN LOSS AND ECONOMIC DAMAGE FROM A PANDEMIC—Continued

| Source | Estimated economic damage from a pandemic | Comments |
|---|---|---|
| ING Bank (October 2005). | • ''Large swathes of economic activity could simply cease.''<br>• ''A realistic scenario might involve GDP declines of tens of percent.''<br>• ''. . . fear of infection leading to drastically altered behavior would result in the greatest economic damage.'' | Assessment by a leading European bank. |
| Conference Board of Canada (October 2005). | • ''A flu pandemic on a large scale would throw the world into a sudden and possibly dramatic global recession.'' | No quantitative estimates. |
| BMO Nesbitt Burns (August, October 2005). | • Cites CDC estimates in 1995 dollars.<br>• ''Depending on [a pandemic's] length and severity, its economic impact could be comparable, at least for a short time, to the Great Depression of the 1930s.'' | A report produced by BMO Nesbitt Burns; widely cited by the media. |

This risk falls in the context of a broader trend toward rising economic costs of emerging infectious diseases in animals and humans in recent years (see Figure 1). The ongoing spread of highly pathogenic avian influenza is exacting a significant economic toll on poultry producers in the countries already affected by the disease, often striking a heavy blow to poor rural farmers who are the least able to respond. But it is hardly the only disease to pose a significant threat to human health and economic prosperity.



FIGURE 1: Economic Impact of Selected Infectious Diseases: Recent Livestock Disease Outbreaks and SARS




From a policy perspective, our analysis of these risks underscores the message that "an ounce of prevention is worth a pound of cure." By investing in efforts to control the spread of highly pathogenic avian flu in wild birds and poultry, we may reduce the risk that a human pandemic will emerge in the first place. Moreover, the investments we make in disease surveillance, monitoring, and prevention at the intersection of animal and human health are multipurpose investments that may help to reduce the risks of emerging infectious diseases in general. Attacking the root causes from a long-term perspective will require an integrated cross-sectoral

approach to human and animal health. It will take time to build the scientific, institutional, and regulatory systems to support this effort. But the potential returns from doing so are large.

In the event that a human pandemic does emerge, despite our efforts to prevent it, the economic impacts would likely spread around the world in two waves. The first wave of economic impacts would result from fearful anticipatory reactions to the spread of the disease; these effects include shocks to financial markets, reductions in consumption and investment, and disruptions of trade and travel. As in the case of the SARS outbreak, these reactions could ripple through the economy very rapidly.

Reactive and uncoordinated national actions to close borders or embargo trade could be exactly the wrong prescription in the early days of pandemic emergence, These could inadvertently fuel fears at the point of emergence and compound the challenges of disease management on the ground. Shutting down transportation hubs, such as airports and ports, would disrupt key supply chains and create unpredictable secondary effects that would compound the effects of the initial outbreak. These feedbacks, coupled with growing fears about the disease itself, would be increasingly difficult to manage as the pandemic spreads globally.

The second wave of economic impacts would be experienced as a result of the spread of the disease itself, with potentially large impacts on the workforce and the flow of goods and services as well as the overburdened medical system. While these direct economic impacts of the disease could be quite significant, these costs are almost certainly manageable from a macroeconomic perspective, even in the case of a moderate pandemic, provided they are not overly compounded by fear-driven reactions.

The SARS outbreak illustrated the sensitivity of the global economy to such threats and, in particular, to the fear of disease. Although the number of people infected with the SARS virus was relatively small—with only about 8,000 infections globally and 774 deaths—we estimate that the cost to the global economy was $30–$50 billion dollars.

But SARS also marked a turning point for public and private institutions that must respond to human and animal diseases. SARS stimulated the response capability of political, social, and economic institutions globally by raising awareness of the economic potency of disease events. It is one reason for the high level of media attention and public policy discussion today about the pandemic risk posed by the H5N1 avian influenza virus. The subtle shift that began in 2003 is still incomplete, but governments and private companies have begun to take steps that could make it less likely that a worst-case scenario will actually come to pass.

In my testimony this morning, I will focus on three topics:

- Lessons learned from the SARS outbreak;
- Possible economic implications of a pandemic; and
- Actions that the government and private companies can take to prepare for the economic consequences of a pandemic.

## LESSONS LEARNED FROM SARS

It is worth taking a close look at the events that took place during the SARS outbreak, since they offer us valuable insights that could reduce the unintended economic consequences of government policies in the future. While the SARS outbreak was quickly contained, the economic events that it triggered illustrate several key points:

*The economic contagion of fear and uncertainty moved even faster than the disease itself.* Between March and May of 2003, when international media attention was intensely focused on the disease, tourist arrivals in Asia dropped 30–80 percent for various countries in the region, compared with previous growth rates of 10–15 percent (see Figure 2). After travel bans were put in place in some affected areas on the heels of World Health Organization (WHO) warnings, almost half the planned international flights to Southeast Asia were cancelled. Even Australia, which was largely unaffected by the disease, saw a 20-percent decline in international arrivals between January and May. The downturn in travel and trade quickly rippled through economies in the region, with the most pronounced effects on those economies that are highly dependent on these sectors. According to the World Bank, SARS caused an immediate economic loss of approximately 2 percent of East Asian regional GDP in the second quarter of 2003. Foreign direct investment in the Asian region slowed sharply and almost instantaneously in response to news of the disease's emergence, while retail sales in Hong Kong fell by 8.5 percent. Canada suffered economic losses of more than $1 billion, although the disease directly affected less than 500 people there (see Figure 3).

FIGURE 2: Decline in Tourist Arrivals During SARS

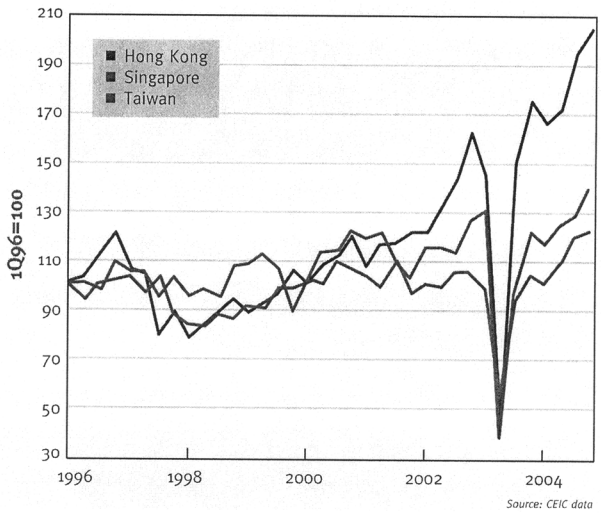
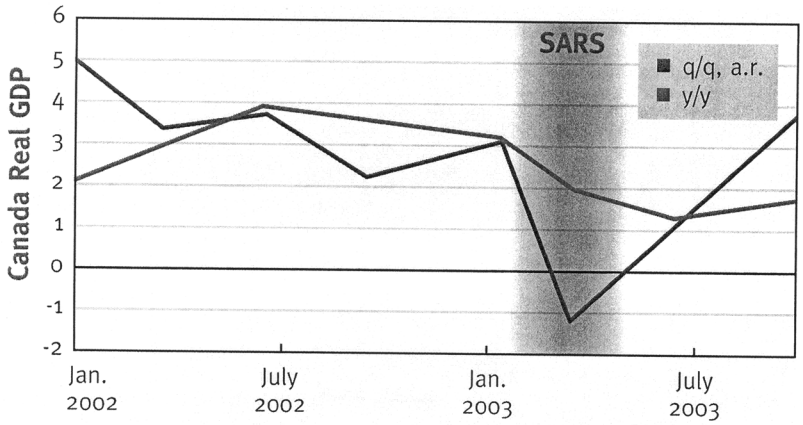



FIGURE 3: Economic Impact of SARS on Canada's Economy

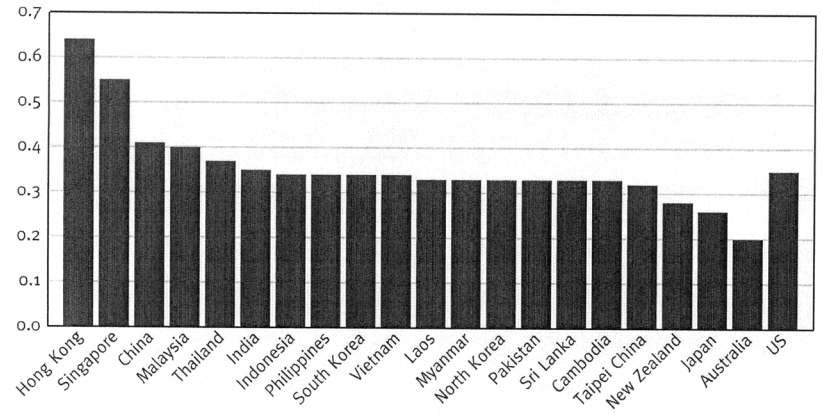



*The direct economic costs of the SARS—that is, the medical treatment costs and lost productivity associated with SARS cases—probably accounted for only about 1–2 percent of the $30–$50 billion of economic damage caused by the disease.* The costs of the SARS epidemic were caused largely by the indirect economic impacts: Disruptions of trade, travel and investment, interruption of product supply chains, and fear-based changes in behavior on the part of consumers, travelers, and businesses.

*Public fears in the early stages of the SARS epidemic were amplified by concerns that some governments were withholding information about the disease.* The SARS scare was made worse, and the economic reactions more severe, by the perception that some governments were less than completely forthcoming with news about disease outbreaks. We can say in retrospect that the public overreacted to the news of SARS in terms of assessing the risk of infection and death, but it was difficult for either the public or the scientific community to assess these risks in the early stages of the disease. Nonetheless, dissemination of credible scientific information as early as possible can significantly affect public responses.

*The most "open" economies were the hardest hit.* Hong Kong and Singapore were the worst affected Asian economies, largely because of their heavy dependence on international trade and travel. The number of tourist arrivals annually in these two economies is approximately twice the resident population. Overall, tourism accounts for a surprisingly high 11 percent of GDP in Southeast Asia. A 10-percent reduction in tourism in Vietnam would have an economic impact eight times greater than that caused by the recent 15 percent contraction in the poultry industry there. Based on a composite index of economic factors, taking into consideration the openness of the economy and healthcare expenditures, Hong Kong, Singapore, and China are the economies in Asia most exposed to the risk of a pandemic (see Figure 4).

FIGURE 4: Relative Economic Risk Index for Influenza Pandemic (selected countries)




*The secondary effects of the disease caused significant and unanticipated disruptions to global supply chains.* While the direct impact of SARS was miniscule in terms of worker absenteeism attributable to illness, the epidemic nonetheless caused significant disruptions to global supply chains in some key areas. In the high-tech sector, for example, the cancellation of commercial airline flights disrupted just-in-time delivery of some goods and components. In some key countries, approximately 50 percent of freight shipments by the semiconductor industry are carried on passenger flights. Trade and travel problems in some areas interrupted the flow of goods and services, with cascading effects in industries with tightly linked supply chains that depended heavily on suppliers in the affected areas.

*There is little evidence that control measures asserted at national borders had a significant impact on the spread of SARS.* Entry screening of travelers through health declarations or thermal scanning at international borders had little measurable effect on the detection of SARS, and exit screening appeared to be only marginally more effective.[1] On the other hand, basic measures taken in Hong Kong to increase "social distance" and improve community hygiene, including hand washing and wearing masks, during the SARS outbreak significantly reduced the incidence of respiratory viral infections.[2] From an economic perspective, control measures at borders, especially trade embargoes and travel restrictions that effectively close borders, are blunt instruments that come at high cost and can compound supply chain problems that reduce a nation's ability to corn-bat disease.

*Once SARS was contained, the economic rebound was swift.* The economic rebound in the aftermath of SARS was speedy and vigorous, partly because little lasting damage had been done to the affected economies. In this instance, the short duration of the crisis meant that most companies could withstand the financial impacts without facing insolvency or restructuring. While some service sector goods, such as those delivered by airlines, hotels, and restaurants are not recoverable, at least part of the losses incurred in other sectors, such as manufacturing, could be recovered.

[1] David M. Bell, "Public Health Interventions and SARS Spread, 2003," Emerging Infectious Diseases, vol. 11, No. 10, November 2004.

[2] Janice Y. C. Lo, et al., "Respiratory Infections During SARS Outbreak, Hong Kong, 2003," Emerging Infectious Diseases, vol. 11, No. 11, November 2005.

Overall, SARS illustrates the tremendous economic damage that can be incurred as a result of the secondary effects of disease emergence in the context of the highly interconnected global economy.

ECONOMIC IMPLICATIONS OF A PANDEMIC

The economic implications of an influenza pandemic are nearly impossible to predict, given the wide range of possible outcomes with respect to the evolution and spread of the disease, its virulence, and the availability of effective countermeasures such as antiviral drugs or vaccines. The often-cited estimate of the economic cost to the U.S. economy of a pandemic provided by the Centers for Disease Control and Prevention places these costs at $71–$166 billion in 1995 dollars, or approximately $88–$206 billion in current dollars. The estimate is based on estimates of the direct costs of illness and does not take into consideration the possible effects of global economic disruption, supply chain problems, and other secondary effects. More recent estimates of the possible costs of pandemic to the U.S. economy span a wide range, reaching as high as $450 billion in a worst case outcome in which more than 1.9 million people in the country would die and 8.5 million would be hospitalized.

We can better understand the potential economic consequences of a pandemic and the related uncertainties and vulnerabilities, by addressing them in relation to the possible stages of the disease's emergence and progression (see Table 2).

TABLE 2.—ECONOMIC STAGES OF A PANDEMIC

| Stage | Features | Economic shocks |
|---|---|---|
| Pandemic Alert ..... | Increasing global demand for and investment in countermeasures; countermeasure production capacity operating at near 100% utilization rates; declines in poultry demand in areas of active H5N1 infection. | Mild and largely localized. As the virus spreads, fear-based reactions cause mostly local disruptions. |
| Emergence ..... | Global media amplification of pandemic spread. Trade and travel likely to be seriously disrupted locally, with unpredictable secondary effects on global supply chains. International cooperation and coordination is critical for minimizing economic disruptions. | The first serious shocks are likely to fall most heavily on the national and regional economies nearest the emergence event. Key determinants are: How deadly is the disease? How easily does it transmit? How rapid and resolute is the response? How responsibly does the media behave? some fear-driven spillover into global financial markets should be expected. |
| Containment Efforts ..... | Countermeasures to prevent spread rushed into outbreak area; political finger-pointing in the event that stockpiles are not accessible to outbreak areas could threaten coordinated, cooperative response. | If containment efforts fail, the inadvertent compounding of fear becomes a major threat. Will there be widespread, immediate, and uncoordinated national bans on travel and trade? Or, will there be a highly coordinated and measured response from national governments? |
| Global Spread ..... | Despite containment efforts, disease enters the general population and begins global spread. The timing of spread to major urban centers is unpredictable, but for each wave of the disease, local epidemics mostly run their course in about 4–6 weeks. Supply strains on hospital beds and other countermeasures. | The depth of the shock to the global economy will depend on the severity (measured in terms of morbidity and mortality) and duration of the pandemic and the extent to which fear effects are minimized, effective countermeasures are available, and risk-reducing behavioral changes are widely supported and adopted. |
| Abatement & Recovery | Normal economic activity begins to resume as fear and disease incidences abate. Timing will depend on the damage done to economies and businesses, and whether concerns over a second wave of disease can be addressed. | Indications of a second wave of disease spreading, or fear of such a recurrence, could interrupt the recovery unless effective countermeasures are widely available. |

*Stage 1: Pandemic Alert*

The world is now on high alert for the further spread of avian influenza among wild birds and poultry, especially in parts of Asia, Europe, and Africa. Additional human cases of the disease raise the possibility that efficient human-to-human transmission will emerge and, at the same time, the news of these cases heightens public fears about the disease.

The economic costs of H5N1 outbreaks in poultry, and the related damage to economies in Asia alone already totals $10–$15 billion. Significant costs are now being incurred in parts of Russia and Europe, where outbreaks have required the destruction of birds in some areas, intensified monitoring and testing, and have led to the imposition of new biosecurity regulations for poultry producers. Consumer fears about bird flu have led to declines of 20–40 percent in poultry sales in France and Italy.

The H5N1 virus could continue to spread to new regions around the world for years to come, with no evidence of efficient human-to-human transmission. The economic consequences of this situation could be further compounded by the simultaneous emergence of other diseases with significant effects on global livestock production and trade. Notably, Brazil's recent confirmation that foot-and-mouth disease has been detected among cattle in Matto Grosso do Sul has led nearly 50 nations to impose total or partial bans on imports of Brazilian beef, and could result in losses of more than $1 billion. Such events could lead to a repeat of the situation in early 2003, when the U.N. Food and Agriculture Organization (FAO) reported that fully one-third of global meat trade was subject to embargoes due to disease outbreaks.

Media coverage and government communications at this stage have the potential to significantly influence reactions to a future announcement that a pandemic has begun, either by preparing the public for possible events or by heightening fear. The investment in medical countermeasures to combat a pandemic is rising rapidly, and probably exceeds by an order of magnitude spending on trying to prevent the further spread of the disease in birds and humans in the countries already affected. Likely commitments by governments around the world to stockpile antiviral drugs and vaccines to combat a pandemic already exceed $6 billion (see Table 3).

TABLE 3.—EXISTING AND PLANNED STOCKPILES OF VACCINES AND ANTIVIRAL DRUGS

| Country | Product | Comments |
|---|---|---|
| Australia | Tamiflu | 3.5 million 5-day treatment courses. |
| | Relenza | 3.95 million 5-day treatment courses. |
| Canada | Tamiflu | 35 million doses. |
| | H5N1 vaccine | ''Several thousand'' doses ordered for clinical testing. |
| China | H5N1 vaccine | Developing and testing H5N1 vaccine; planned stockpile levels unknown. |
| France | Tamiflu | 13 million 5-day treatment courses. |
| | H5N1 vaccine | 2 million doses. |
| Hong Kong | Tamiflu | 2.7 million doses stockpiled; additional purchases planned to reach 18 million doses in 2007. |
| | Relenza | 300,000 doses stockpiled; additional purchases planned to reach 2 million doses in 2007. |
| Italy | H5N1 vaccine | 2 million doses ordered. |
| Japan | Tamiflu | Plans to stockpile 20 million doses. |
| Netherlands | Tamiflu | 220,000 doses stockpiled; 5 million doses ordered. |
| New Zealand | Tamiflu | 835,000 doses ordered; to be delivered by year-end. |
| Singapore | Tamiflu | 350,000 courses planned. |
| South Korea | Tamiflu | 700,000 doses; 900,000 by January 2006. |
| Taiwan | Tamiflu | 230,000 doses; 700,000 additional planned. |
| Thailand | Tamiflu | 700,000 courses; 3 million planned by 2007. |
| United States | Tamiflu | Up to $3.1 billion proposed for additional supplies. |
| | H5N1 vaccine | Up to $3.3 billion proposed for additional supplies. |
| United Kingdom | Tamiflu | 14.6 million courses; to be delivered over the next 2 years. |

*Tamiflu stockpiles have been variously reported by governments and in the press in terms of numbers of ''doses'' (individual pills or the equivalent) and/or ''courses'' (a standard treatment course is two doses a day for five days—10 pills; taking the drug preventively might require two doses a day for several months). The data reported here reflect the best available public information based on press accounts and, in some cases, interviews with government officials. Substantial uncertainty remains about the timetable for delivery of the large amounts of Tamiflu ordered by many governments, as the amounts described here exceed Roche's annual production capacity for Tamiflu.

*Stage 2: Emergence*

An official announcement that H5N1 has acquired the capacity for efficient human-to-human transmission can be expected to trigger immediate reactions in fi-

nancial markets around the world, stimulate intense media coverage, and provoke strong public interest accompanied by strident calls for immediate government actions. The initial market reactions might include downward shocks in financial markets in the parts of the world nearest to the initial outbreak of the disease, severe contractions in the most vulnerable industries, such as travel and tourism, and a weakening of consumer and investor confidence worldwide. As one of the largest sectors of the global economy, the impact on international tourism alone, which accounted for $622 billion in revenues in 2004 and involved more than 763 million tourists worldwide, would have serious economic consequences, especially in Southeast Asia and other parts of the world that are heavily dependent on tourism.

There is a danger that fear of a rapidly spreading pandemic might trigger panic in the country or countries initially affected, as officials trying to impose quarantines confront citizens hoping to flee the affected areas. Some of the countries at greatest risk for emergence of an H5N1 pandemic have extremely limited resources to educate the public or to manage emergency responses in the event of a crisis. According to WHO, the total annual per capita healthcare expenditure in Vietnam is less than $25. Media coverage of an emerging crisis could heighten fears globally about the spread of the disease, spurring citizens in other areas to begin hoarding food and emergency supplies. The extent of economic disruption at this stage will be highly sensitive to the effectiveness of prepandemic planning and preparedness, especially the degree to which the public has come to trust government communications, leadership, and responsiveness at all levels.

*Stage 3: Containment Efforts*

Governments around the world would quickly begin to take measures in an effort to slow the spread of the disease. Emergency plans including, under certain circumstances, restrictions on trade and travel that entail the complete closure of all international airports and ports have been announced by some governments. Such severe control measures at national borders would have profound economic consequences. Ideally, decisions regarding the implementation of various control measures, including travel and trade restrictions imposed at national borders, should be based on the best available information about the epidemiological features of the disease. Asian nations gathering at the recent APEC conference in Brisbane discussed containment policies in an effort to strengthen and coordinate these policies on a regional basis. Regional and global coordination of such policies could significantly reduce the economic disruption caused by a pandemic.

Nonetheless, the serious economic effects of a pandemic in the countries initially affected by the disease could disrupt global supply chains. Pandemic emergence in Asia could have serious consequences for China and India, which together account for more than one-third of the world's population and represent the fastest growing economies in the world. Moreover, lean inventories and just-in-time delivery in the high-tech sector make this industry potentially vulnerable to disruption, especially in view of the high proportion of manufacturing that takes place in Asia.

*Stage 4: Global Spread*

As the disease spreads globally, economies in areas of the world not initially affected would begin to feel the direct economic impacts of the disease. These impacts would arrive through illness and absenteeism of workers, declines in consumption and spending, increased medical costs and hospitalizations, and pressures on the insurance industry.

In addition to the direct effects of worker illnesses, some workers would stay home to care for children during school closures, care for the sick, or to avoid the risk of infection. Analysis of scenarios assuming an infection rate of 40 percent suggest that only about 50–60 percent of workers would be able to come to work during the 3 or 4 weeks at the peak of the pandemic in a given area. But fear of infection could cause even greater absenteeism.

Fear of contracting influenza in the workplace and other constraints on workers' ability to come to work could contribute to absenteeism among healthcare workers at the same time that the healthcare system is under the greatest pressure. A survey of over 6,000 healthcare workers in the New York metropolitan area conducted by the Mailman School of Public Health at Columbia University indicated that only 48 percent of healthcare workers would be willing to come to work during a SARS outbreak. The combined effects of high worker absenteeism, curtailment of supplies and raw materials from other suppliers, and sharp changes in demand caused by the pandemic could hit many metropolitan areas simultaneously. The financial strain on companies whose cash flows are most severely affected by the pandemic will be greatest during this stage.

*Stage 5: Abatement and Recovery*

As the disease begins to abate, economic activity could rebound quickly, as was the case for SARS, or quite slowly, depending on the severity of the pandemic and the post-pandemic condition of major companies, the government, and the economy as a whole. The condition of financial markets, currencies, and interest rates will affect the speed of the recovery, but the underlying, real economy—the demand for goods and services—will be the fundamental driver of the recovery.

## WATCHING FOR SIGNPOSTS

The many unknowns inherent in the current situation make it difficult to reduce the level of uncertainty surrounding the pandemic risk posed by H5N1. There is little that can be done about this, and no fixed timetable by which the current questions about H5N1 pandemic risk will be answered. Still, governments and companies can prepare contingency plans based on scenario outcomes and, at the same time, make operational plans that take into consideration the broader range of possible emerging disease events.

Experience with the SARS outbreak indicates that the initial fears triggered by announcements of disease emergence can have sudden economic consequences. So far, events have paralleled those bio-era outlined in April 2005 under a scenario we named "Big Noise on Stairs . . . Nobody Coming Down." The noise has certainly increased, but there is still no clear evidence that a human pandemic will ensue. Indeed, although most attention by policymakers is justifiably focused on pandemic risks, a scenario that entails the global spread of H5N1 among birds over the next 2–3 years—without efficient human-to-human transmission—remains plausible.

Rather than claiming that the possibility of a deadly global pandemic hangs over the world by a single thread—like a Sword of Damocles—we find a complex situation in which many different outcomes are possible. The course of the disease and the economic reactions to its emergence are, in fact, being significantly shaped by the actions and reactions of governments, corporations, and other stakeholders. In light of this, it is only prudent to prepare now by thinking through possible scenarios, and considering their implications.

## HOW CAN WE PREPARE?

Based on what we know about the potential economic dimensions of a pandemic, what steps can the government and other public and private institutions take in advance to reduce the potential economic damage?

First, these institutions should continue to work to reduce the risk of pandemic emergence at its source, by lowering the incidence of highly pathogenic avian influenza in birds and improving capabilities for responding rapidly to disease outbreaks where they occur. These are the most cost-effective investments that can be made in advance of pandemic. Specific things that should be done include:

- Strengthening disease monitoring and surveillance for humans, livestock, and wildlife, and enhancing and integrating national, regional, and international reporting systems and networks.
- Improving biosecurity standards and practices for the poultry industry globally and incease access to low-cost rapid diagnostic tests.
- Enhancing early rapid response, including culling capabilities, deployable stockpiling of countermeasures, and targeted vaccination in countries facing the greatest risks.

Second, our analysis indicates that events and decisions at the interface between government and the private sector have the potential to significantly encourage private companies to review supply chain vulnerabilities and other economic and business risks that might be incurred under various pandemic emergence scenarios. Some leading corporations have already developed plans and strategies addressing business operations and continuity management, supply chain management, employee health and safety, and community involvement. But, many companies have not. In encouraging the development of these plans, the government should support public-private dialogue at the interface between the nation's pandemic preparedness plans and the role companies will play in the private sector.

Third, U.S. government response plans should anticipate and respond to the challenges of fear-driven herd behaviors, as has already been foreshadowed by the sudden surge in demand for antiviral drugs and other countermeasures. Efforts should be made to limit potentially damaging and unnecessary hoarding behavior, and the possibility of the sudden mass movement of populations. To date, government efforts to build strategic stockpiles have largely focused on antiviral drugs and vaccines of uncertain effectiveness against a pandemic virus. But medical and hygienic sup-

plies, such as masks, gloves, sanitary wipes, hand-cleaning supplies, syringes and hypodermic needles will certainly be in very high demand in the event of a pandemic, and governments might be wise to secure ample supplies of these materials in advance as well.

Finally, given the sensitivity of economic consequences to disruptions of trade and travel in the earliest stages of a pandemic, international coordination of border control policies to avoid misunderstanding and promote cooperation will be essential. To the extent that these policies are transparently based on expert scientific advice from WHO and CDC authorities, and widely and jointly communicated to the public beforehand, the foundation for public reassurance and international cooperation will be solidly established—along with our best chance to minimize the severity of global economic disruption.

Senator CHAFEE. Thank you, Mr. Newcomb.

Welcome, Ms. Garrett.

**STATEMENT OF LAURIE GARRETT, SENIOR FELLOW FOR GLOBAL HEALTH, COUNCIL ON FOREIGN RELATIONS, NEW YORK, NY**

Ms. GARRETT. Thank you, Senators and staff.

I have submitted prepared remarks. I am not going to read remarks. But what I would think would be more useful is to react a little bit to some of what you've already heard this morning. So, I will jump around very quickly over a number of different issues. I hope that will be useful.

First of all, many people have bandied the figure from the World Bank of $800 billion as the projected cost of a pandemic. That is not actually what the World Bank said in the report released yesterday. What they said was, it would be $800 billion for Asia, another $550 billion for the OECD nations, and an untold amount for all of Latin America, all of Africa and Eastern Europe, so that it would top a $1.35 trillion impact. That's rather considerable.

We also, yesterday, got from ASEAN, their estimate—or the Asia Development Bank—of something in the neighborhood, much lower, of $400 billion as the likely impact for Asia.

We've seen estimates from our own Institute of Medicine putting impact in the range, just for direct medical costs in the United States alone, at something like $166 billion.

Look, I think the bottom line here is that you should ignore all these numbers. You should ignore all numbers about how many people are likely to get sick, how many are likely to die. It's all garbage in, garbage out. They all depend on what the assumed attack rate is of the virus, its assumed virulence, a number of factors that we can't possibly know at this time.

So that I would say, to be honest, I believe the only empirically valid statement that can be made, and that should be used in your policy assumptions, is that a highly virulent, highly transmissible pandemic influenza that circulates the world repeatedly for more than a year will kill more people than all the weapons of mass destruction that have been of concern to this committee, save perhaps a thermonuclear exchange. And such a catastrophe will be astoundingly expensive to the global economy, not only in immediate GDP losses, but quite possibly in the form of a long-term shock to the entire globalized trade environment.

This morning, I felt that much of the discussion centered on two key concepts. One, containment and the possibility that containing a small-scale outbreak in a remote region is possible; and, second,

the assumption that with such containment we would have a short-lived phenomenon. In fact, I kept feeling that I was hearing a discussion that was about something that would be like a hurricane. It would hit, you know, we have this chain of command, the Department of Homeland Security would jump to the fore, and, boom, we'd take care of it. That is absolutely contrary to all known biology of this virus and its likely behavior.

In fact, the best way to think about the containment question, first of all, is that the Achilles heel of all containment strategies are recognition and notification. Local health providers must recognize that an unusually virulent form of flu is in circulation. Then they must notify higher authorities, and have means to do so. Do they have a telephone? Do they have any communications devices? Then they must send samples to a laboratory. How far away is said laboratory, and what is its level of competence? That laboratory must, over a period of time—often, a lengthy period of time—conduct necessary experiments to do confirmation that, indeed, a dreaded flu has emerged. Then they must gain the clearance of their government authorities—or, in some of the countries we're worried about, the political party—in order to officially notify the World Health Organization or neighbor states. By that time, well over 30 days has transpired. Indeed, here in the United States, we have communities that would be hard-pressed to go through that chain of events in public health, recognition, and notification in 30 days. And to imagine that poor countries, where per capita spending on health is less than $50 a year could do it any more rapidly and with any greater efficiency is very difficult to understand.

Also, it seemed as if all the discussion was predicated on the assumption that the initial emergence event, should it occur—this dreaded mutational event in which a human-to-human highly transmissible form of the H5N1—would occur in a rural area such as some part of the Mekong Delta or some remote part of Laos. Why? It could very well be Jakarta, tomorrow, with an international airport and a population of 9 million people. Or, for that matter, the flyway piece that is about to connect, and will connect, with contamination, I would be willing to wager, within the next 60 days, is sub-Saharan Africa. And we may very well begin to have reports of dead and dying birds carrying H5N1 in the Serengeti—in Ngorongoro Crater, all the way down to South Africa. What imaginary infrastructure do we have in place that would give anyone confidence that there would be recognition, analysis, and transmission of the alert within 30 days from such a region?

There are some things that we could be doing that I did not hear highlighted this morning, and I hoped would be. One of the big lessons of SARS is that it was a nosocomial disease, which means it was spread and acquired within hospital facilities. In fact, if you look around at the recent surge of emerging diseases in epidemics—I've been in nearly every one of them. And in these epidemics, whether it's been SARS or the Ebola epidemic I was in in 1995, or the pneumonic plague epidemic I was in in 1994, or—we could go down the list—repeatedly, the major magnifier of the epidemic is the hospital facilities themselves. And that is something that, if we could expand our $250 million thinking about foreign assistance to something realistic, we would be immediately

asking, How do you improve infection control in these hospital facilities? Where do we get sufficient supplies of latex gloves, of masks, of sterile syringes, of autoclaves, of generators to power the autoclaves, so that hospitals do not become foci of extraordinary infection?

I think Tamiflu is a rotten drug. I think there are plenty of reasons why Roche only built one factory. I don't think Roche was particularly excited about the drug, or thought they had a huge market for it, until relatively recently.

I've submitted a good deal of written information about the limitations of Tamiflu. But any public-health policy that is predicated on the assumption that either in the Third World emergent situation with a hope for localized containment, or here in the United States, Tamiflu will play a pivotal role in being the decisive factor that turns the tide of a pandemic, is a public-health policy that will fail.

I heard a great deal this morning about chain-of-command questions. And I wholeheartedly support the skepticism and concern that was expressed by many Members of the Senate. And I am also looking to know who is in charge.

And, perhaps the big problem is understanding the difference between a pandemic and a hurricane. It is totally appropriate that Secretary Leavitt would play the lead role if we were talking about an outbreak that would come and go in a matter of a week or two. But looking out over a year, or two years, with consistent waves, and these waves are mutated forms, different from the prior wave of flu—indeed, I would remind this group that in 1918, the first wave was not a particularly dangerous flu wave; it was the second wave that was the great killer—waves of mutating viruses coming through, surging over the continent, over the planet, one after another. And, in each case, there will be another impact on the economy, another impact on trade, another impact on the flow of essential goods and services, another impact on the United States military and its ability to conduct war on two fronts and protect national security. And these are issues that go far beyond the authority of Secretary Leavitt, or, indeed, any one Cabinet leader. And I would hope that, at the very least, the Senate would urgently request greater clarification on this chain-of-command issue, in light of a very long-term, protracted, and constantly changing event, and that part of that would recognize the tremendous value in coordinating with nongovernmental agencies, not just the corporate sector, as my colleague here quite well covered, but also the humanitarian sector. Many emerging diseases have first been spotted by MSF, Médecins Sans Frontières, or other on-the-ground organizations that are not associated with any government. We need to coordinate with them.

None of the Federal plans released to date mention the Red Cross, tell us what CARE will do, United Way will do. When we have every single hospital bed in America full, and now we're warehousing patients in school auditoriums and in gymnasiums, who is it that's giving food, water, and sustenance, and tender loving care to those people? It won't be the healthcare workers: It's some volunteer force that is not named in any of the Federal documents.

Let us just remind ourselves that we have many unprecedented events associated with H5N1. Dr. Fauci listed some of them. We could go into a long list of reasons why this is a virus like no other, this is not a normal event, and that it is truly aberrant. But the one that concerns me the most is, we did not, in 1918, have 42 million people living in the world with an immunosuppressive virus in their body called HIV. We do not know what will happen when H5N1 gets in the body of an HIV-positive person. There are two theories about what could happen. In one theoretical frame, biologically, all those HIV-positive people would have weakened immune systems and would be like—to use Secretary Leavitt's analogy of a forest fire, kindling, horribly stoking a mass conflagration that would devour the world.

In another scenario, it would be quite the opposite. Then it might be like SARS. Most people don't know that all the original SARS patients in Guangzhou were placed on the AIDS ward by the Chinese authorities. Most of their healthcare workers contracted SARS. But not a single HIV-positive person ever developed SARS. Why? Well, it appears that SARS was so foreign to the human body that what really killed individuals was their immune systems going crazy, saying, "Oh, my God, I don't know what this is. Bring out the thermonuclear-weapons equivalent of an immune response." And it was the collateral damage of that great battle between their immune systems and the virus that proved so deadly to so many people.

Well, we now know that was also true in 1918, with flu. And the few deeply analyzed clinical cases that have been looked at so far with H5N1 look the same way. So, another possibility is that HIV-positive people actually wouldn't mount a serious, obvious symptomatic response to pandemic flu, might actually be able to harbor the virus, in which case, they could be walking ambulatory petri dishes for mutating strains of H5N1 that would find a way to adapt to our species.

With that in mind, I would hope that, as we consider whether or not the $250 million figure is an adequate number to put on the foreign assistance budget for pandemic flu preparedness, we would be very seriously considering that, at this time, almost all energies are focused on Asia. If we want to look at a region of the world with a desperate public-health infrastructure, desperate medical infrastructure, by one key estimate put forward by Lincoln Chen and Associates, a dearth of missing 1 million healthcare workers, the eyes should look to Africa.

[The prepared statement of Ms. Garrett follows:]

PREPARED STATEMENT OF LAURIE GARRETT, SENIOR FELLOW FOR GLOBAL HEALTH, COUNCIL ON FOREIGN RELATIONS, NEW YORK, NY

Chairman Lugar, Senator Biden, and distinguished members of the U.S. Senate Committee on Foreign Relations. I am honored to appear before you this morning to discuss our Nation's response to the threat of pandemic influenza, with special attention to implications for foreign policy and national security.

Since late May of this year, when the Council on Foreign Relations publication Foreign Affairs published a special issue on the threat entitled "The Next Pandemic?" we have been pleased to see a marked increase in the level of concern and action regarding the flu threat, both within our government as well as at the highest levels of other governments, international agencies, the United Nations system, trade organizations, and multinational corporations. As we meet here today a major

3-day flu summit is winding up in Geneva, involving more than 600 representatives of 100 nations. Grim news has poured from that summit, including a World Bank estimate that a pandemic would cost the global economy some $1.35 trillion. The good news is that such a meeting, bringing together rich and poor nations and U.N. agencies to plan a pandemic response, has happened. The bad news: It was the first such gathering, coming only after the H5N1 virulent avian influenza virus has been in circulation for at least 9 years in Asia, has now spread to Europe, and threatens to surface in the next 30–60 days in sub-Saharan Africa.

In recent days we have seen pandemic plans released by the governments of the United Kingdom, Canada, Hong Kong—according to the World Health Organization some 60 percent of the world's nations have created some type of pandemic plan in recent weeks. Our own government has in the last 2 months: Issued the "Ten Core Principles" of global pandemic response, hammered out in September negotiations between Presidents George W. Bush and Hu Jintao and now signed onto by 88 nations and agencies; released the President's $7.1 billion pandemic budget request; the Department of Homeland Security released its 12-page plan; and the Department of Health and Human Services released a 300-plus-page influenza pandemic plan. We are told that a detailed, all-agencies Federal plan will soon be released, offering details that are sorely lacking in those schemes that have, to date, been published.

This is a very good start. But let's be clear—that is all we are seeing, even with pandemic flu threats making the covers of every major news weekly and newspaper in the Nation—a start.

From the foreign relations perspective of this committee I would like to offer a few key concerns, drawn from the scientific and public health communities.

- If prognostic forecasts of human death tolls or economic costs are going to be released by "official voices," let's be clear about the motivations behind those numbers, and the data assumptions used in their derivations.

Fear can motivate policy, and conversely low-ball estimates may prompt sighs of relief and eventual complacency. Some global and national agencies, concerned that high numbers might lead to public panic or to fret that response agencies are inadequate to the task, have chosen to derive all their numbers from comparatively mild flu data. For example, WHO and CDC have extrapolated their estimates that, at most, the world might experience 7.5 million deaths from virulent flu from the 1968 flu database. That influenza, however, killed roughly 0.6 percent of those humans it infected. That's a far cry from the 55 percent who have succumbed following infection with the H5N1 strain. On the other hand, extrapolating from that 55 percent mortality rate to a global scale would lead to a staggering, terrifying number that cannot possible motivate a reasonable policy response. Reckonings based on a somewhat dampened mortality rate have put the projected death toll as high as 360 million deaths globally, with 1.7 million of them being Americans. It is imperative, when looking either at global mortality data or economic costs, that policymakers demand to know the assumptions used to derive reckonings.

The two most important assumptions are (1) the virulence, or mortality rate, of the virus—How many infected people will die? And (2) the attack rate, or transmissibility of the virus—What percentage of an exposed human population will actually become infected with the given flu strain? There is no way to know the answers to those two points until a virulent, human-to-human transmissible flu emerges. Therefore, ladies and gentlemen, it is all guesswork. You should be skeptical of claims, scrutinize the assumptions made to derive any numbers, and avoid basing your policies on them. A quick example: Earlier this year the Institute of Medicine estimated that a pandemic flu would cost the United States somewhere between $151–$166 billion, just for medical care and direct costs to the health system. The larger costs to the U.S. economy due to lost productivity, sustained market failures, projected stock losses and international trade disruptions are considered virtually unknowable. Yet the World Bank this week released its estimates, based on a pandemic that lasts for a full year: $800 billion lost to the Asian economies, plus $550 billion for the United States and OECD nations, with no estimates for Africa or most of Latin America, for a ball park total of $1.35 trillion.

To be honest, I believe the only empirically valid statement that can be made—and that should be used in your policy assumptions—is that a highly virulent, highly transmissible pandemic influenza that circulates the world repeatedly for more than a year will kill more people than all the weapons of mass destruction that have been of concern to this committee save, perhaps, a thermonuclear exchange. And such a catastrophe will be astoundingly expensive to the global economy, not only in immediate GDP losses, but quite possibly in the form of a long-term shock to the entire globalized trade environment.

- Containment is not possible with currently available health infrastructures and technology, and funding priorities stated to date do not reflect the needs levels.

Two major computer modeling studies published this summer in Science and Nature demonstrate that only the most Pollyanna of assumptions can possibly result in containment of an initial outbreak of human-to-human transmissible influenza. WHO's flu leadership has concluded that the agency and its global partners—such as the CDC—would have only 30 days to throw a Tamiflu and quarantine ring around an outbreak site before the virus would manage to get into regional, and probably global, circulation. But it's not really even 30 days, as the Achilles heel of all containment strategies are recognition and notification. Local health providers must recognize that an unusually virulent form of flu is in circulation, notify high authorities, send samples to laboratories for confirmation, gain their government's clearance and then officially inform WHO. Let's be clear about this: There are places inside the United States of America that would be hard-pressed to accomplish all of these steps in 30 days; expecting such performance from countries with per capita health spending below $50/year is naive in the extreme.

What, after all, is the incentive to report? If you were a poor farmer in southern Indonesia and suddenly half your chicken flock was sick, why is it in your interests to let anybody know about it? Even a wealthy livestock company in a G–8 nation might consider it "wise" to try limiting damage on its own, never reporting an outbreak. Unless governments have the clout to force notification, and can offer compensation to farmers that lack flock/herd insurance, this will always be the Achilles heel of animal surveillance.

Human disease surveillance systems are only as good as the public health infrastructure. SARS started in November 2002. The world officially learned of it 5½ months later. Ebola broke out in Kikwit, Zaire, in January 1995. WHO was notified that samples of suspected Ebola-contaminated blood had been shipped to Belgium 3 months later. Even now human cases of H5N1 infection in Asia are being reported more than 80 days after they occur. Some of these lag-time issues are political (government coverup; appointment of incompetent officials to crucial health positions; corruption), and it is difficult for representatives of an outside government or agency to confront them. But the real problem in most cases is capacity.

Last May, at the annual World Health Assembly, the 192-member nations debated pandemic flu policies and changes in the International Health Regulations (IHR) for many days, with official arguments raging as late as 5 a.m. Happily, the IHR were changed to a form that offers greater national transparency about disease and collective response to emerging threats. And the flu policy that was ultimately hammered out forms a good international legal framework of response. But throughout the long hours of debate the vast majority of nations repeated the same mantra, over and over: We need resources. That same mantra was heard this week in Geneva at the flu summit.

Wealthy country governments, the G–8, and the World Bank have long neglected the public health infrastructure problem. The HIV/AIDS pandemic has sapped systems that in many cases were barely functional to begin with. If the Africa flyway becomes contaminated with H5N1 (and it will, soon) we will see what happens when nonexistent public health infrastructures, enormous HIV+ populations, and a vast range of bird species meet H5N1.

In the long run we should view H5N1 as yet another warning shot across the bow for the wealthy world, signaling the need to invest heavily in development of public health infrastructures in poor countries. But H5N1 may not give us time to create such infrastructures.

Short-term "solutions" are obvious: Bolster laboratory capacities, create standardized reporting mechanisms that are accessible to poor country residents, improve satellite and cell phone connections to allow rapid reporting of observations from all over the world. Syndromic surveillance is unlikely to be useful with flu, as the essential symptoms overlap with hundreds of other diseases, and the course of the illness in individuals is very rapid. Against a background of, for example, meningitis, malaria, HIV and TB, spotting high fevers due to flu could be impossible.

One immediate technological breakthrough that could make an enormous difference would be a rapid saliva-based dip stick assay specific for H5N1. It would look like litmus paper—lick it, it changes color, and we know you have H5N1. I am aware of several labs that are working on such a technology. The key will be finding manufacturers that are willing and able to manufacture hundreds of millions of these diagnostics at a price affordable to countries like Cambodia, Laos, Malawi, and Ecuador.

The President's proposal and the HHS plan released this week offer no specific allocations for development, manufacture, and global distribution of specific rapid diagnostics. That is a tragic oversight. The plans also spend only 4 percent of the

President's $7.1 billion request on improving the surveillance and response infrastructures in poor countries; that, too, is an oversight.

Last week the World Bank indicated it will put $500 million into the public health infrastructure effort, and the European Union this week promised to pony up $35 million. Combined, however, the $786 million promised by various wealthy-nation sources will not come close to meeting needs, especially if human-to-human transmissible H5N1 emerges in HIV-ravaged Africa.

- Stop spread of influenza inside hospitals and medical facilities worldwide.

SARS is an order of magnitude less contagious than influenza, ultimately proving to be primarily a nosocomial disease. Such measures as quarantine, travel advisories, and restrictions could succeed with SARS, but would have little, if any, efficacy in controlling spread of influenza. The most crucial lesson of SARS that would be applicable widely is that of hospital infection control. SARS spread primarily inside medical facilities, and comparisons of hospitals with very low levels of transmission (e.g., Queen Mary, Hong Kong or Bach Mai, Hanoi) to those with horribly high rates of in-hospital spread and death (e.g., Prince of Wales, HK) offers elegant and empirical proof of the efficacy of solid programs of infection control and patient isolation. Whether pandemic flu would prove open to mitigation through such means is doubtful, on a large scale, but individual lives and healthcare workers could well be saved by careful advance study and implementation of infection control measures. Further, epidemics have always spawned mass population migrations toward hospitals, particularly in poor areas, as desperate people search for solace, even if they are not themselves ill. The global paucity of such basics as soap, latex gloves, surgical masks, protective medical gowns, sterile syringes, autoclaves, and portable generators to power sterilizers guarantees that hospitals the world over will be cauldrons of infection.

- Managing to think, in a time of great uncertainty, on three planes at a time.

It is difficult for any leaders, whether in politics, industry, or nonprofit sectors, to create policies that address a given problem from three different event horizons all at the same time. But we have no choice with pandemic flu: It may emerge in a human-to-human transmissible form within 24 months, within 3–5 years, not for a full decade's time, or, if we are lucky, not at all. Investments and preparedness plans must consider the alarmingly slim list of options we have for action should H5N1 take on a rapid transmission form in the near future, but simultaneously we must invest in research and planning that may provide us with a far longer list of options for action in 2010, or 2015.

In the past, Federal plans (and local, State, and international ones) tended to rest on overly optimistic assumptions about vaccine production and rather blithely ignored the vast chasms that exist in emergency response coordination and communications. Since the state of urgency over H5N1 escalated radically this summer, the weaknesses in past plans have become obvious to all.

In the short term, then, planning must emphasize organizational issues, chains of command, international cooperation, melding of human health and veterinary efforts, supply problems for both antiflu drugs (e.g., Tamiflu and Relenza) and a long list of general medications, hospital equipment, and even food.

For a middle-term event horizon it is reasonable to expect that investments made today may result in vast improvements in diagnostics, vaccines, and perhaps even antivirals. Further, tabletop exercises, computer modeling, and a host of international efforts should provide planners with far more sophisticated understandings of the gaps and weaknesses in current systems of coordination and communication at all tiers, from the United Nations to city halls.

And looking forward a decade it is reasonable to assume that a sound investment today in R&D will result in development and commercial production of a safe, effective, universal flu vaccine that, with a single round of immunization, will protect individuals against all forms of influenza viruses to which they may be exposed in their lifetimes. Further, investments made today in ecological improvements in Asia—particularly China—could reasonably be expected to vastly decrease the probability of any given wild bird virus crossing to domestic animals and humans.

The trick is to comprehend how budgets, at all levels from the United Nations on down, can appropriately reflect all three planes, all three event horizons.

- Appreciate the limitations of current technologies, and understand that Tamiflu is not a terrific drug.

Several of the pandemic plans released by governments around the world, as well as the U.S. plans released to date, rested heavily on the use of the antiflu drug, Tamiflu. Made by Roche Pharmaceuticals in Switzerland, Tamiflu is not curative, but does slow down influenza viruses and offer patients some opportunity for a

swifter recovery. In addition, some studies indicate prophylactic use of Tamiflu reduces the chances that any given individual will become infected with circulating viruses. The later finding has prompted many governments to build pandemic control plans around various schemes of widespread Tamiflu use. In some iterations, the U.S. plan posited widespread prophylactic use of Tamiflu by first responders: Physicians, nurses, EMT personnel. It will be important to see which groups are targeted for Tamiflu use, and over what period of time.

While it is true that Tamiflu is the only drug we have, I hope that budgets will reflect recognition of the limitations of this drug and push for R&D aimed at replacing Tamiflu with far superior medications. Even in the short term I am anxious about Tamiflu.

The FDA has approved use in kids over 1 year of age for treatment, but there is no approved pediatric use for prophylaxis. (Yes, physicians can prescribe any drug for off-label purposes, but a national public health policy ought not rest on such flip use.) The public health model requires using Tamiflu on all humans in an exposed area to control spread. Worse, H5N1 seems to have been especially likely to target children so far, which means that any effective public health strategy for use of the compound would have to posit widespread distribution for prophylactic purposes to children of all ages. But there are no approved uses and no studies to guide decisions on the safety of giving Tamiflu (or Relenza) to kids who aren't already suffering flu.

Further, a manufacturer's warning was issued by Roche in 2003, based on rat studies: The extrapolation was that the babies and toddlers could have lethal effects from Tamiflu when taken correctly as treatment for flu. The manufacturer suggested (but offered no evidence) that the drug was crossing the blood/brain barrier in babies, and would cause lethal central nervous system effects. Roche, therefore, warned that no children under 1 year of age should ever take the drug.

Even in adults there are problems. Roche's own studies show that people who take Tamiflu suffer more nausea, vomiting, stomach pains, and headaches than people given placebos and it is statistically significant. For example, twice as many Tamiflu users vs. placebo users suffered nausea; twice as many had vomiting; 1.5 times as many had diarrhea. (This may be a universal problem with neuraminidase inhibitors, as Relenza also produces nausea, vomiting, diarrhea, and stomach pains in a sizeable subset of users.) Because of the way the data was presented it is not possible to discern whether these side effects are experienced in a small subset of users who have multiple problems with the drugs, or in a sizeable percentage of the drugs' users, each of whom experience one or two of the side effects. One prominent scientist who sat on the FDA's Tamiflu review panel recently told me, "You want to take Tamiflu? Prepare to be nauseated."

The side effects may not matter when an individual already has the flu, but in a prophylaxis context it may prove impossible to get mass compliance with these drugs over a sustained period. It is important to understand the compliance issue before making plans for large-scale, sustained-use of the drug(s).

All prophylaxis studies have been done in adults—none are pediatric, though some involve teenagers. They do show efficacy, with 3- to 12-fold reductions in flu cases compared to placebo recipients (the variation in efficacy covers a wide range, depending on the study, however). That's good news. But given the drug appears to produce some "flu-like symptoms," such as nausea, vomiting, and diarrhea, compliance with long-term self-medication could be a problem. And, again, we have no pediatric data.

For Relenza we have data that shows it may reduce the length of flu illness by a mean of 1 day in infected kids. But the efficacy in kids under 6 years of age was so low that the manufacturer recommends it only for kids over 6. Here, too, there is no long-term-use data, though the inhalant drug is not really under consideration for prophylactic use.

Large pooled studies (metaanalyses contrasting the results of many separate studies) conclude that Tamiflu cuts the length of a flu episode by about 1 day in adults, and 0.9 days in children. Relenza's efficacy appears to be about the same. As prophylaxis, Tamiflu and Relenza appear to reduce the odds of coming down with flu by about 70–90 percent in adults.

But, the best such study (Cooper, NJ, et al., BMJ 326:June 7 2003; obtained on line) has this crucial statement: "Lack of evidence exists for the use of neuraminidase inhibitors for preventing flu in children and in frail elderly people in residential care."

A final consideration regarding pediatric use: Metabolism. All studies indicate kids metabolize the drugs faster than adults, and this means direct mg/kg dosing comparatives are unwise. Though the drugs were eventually licensed for treatment of flu in kids, the scientific review panels argued about proper dosing, and were

troubled by the direct mg/kg choice. The kids simply clear the drugs from their systems faster, meaning there is less available drug over time. In the end, the panel compromised and decided that the drugs were safe enough to warrant a blunt instrument approach to pediatric dosing.

Data submitted to the FDA by Roche shows a few other considerations:

—There was no statistically significant difference between placebo and Tamiflu in terms of delaying otitis media (ear infections) in kids, the most common outcome of bad bouts of flu. Since OM was the FDA-agreed measure of the efficacy of the drug for preventing serious forms of influenza illness, this has got to raise concerns about whether the drug worked. (In contrast, adult studies show marked reductions in bacterial pneumonia among older Tamiflu users.)

—Pediatric use of Tamiflu was eight times more likely to result in emergence of drug resistant forms of the virus, compared to adult use. (This could be related to the rapid metabolism issue in kids.) Kids who developed resistant viruses stayed sicker longer on Tamiflu, thereby erasing the drug's benefit of, statistically, reducing the length of a bout of flu in kids by 0.9 days.

—This emergence of drug resistant mutants was quite troubling to the FDA panel. Keep in mind that a baseline survey of flu strains circulating worldwide in 2002–3 season found no examples of resistance in nature to these drugs. So the possibility that pediatric use of the drugs promotes emergence of drug resistant strains clearly worried the FDA panel. A crucial FDA review of the Roche data states:

> It also appeared that the mutant virus may be shed at high titers in some subjects before being cleared. Therefore, this reviewer has not been reassured that these viruses are harmless to the general population. The pediatric studies were not designed to determine if there was secondary spread of the mutant viruses to household or other contacts so there is no data regarding transmission of these viruses in vivo. Since these mutations involve the neuraminidase enzyme and to a lesser (but undefined) extent the hemagglutinin, there are also theoretical concerns that they could be antigenically distinct from wild type influenza. The review team believes that it will be of critical importance for the sponsor to further characterize these mutant viruses, the course of clinical disease associated with them, their potential for transmission in households and the nature of the antibody response to them compared to wild type influenza. (NDA 21–087, NDA 21–246, June 2000.)

In reviewing all data on Tamiflu provided by the manufacturer as of March 2001, the FDA's Dr. Heidi Jolson, Director of Antiviral Drug Products, concluded:

> . . . once an individual contracts infection and develops influenza symptoms, the role of an antiviral appears to be limited. As demonstrated in the studies submitted in support of the applications for oseltamivir and zanamivir, early antiviral treatment results in only a modest attenuation of the course of clinical illness (approximately 1-day shortening in the median duration of major symptoms with both products). Therefore, if promoted to the consumer, balanced promotion should contain information regarding the importance of vaccination, the reminder that not all viral illness is caused by influenza virus, and the likely modest treatment benefit a patient and healthcare provider elect to treat influenza with an antiviral medication.
>
> The clinical relevance of the modest treatment benefit is a highly subjective question.
>
> More definitive demonstration of clinical or public health relevance with the neuraminidase inhibitors will require additional data, such as studies to demonstrate prevention of influenza transmission or prophylaxis, reduction in influenza-associated complications or mortality, or the pharmacoeconomic gain due to illness shortening.

In FDA hearings on February 24, 1999, regarding the licensing of the first of the neuraminidase inhibitors to reach the agency, Relenza, independent scientists were convinced that Relenza's efficacy was barely discernible in patients who simultaneously took over-the-counter drugs, such as aspirin and "flu medicines." Much of the debate among the review panel concerned how, exactly, the "efficacy" of the drug could be measured. Panel members were clearly skeptical that Relenza had much benefit, at all, and some argued that the FDA and Glaxo had agreed on a set of clinical trial endpoints that ended up providing no real clarity. I have spoken to some members of that panel and they describe a great reluctance in the room to accept that the drug offered much, if any, benefit beyond what patients could obtain from the shelves of their local drug stores.

In the above metaanalyses that I referred to, this question of how many patients simultaneously took other flu medicines that they purchased at their neighborhood drug stores was not addressed. So we have no idea how profound a confounder over-the-counter drug-use may be. It's possible Tamiflu and Relenza still have powerful impacts, beyond the OTC drug impacts. (Certainly, the adult prophylactic use benefit can be considered a genuine one, to be credited to Tamiflu, based on the studies' designs.) It is also possible that factoring for OTC drug use in the test subjects (both placebo groups and Tamiflu/Relenza recipients) would have revealed more problematic benefits from these pharmaceuticals, particularly in treatment for flu infections.

- The Number One priority in the short term: Chain of command.

In any complex crisis the greatest failure is command, and its corollary, communication. In recent history only one American disaster witnessed a clear chain of command understanding, namely Rudolph Giuliani's clear leadership of 9/11/2001 responses. Conversely, lack of clear chain of command and communication was key to failures in New Orleans.

Influenza pandemics are not singular events, such as the strike of a hurricane, the slip of an earthquake fault, or the suicidal attack by a terrorist. Rather, pandemics unfold over time, recirculate in waves, continually mutate and persist for months, perhaps years. Planning must appreciate the difference between emergency response and long-term disastrous outcomes, including shortages of food, medical supplies, essential products, and business equipment. Chain of command for singular emergency events may differ from that which will be key to keeping societies functioning throughout a prolonged, horrible event.

Few cities, states, provinces, agencies, or nations have thought this through and developed clear understandings of which individuals and agencies are in charge of the various facets of a pandemic response. We look forward to seeing clear delineation of these issues in the forthcoming multiagency Federal response plan for the United States.

- Global and domestic responses must coordinate with nongovernmental and humanitarian organizations.

None of the plans presented to date at the international or national levels delineate roles for volunteers and nongovernmental groups, such as the Red Cross, Médecins Sans Frontièrs (MSF), CARE, Oxfam, the Red Crescent, or WorldVision. No matter what assumptions are made about the expected numbers of infected and dying people in a flu pandemic the world lacks sufficient nurses, physicians, government first responders, and employed officials to adequately respond. In some parts of the world the first warnings about new epidemics and disease emergences have come from humanitarian groups, particularly MSF. It is imperative that governments work closely, at all tiers, with private volunteer organizations to coordinate recognition, surveillance, and response efforts. Such groups must be considered partners, not mere adjuncts, in a global effort.

- The role of the military and national security response is complex and requires considerable forethought.

In the United States we face a unique problem, born from our engagement in Iraq. In order to avoid a divisive military draft, the Bush administration ordered the Army Reserves and National Guard into foreign combat. Among other things, this has blurred the lines between the various Armed Forces in America and left us bereft of National Guard under individual States control for response to domestic crises. The weakening of the National Guard was an apparent problem following Hurricane Katrina and will continue to be a special issue for the United States.

Historically, the lines between the National Guard and U.S. Army, Air Force, Navy, and Marines were far clearer, and it was entirely appropriate to posit a role for the National Guard in a pandemic response. That is no longer the case.

Internationally, the nature of State response to this issue will vary dramatically. Some countries routinely use their armed forces for police actions and probably will not hesitate to do the same in a pandemic. The opposite may also be true: When I was in the Ebola epidemic in Zaire in 1995 the army fled the region, leaving the people to fend for themselves for several weeks.

You might well ask this question: If a nation has an adult HIV prevalence of 35 percent, and the effect of HIV on H5N1 infection is to double the flu mortality rate, what will happen to the forces of State security? If a nation is fighting wars on two fronts involving more than 200,000 troops, and H5N1 turns out to mirror the 1918 flu in that it takes its highest toll among young adults, how can the armies continue to carry out their operations? If, in addition, their enemy practices suicide bombings, and, therefore, cares not whether it is infected with a deadly virus, how might the pandemic affect the course of the wars?

The Armed Forces of the United States, Canada, France, and dozens of other nations are among the best organized forces for rapid deployment, transport, and infrastructural support. There is more to modern militaries than shooting guns and dropping bombs. Just ask the people of Aceh: Who got there first, after the tsunami? I'll give you a hint—it was a navy with red, white, and blue flags flying. Why? Because making one's way thru newly reshaped reefs and shoals, with entire coastlines utterly remapped, to deliver supplies for hundreds of thousands of people required a modern satellite-guided naval armada.

While I strongly support the use of U.S. military personnel for logistics, supply and support activities, both domestically and overseas, in response to a flu pandemic, I do not believe the Army, Navy, Air Force, or Marines ought to be considered primary enforcers of domestic quarantines or public health actions.

• A final note . . .

There are at this moment unconfirmed reports of H5N1 die-offs among bird populations in Iran and Iraq. If true, these could foretell spread of the virus to the African flyway, which would include a spectacular range of species migrating from Ethiopia to South Africa. We do not know how H5N1 will behave in the body of an HIV+ human being. There are two theories, scientific rationales for which are a bit too complicated to detail here. Nevertheless, in one scenario the HIV-weakened immune systems of infected individuals create permissive environments for H5N1, allowing the flu virus to thrive, mutate, and adapt to human beings. In such a scenario, the HIV+ person is, in a sense, an ambulatory Petri dish, incubating, and possibly spreading, new forms of the virus.

In a second scenario, however, the HIV+ individual, unable to mount a protective immune response against H5N1 is easily infected and swiftly devastated. In that situation vast populations of HIV+ people could be obliterated by the pandemic flu. This is a horrible notion, and ominous given the extraordinary HIV infection rates in many African countries.

Regardless of which HIV/H5N1 scenario is correct, spotting any movement of the flu virus from African birds to the continent's peoples will be exceedingly difficult. As weak as the public health infrastructures and surveillance systems are in much of Asia, such capacities are far worse in sub-Saharan Africa. Further, spotting symptoms such as the emergence of clusters of people with high fevers and nausea might be impossible against a background of malaria, tuberculosis, and HIV.

It is imperative that the international cooperation components of the forthcoming multiagency U.S. pandemic plan will give close attention not only to improving surveillance and response capacities in Asia, but also in Africa.

Senator CHAFEE. Thank you very much for your expert testimony.

And since this is the Senate Foreign Relations Committee, I thought I might just stress our international effort here. And the Under Secretary testified earlier that the President has established the International Partnership on Avian and Pandemic Influenza as an umbrella organization to bring everybody together. Do you think that this initiative is the right direction to go as we look at this as an international issue and—Mr. Newcomb, particularly on economic issues that—to have this one international partnership on avian and pandemic influenza as the lead agency here?

Mr. NEWCOMB. I think it's certainly an important and valuable centerpiece for that strategy, although I'd underscore that there are really many different channels by which public and private efforts need to be coordinated.

I'd mention, in particular, concerns about—questions about potential border-control policies that might be put in place by governments around the world. It's an especially important area for companies that are trying to develop contingency plans today. So, the greater clarity that can be brought forward, whether that is in the Asian context, as has recently been discovered, explored through APEC, or through other collaborative international discussions, any of those will be effective, to the extent that they bring forward greater coordination and greater communication or clarity in ad-

vance of what those policies might look like. Because I think those are the—a building block for the kinds of supply-chain planning and preparation measures that the private sector has to undertake.

I'm only underscoring that point from the perspective that a healthy economy is an important component of our ability to respond to the disease. We know from our own work that many companies are moving very quickly to develop, in some cases, quite sophisticated plans for response. And it's difficult planning work to do, because of the nature of uncertainty of the situation. But there's certainly a tremendous amount of work being undertaken in the private sector, and the private sector, I would only—I would only underscore looks to government policies in this area as a guidepost or a starting point for its own planning efforts.

Senator CHAFEE. Thank you.

Ms. Garrett, you mentioned wave after wave of mutating viruses sweeping across the globe. Are we ready?

Ms. GARRETT. No, we are not. Not—we aren't remotely ready. And I don't even think that in most of the planning the word "ready" is associated with an appropriate level of imagination of the complexity of what we're up against. It's very exciting for me to see the increase in concern and attention that this issue has gotten in the last 3–4 months. Would that it had been building over the last several years. Perhaps the best way to put this in perspective is, in May every year, the World Health Assembly convenes. That is the legislative body, if you will, or governing body, of the World Health Organization. This year, there were two key issues on that agenda, one of which touched on one of your earlier questions related to Taiwan and China. The two key issues that gathering faced, were, one, Could we all agree to change the international health regulations that guide WHO so that they'd actually have the capacity to respond to a pandemic, to be in the middle of an epidemic, and to put pressure on countries to be transparent? And the second was, specifically, Could the global community agree on the sort of baseline set of principles for a flu pandemic? In both cases, the negotiations were heated, lengthy, and broke down many times over the Taiwan/China question, with Taiwan lobbying very hard for other countries that were allowed to be speaking in the room to say, "Yes, but what about countries not officially part of WHO's system or the U.N. system? What about regions not officially recognized?"

The other was the question, just generally, about pandemic flu, that, once the actual voting took place every country said, "Of course we support, in principle, having a pandemic flu plan, but the world should know we have not one penny that we can direct to it, and that unless the wealthy world is willing to redirect funds toward our efforts, this is just so much paper. It's paper we sign, but it's not paper we can implement."

Senator CHAFEE. How much do you know about the 1918 outbreak and—you said it was the second wave that was the most lethal—what caused it to subside, these waves of mutating viruses, back, you know——

Ms. GARRETT. Very interesting question. And, of course——

Senator CHAFEE [continuing]. A hundred years ago?

Ms. GARRETT [continuing]. There are a number of things, in hindsight, we can only speculate about, so, forgive me if that's probably what I'm doing.

We're not exactly sure where the first wave came from. Various places have been named, but probably it was from Asia. That's where flu comes from. It circulated the world and in its original form, was mild enough that, actually, in the heat of World War I, the British High Command officially set down that this was nothing to worry about, and it would not affect our war effort.

There are some strong indications that the pivotal event may have taken place in Kansas, where the U.S. Cavalry was bivouacked at Fort Riley. There, in Kansas, the virus would have had opportunity—and there's some evidence that it did—to pass both through horses and pigs. And it underwent a critical mutational event and became a far more lethal virus than the wave that had preceded it. There was a third wave that was considerably milder, and then it was over.

Why was it over? Well, probably two reasons. One, the virus itself attenuated, it dampened down, it became a less virulent virus. And, two, the surviving populations had a pretty high level of herd immunity so that it was as if there had been a mass immunization campaign, only it was carried out through contagion, not through syringes.

Senator CHAFEE. Well, very good.

I don't have any further questions. I'd like to thank you for your time and patience for sitting through the morning's testimony, the first panel's testimony.

And we wish you well, and, once again, thank you.

[Whereupon, at 12:20 p.m., the hearing was adjourned.]

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## ADDITIONAL STATEMENTS AND QUESTIONS AND ANSWERS SUBMITTED FOR THE RECORD

### PREPARED STATEMENT OF DR. MARGARET CHAN, ASSISTANT DIRECTOR GENERAL, COMMUNICABLE DISEASES, WORLD HEALTH ORGANIZATION

#### INTRODUCTION

The World Health Organization would like to thank Chairman Lugar and the committee for the invitation to provide a statement in the context of its timely hearing on "The Current Status of Avian Influenza and the Consequences of an Influenza Pandemic." Today, in Geneva, WHO is cohosting, with FAO, OIE, and the World Bank, a meeting of the cosponsoring organizations, country representatives, donor partners, and regional organizations involved in the influenza issue. This international meeting will enable an examination of integrated national plans to deal with the issue, focusing on affected countries and countries at risk. One expected outcome of this meeting is to identify key next steps based on an agreed strategy with political support and backing from the international community. I look forward to being in further contact with the committee about the outcomes of the meeting.

As requested, this statement will address reasons for the concern about the current H5N1 virus in Asia and elsewhere, WHO's work in assisting countries to prepare for a human influenza pandemic including the status of stockpiling of antiviral drugs and vaccines, WHO's key recommendations for the international community on human pandemic preparedness, and lessons learned from the SARS epidemic.

#### REASONS FOR CONCERN ABOUT THE H5N1 INFLUENZA VIRUS

—The virus causes extremely severe disease in humans.
—It has considerable pandemic potential.

—The source of human exposure is not easily removed.
—The virus is evolving in ominous ways.
—The world may be on the brink of another pandemic.

*Severe human disease*

Of all influenza viruses that circulate in birds, the highly pathogenic H5N1 virus currently becoming widespread in animals is of greatest present concern for human health for several reasons. First, though avian influenza viruses rarely cross the species barrier to infect humans, H5N1 has done so on three occasions since 1997. This virus has also caused, by far, the greatest number of human cases of very severe disease and the greatest number of deaths. Unlike normal seasonal influenza, where infection causes only mild respiratory symptoms in most people, the disease caused by H5N1 follows an unusually aggressive clinical course, with rapid deterioration and high fatality. Primary viral pneumonia (which does not respond to antibiotics) and multiorgan failure are common. For unknown reasons, most cases have occurred in previously healthy children and young adults.

*Pandemic potential*

The H5N1 virus has considerable potential to spark another influenza pandemic. At present, all conditions for the start of a pandemic have been met save one: The establishment of efficient and sustained human-to-human transmission. Each additional human case gives the virus an opportunity to combine with other viruses or adapt in ways that allow it to spread easily among humans. The risk of human cases persists as long as the virus continues to circulate in birds; the virus will not be eliminated from birds for some years to come.

*A tenacious virus in poultry*

The current outbreaks in poultry are historically unprecedented in their scale and geographical scope. Never before have so many birds been affected in such a large number of countries. Despite intense control efforts, the virus has become firmly entrenched in large parts of Asia. On numerous occasions, countries thought close to control have experienced setbacks as outbreaks recurred and then spread rapidly. Timeframes for controlling the disease are now being measured in years. Recent evidence that wild waterfowl are now carrying the virus in its highly pathogenic form is particularly worrisome, as all experts agree that elimination of the virus from wild birds is impossible.

*An ominous evolution*

Like all influenza viruses, H5N1 is notoriously unstable and unpredictable. In an historically unprecedented situation involving a constantly changing virus, unusual developments can be expected, and these have occurred. During the past 18 months, the virus has evolved in ways that increase the complexity of control and heighten concern about the pandemic threat.

Domestic ducks can now excrete lethal virus without showing signs of illness, thus acting as a "silent" reservoir of the virus, perpetuating transmission to other birds. This adds yet another layer of complexity to control efforts and removes the warning signal for humans to avoid risky contact with sick or affected animals. Second, the relationship between the virus and its natural animal reservoir, wild waterfowl, appears to have changed, possibly for the first time in centuries. The spring 2005 die-off of more than 6,000 migratory birds at a nature reserve in central China, caused by highly pathogenic H5N1 virus, was highly unusual and probably unprecedented. Scientists are increasingly certain that at least some wild waterfowl are now harbouring and excreting highly pathogenic H5N1 virus and carrying this virus with them along their migratory flyways. The recent spread of the virus to Russia and parts of Europe is thought to have occurred via this wild-bird vector; spread to additional areas is considered inevitable.

When compared with H5N1 viruses from 1997 and early 2004, viruses now circulating are more lethal to experimentally infected mammals and survive longer in the environment. Mammalian species previously considered resistant to infection have developed disease and can spread it to others within their species. Expansion of the mammalian host range of the virus is of concern as it gives this purely avian virus more opportunities to adapt to a form that spreads more easily among mammals, including humans.

Perhaps most significantly, recent research on both human and animal viruses circulating in Asia in 2005 has detected several mutations, some of which may affect transmissibility in humans. Research following recent reconstruction of the highly lethal 1918 pandemic virus determined that this virus was entirely avian and may have evolved along an evolutionary pathway similar to that being seen with the H5N1 virus.

*On the brink of a pandemic*

For all these reasons, WHO and international experts believe that the world is now closer to another influenza pandemic than at any time since 1968, when the last of the previous century's three pandemics began.

A pandemic is caused by a new influenza virus that has either never circulated in humans or has not done so for a number of years. Because humans will have little, if any, immunity to this "foreign" virus, susceptibility is virtually universal. This lack of immunity also results in more severe disease than seen during seasonal epidemics of normal influenza. The result is a worldwide epidemic (pandemic) that sweeps through susceptible populations, rapidly encircles the globe, and causes excess morbidity and mortality, usually far above that seen during seasonal epidemics. Whereas, seasonal influenza usually has its most severe effects on a limited number of risk groups (the very young and the elderly, persons with underlying chronic disease or compromised immune systems), pandemics can cause severe illness and deaths in all age groups, including the young and healthy. The newness of the virus also means that existing vaccines will not confer protection.

With the H5N1 virus now considered endemic in large areas, and spreading to new ones, the probability that a human pandemic will occur has increased. As no virus of the H5 subtype has ever circulated widely in human populations, human vulnerability to infection with this virus will be universal. On the positive side, experts anticipate that the virus will lose some of its virulence (the present case fatality rate is higher than 50 percent) when it improves its transmissibility; this is not, however, known with certainty. Historically, pandemics have encircled the globe in 6 to 9 months, even at times when international travel was mainly by ship. Today, experts believe that the first pandemic of the 21st century will reach all parts of the world within 3 months.

STATUS OF H5N1 OUTBREAKS IN SOUTHEAST ASIA

The recent history of avian influenza in Asia begins in 1996, when a highly pathogenic H5N1 virus was isolated from a farmed goose in Guangdong Province, China. The following year, Hong Kong experienced poultry outbreaks, caused by this virus, on farms and in wet markets. Coincident with these outbreaks, the first instances of human infections with the H5N1 virus were recorded in Hong Kong. Altogether, 18 cases, of which 6 were fatal, were identified in that outbreak. This event changed scientific thinking about how pandemic viruses might emerge, raising—for the first time—the possibility that an entirely avian virus, capable of causing severe human disease, could be the origin of the next pandemic if given enough opportunities to infect humans and adapt to them. The destruction of Hong Kong's entire poultry population of around 1.5 million birds within 3 days is thought by some experts to have averted an influenza pandemic at that time. Human cases were again detected in Hong Kong in February 2003 in members of a family with a recent travel history to Fujian Province, China.

After a period of quiescence, the virus resurfaced at some time during mid-2003, and quickly erupted into the largest outbreaks of this disease seen in history. Beginning in late December 2003, outbreaks of highly pathogenic H5N1 avian influenza in poultry were reported in nine Southeast Asian nations (listed in order of reporting): Republic of Korea, Vietnam, Japan, Thailand, Cambodia, Lao People's Democratic Republic, Indonesia, China, and Malaysia. Of these countries, three have controlled their outbreaks and are now considered disease-free: Japan, Republic of Korea, and Malaysia. Elsewhere, experience shows how firmly entrenched this virus has become and how difficult its complete elimination will be. Despite the death or destruction of around 150 million birds, at a cost to agriculture of an estimated US$10 billion, the virus is now considered endemic in Indonesia and Vietnam and in some parts of Cambodia, China, Thailand, and possibly also Lao PDR.

In late December 2003, human infections were identified in people exposed to infected poultry in Vietnam. Since then, at least 120 human cases have been laboratory confirmed in four Asian countries (Cambodia, Indonesia, Thailand, and Vietnam), and more than half of these people have died. At present, however, the species barrier is significant. The number of human cases is small in comparison with the huge number of birds affected, over large geographical areas, for 2 years, and under circumstances offering abundant opportunities for human exposure to occur.

Control of the disease in animals faces several serious challenges, and opportunities for further human infections to occur will persist. In some affected countries, up to 80 percent of poultry production takes place in small backyard flocks, where surveillance is weak, reporting is poor, and control measures are difficult to implement. These are the areas of greatest concern for human health. To date, the majority of human cases have been linked to exposure to infected poultry in rural and

periurban areas. In these areas, poultry usually roam freely, scavenging for food, often entering homes or sharing outdoor areas where children play. Populations traditionally sell or consume birds when signs of illness appear in a flock, and this practice has proved hard to change, especially when poultry are a principal source of income and food. Behaviours thought to carry a high risk of infection include the home slaughtering, butchering, defeathering, and preparation for consumption of diseased birds.

Most affected countries cannot adequately compensate farmers for culled poultry, thus discouraging the reporting of outbreaks in the rural areas where the vast majority of human cases have occurred. Veterinary services frequently fail to reach these areas. Detection of human cases is impeded by patchy surveillance. Diagnosis of human cases is impeded by weak laboratory support and the complexity and high costs of testing. Few affected countries have the staff and resources needed to thoroughly investigate human cases and, most importantly, to detect and investigate clusters of cases—an essential warning signal that the virus may be improving its transmissibility among humans.

Not all countries have undertaken control measures to reduce the presence of the virus in poultry. As a result, the virus is now pervasive in Indonesia and Vietnam and perhaps elsewhere. In Vietnam, detection of human cases has often been the first signal that outbreaks in poultry were occurring in a given area. In Cambodia, all human cases were detected only after patients crossed the border for medical care in Vietnam, and were managed by doctors well-acquainted with the clinical features of this disease. Because of this inadequacy of the surveillance system, the possibility that poultry outbreaks and sporadic human cases are occurring—undetected and unreported—elsewhere cannot be ruled out. Such lapses are of critical importance to the international community, as timely case reporting constitutes the backbone of the early warning system for detecting the emergence of a pandemic virus.

### THE ROLE OF WHO IN SOUTHEAST ASIA

WHO staff at country offices work closely with Ministries of Health, assist in the diagnostic confirmation and field investigation of cases, and provide the interface between these Ministries and the international community. Diagnostic confirmation of human cases is technically challenging; work with the virus can be safely performed only in laboratories with a high level of biosecurity, and such laboratories are rarely available in affected countries. For these reasons, WHO provides diagnostic support through its coordination of the global network of influenza laboratories specialized in work on H5 virus subtypes. In the United States, this network includes the U.S. Centers for Disease Control and Prevention (CDC) and a second laboratory, for animal influenza viruses, at St Jude Children's Research Hospital in Memphis. The U.S. Naval Medical Research Unit 2 (NAMRU2), located in Jakarta, Indonesia, has been another source of rapid diagnostic support, particularly for cases in Indonesia that have been occurring since mid-September 2005. All of these laboratories are equipped to handle H5N1 viruses at the highest level of biosecurity. WHO country staff arrange for patient samples to be shipped safely to these laboratories for diagnostic confirmation. These laboratories also conduct molecular studies of viruses to look for evolutionary changes that might signal improved transmissibility and to ensure that work on a pandemic vaccine remains on track.

While molecular studies of the virus are one important part of the early warning system, rapid detection and investigation of human cases are even more important, as the occurrence of clusters of cases, closely related in time and place, will probably be the first signal that the virus is spreading more easily among humans. At the request of governments, WHO regularly sends international teams of experts, drawn from institutions in its Global Outbreak Alert and Response Network (GOARN), to conduct on-site investigations when unusual disease events of potential international public health importance—such as H5N1 cases in humans—occur. Such teams also assist in the development of national surveillance and diagnostic capacity. Experts from the CDC are usually part of these teams. WHO also procures essential supplies to support laboratory work and the clinical management of cases. Video conferences and teleconferences are regularly held with international experts to gather consensus on the evolution of the threat and to assist WHO in its overall assessments of the situation.

### THE OUTBREAKS IN RUSSIA AND EUROPE

Beginning in late July 2005, highly pathogenic H5N1 was detected in wild and domestic birds in Siberia (Russia) and in adjacent parts of Kazakhstan. Almost simultaneously, Mongolia reported H5N1 in a large number of dead migratory birds. In Russia, poultry outbreaks have since spread westward toward Europe. In October

2005, Turkey and Romania confirmed H5N1 outbreaks in poultry, and Croatia detected the virus in dead migratory birds. Deaths of wild and domestic birds in several other areas are under investigation. All newly affected areas are located along the flight paths of migratory birds.

Throughout Europe, vigilance for the appearance of outbreaks in wild and domestic birds and for the occurrence of associated human cases is high. Outbreaks in animals have been detected and reported quickly, and extensive control measures have followed immediately. WHO epidemiologists and virologists have assisted in investigations, when requested. Diagnostic reagents have been sent to national laboratories, and WHO has provided training in H5N1 diagnostic techniques. Viruses have been shared internationally and are undergoing analysis at WHO reference laboratories. These laboratories have also helped to rule out, authoritatively, the many false rumours of cases. To date, no human cases have been associated with any of these newer animal outbreaks outside Asia.

Several high-level meetings of European Ministries of Health and Agriculture have been held to discuss the avian influenza threat and consider the best preventive and control measures. These meetings have led to the development or refinement, with WHO assistance, of pandemic response plans in the vast majority of European countries.

Europe has areas with dense poultry populations and has experienced outbreaks of highly pathogenic avian influenza in recent years, though caused by influenza viruses other than H5N1. While the further evolution of poultry outbreaks caused by H5N1 in Europe cannot be predicted, prompt detection of outbreaks and the rapid introduction of control measures will hopefully prevent the virus from establishing endemicity outside its present epicentre in Southeast Asia. Differences in farming systems between Western Europe and Asia, and the greater availability of resources in Europe, should give established control measures a greater chance of success. Many European countries do, however, have rural areas where poultry flocks are kept in close contact with households, and these areas could pose a heightened risk of human cases should outbreaks in poultry become established.

VACCINES AND ANTIVIRAL DRUGS

Vaccines and antiviral drugs are the most important medical interventions for reducing morbidity and mortality during a pandemic. Vaccines are the most important intervention for conferring populationwide protection, but vaccine effectiveness requires a close match with the actual pandemic strain of the virus. Because a pandemic strain, capable of efficient and sustained human-to-human transmission, does not yet exist, the specific pandemic vaccine does not yet exist either. As no country will have adequate vaccines at the start of a pandemic, antiviral drugs assume particular importance as the only possible medical intervention for protecting priority groups pending the arrival of vaccines. Antiviral drugs might also be used to contain or delay the spread of a pandemic at its source. For both vaccines and antiviral drugs, present constraints—which are considerable—mean that most developing countries will have no, or very limited, access to either throughout the course of a pandemic.

*Vaccines*

Vaccines are considered the first line of defence during a pandemic. For several reasons, no country will have adequate supplies of vaccine at the start of a pandemic and for many months thereafter. Large-scale commercial vaccine production of a pandemic vaccine is not expected to commence until about 3 to 6 months following the emergence and characterization of a pandemic virus.

Manufacturing capacity for influenza vaccines is overwhelmingly concentrated in Europe and North America. Current production capacity—estimated at around 300 million doses of trivalent seasonal vaccine per year—falls far below the demand that will arise during a pandemic.

WHO, through its network of specialized influenza laboratories, has constantly monitored the evolution of seasonal viruses and also of the H5N1 virus since its initial infection of humans in 1997. These laboratories prepare the prototype virus strain that is being provided to industry as the "seed" for vaccine development. Constant molecular analyses of viruses, conducted by these laboratories, help ensure that this "seed" strain continues to closely match the genetic characteristics of currently circulating viruses. This activity is particularly important in view of mutations in the H5N1 virus detected during 2005.

At present, around 80 percent of vaccine manufacturing capacity is concentrated in Europe and North America. Just under 20 countries have domestic manufacturers producing influenza vaccines for the seasonal influenza viruses; several of the largest of these companies are presently working on the development of a pandemic

vaccine. Some of these development projects have reached the stage of clinical trials; clinical trials of other candidate vaccines are expected to begin shortly. In early November 2005, WHO convened a meeting of influenza vaccine manufacturers to assess progress in the development of a pandemic vaccine and to conduct an inventory of global manufacturing capacity, particularly in developing countries. While overall capacity looks somewhat more encouraging than 1 year ago, if a pandemic were to begin within the next few months, no company would be ready to move immediately into commercial production of a pandemic vaccine. Several companies have plans to expand production capacity, but these plans will not be realized for at least another 2 to 3 years.

At present, little knowledge exists to guide formulation of an influenza vaccine that is both effective and economizes on the use of antigen—the component of the vaccine that elicits the immune response. Clinical trials are under way to test different formulations, and these trials will provide some answers. WHO has encouraged companies to test vaccine formulations that include an adjuvant. This substance boosts the immune response, and theoretically could allow adequate protection at lower quantities of antigen. Work on this approach is also under way.

As a pandemic vaccine needs to be a close match to the actual pandemic virus, commercial production cannot begin prior to emergence and characterization of the pandemic virus. WHO has, however, encouraged industry and regulatory authorities to develop fast-track procedures for licensing and marketing authorization of a pandemic vaccine, and this has been done.

WHO is using international meetings to urge the international community to find ways to increase manufacturing capacity and ensure that developing countries have access to an effective vaccine at an affordable price. As another strategy, WHO has provided direct assistance to some developing countries engaged in work on a pandemic vaccine. On current trends, however, most developing countries will have no access to a vaccine during the first wave of a pandemic and perhaps throughout its duration.

*Antiviral drugs*

Pending the availability of vaccines, several antiviral drugs are expected to be useful for prophylaxis (prevention of illness) or treatment purposes. Two drugs (in the neuraminidase inhibitors class), oseltamivir (commercially known as Tamiflu) and zanamivir (commercially known as Relenza), have been shown, in laboratory studies, to reduce the severity and duration of illness caused by seasonal influenza. The efficacy of the neuraminidase inhibitors depends on their administration within 48 hours after symptom onset. For cases of human infection with H5N1, the drugs may reduce the severity of disease and improve prospects of survival, if administered early, but clinical data are limited. The H5N1 virus is expected to be susceptible to the neuraminidase inhibitors.

Another class of antiviral drugs, the M2 inhibitors amantadine and rimantadine, could potentially be used against pandemic influenza, but resistance to these drugs may develop rapidly and this could significantly limit their effectiveness. Some currently circulating avian H5N1 strains are fully resistant to the M2 inhibitors, while others remain fully susceptible.

For the neuraminidase inhibitors, the main constraints—which are substantial—involve limited production capacity and a price that is prohibitively high for many countries. Because of the complex and time-consuming manufacturing process, the sole manufacturer of oseltamivir is unable, fully, to meet demand and faces a backlog of orders. At present manufacturing capacity, which has recently quadrupled, it will take a decade to produce enough oseltamivir to treat 20 percent of the world's population.

The complex manufacturing process also makes it difficult to transfer production technology to other facilities. Nonetheless, strategies for doing so are being explored as a matter of urgency, and particular attention is being given to the option of manufacturing oseltamivir in developing countries.

Since supplies are severely constrained, countries now stockpiling antiviral drugs need to decide in advance, on priority groups for administration, particularly for prophylactic purposes. Frontline health care workers would be an obvious first choice, but such decisions are the responsibility of governments. While antiviral drugs can confer some measure of protection pending the availability of vaccines, these drugs should not be used to perform the same public health function as vaccines—even if supplies would permit. The mass administration, for prophylactic purposes, of antiviral drugs to large numbers of healthy people for extended periods is not recommended, as this could accelerate the development of drug resistance.

Following a donation by industry, WHO will have a dedicated stockpile of antiviral drugs (oseltamivir), sufficient for 3 million treatment courses, by early 2006.

These drugs are strictly reserved for use in the first areas affected by an emerging pandemic virus. Recent studies, based on mathematical modeling, suggest that these drugs could be used prophylactically near the start of sustained human-to-human transmission to reduce the risk that a fully transmissible pandemic virus will emerge or at least to delay its international spread, thus gaining time to augment vaccine supplies. The drugs will be stored centrally; WHO has considerable experience in the rapid dispatch of medical supplies during emergencies.

The success of this strategy, which has never been tested, depends on several assumptions about the early behaviour of a pandemic virus, which cannot be known in advance. Success also depends on excellent surveillance and logistics capacity in the initially affected areas, combined with an ability to enforce movement restrictions in and out of the affected area. To increase the likelihood that early intervention using the WHO rapid-intervention stockpile of antiviral drugs will be successful, surveillance in affected countries needs to improve, particularly concerning the capacity to detect clusters of cases closely related in time and place.

Should the virus behave in ways that preclude rapid intervention to contain a pandemic or delay its spread, drugs in the stockpile will be used to provide treatment in the initially affected countries.

### URGENT ACTIVITIES IN AN EMERGENCY SITUATION

The seriousness of the present threat to international public health calls for emergency actions calculated to provide the greatest level of protection as quickly as possible. The most reliable and predictable way immediately to improve the world's defences is to build on existing structures and mechanisms that have worked well in similar emergencies.

No health emergency on the scale of a severe influenza pandemic has confronted the international community for several decades. At the same time, however, WHO and its international partners have acquired considerable experience in responding to outbreaks of new and epidemic-prone diseases that have occurred, in unprecedented numbers, in recent years. Each outbreak presents a unique set of problems that have to be solved, innovatively and quickly, under emergency conditions. Each outbreak response has left WHO and its partners with more experience and more technical innovations to draw on when crafting a response plan for the next unique event. These experiences, and the existing mechanisms that sustain them, can be immediately adapted to provide a strengthened response near the start of a pandemic. WHO now has a flexible fund of operational options to draw on, and these are backed by standardized protocols for outbreak investigation and standard operating procedures as well as by considerable experience under a variety of country settings.

The type of support that can be provided by WHO and its institutional partners in the Global Outbreak Alert and Response Network (GOARN) will probably be most decisive in the first countries experiencing evidence of efficient human-to-human transmission.

For almost 2 years, several Asian nations have undertaken resource-intensive activities in the interest of protecting the international community from an unpredictable, yet potentially catastrophic event. These activities have been undertaken despite low national budgets for health care and the presence of many other high-priority diseases. Many of these activities, specific to the control of avian influenza and prevention of another pandemic, must now be given full international support. Only through such support will the international community receive the data needed for a reliable risk assessment which, in turn, guides many interventions in line with the WHO phases of pandemic alert. If this support is not provided, triggers for scaling up activities will be missed and the world may, once again, be taken by surprise when a pandemic virus emerges.

### WHO RECOMMENDATIONS FOR INTERNATIONAL PREPAREDNESS

WHO has issued a number of documents to assist countries, at various levels of development, in preparing their strategies and detailed responses to pandemic influenza. These technical and strategic documents are available on the WHO Web site (www.who.int). Last week, WHO launched a new Web site devoted to assessment of the influenza pandemic threat. (http://www.who.int/csr/disease/avian__influenza/pandemic/en/index.html)

For the international community, WHO stresses four main priority actions for the prepandemic and early pandemic phases:

—*Accelerate vaccine development and vastly expand capacity.* Improving the ability of the world to vaccinate large numbers of people in a timely manner is the single

greatest challenge facing the international community as it considers how to respond to an influenza pandemic.

—*Strengthen the early warning system.* The capacity of the international community to move forward decisively, and to invest its resources wisely, depends on understanding what is happening with the H5N1 virus in both animals and humans in all affected countries. Surveillance in affected and high-risk countries needs to improve. Each human case needs to be investigated, and viruses must be shared internationally with WHO network laboratories.

—*Intensify containment operations.* A rapid response to each human case, involving contact tracing and monitoring and prophylactic administration of antiviral drugs, can minimize the risk of onward transmission and thus reduce opportunities for the virus to improve its transmissibility. Proper infection control in hospitals treating patients is equally important. WHO will use its international stockpile to intervene rapidly following the first signs that the virus is improving its transmissibility. If quantities suffice, drugs from this stockpile will also be used to provide treatment in the initially affected areas and to protect frontline workers.

—*Build capacity to cope with a pandemic.* Once a pandemic virus has begun to spread internationally, the focus must shift to reducing morbidity and mortality. All countries must have preparedness plans, and WHO must be fully equipped to perform its constitutionally mandated leadership role during a public health emergency.

LESSONS FROM SARS

The international outbreak of severe acute respiratory syndrome (SARS) was a watershed event. It revealed how much the world has changed in terms of the impact that outbreaks of a severe new disease can have in a highly mobile and closely interconnected world. During a fortunately brief stay in its new human host, the SARS virus traveled rapidly along the routes of international air travel to infect more than 8,000 people in about 30 countries. Of these people, SARS killed just under 800.

The SARS experience was remarkable in several ways. It caused enormous economic damage and social disruption in areas far beyond the outbreak sites. The previous estimates of the economic costs of that outbreak, US$30 billion, are now considered conservative. The SARS experience showed that decisive national and international action, taking full advantage of modern communication tools, could prevent a new disease from establishing endemicity. It raised the profile of public health and appreciation of the importance of international cooperation in health to new heights.

SARS primed politicians to understand both the far-reaching consequences of outbreaks and the need to make rapid containment a high priority. SARS also stimulated efforts to find ways to make the impact of the next international outbreak less dramatic.

Many—but not all—of these lessons are useful as the world braces itself against the prospect of another human influenza pandemic. The unprecedented scientific and medical collaboration that characterized the SARS outbreak, with leading experts openly sharing their latest findings, can also be expected to help the world understand a new pandemic virus quickly and translate this new knowledge rapidly into practical advice for control. The threat posed by the H5N1 virus has already attracted political attention at the highest levels, including the launch of the U.S.-initiated International Partnership for Avian and Pandemic Influenza. This is valuable to advance necessary prevention and preparedness activities worldwide at national, regional, and global levels.

Unlike SARS, however, pandemic influenza is considered unstoppable once international spread is fully under way. The classic public health interventions—screening, early detection of cases, and tracing and followup of contacts—that proved decisive in containing SARS will not be sufficient to interrupt the transmission of a pandemic influenza virus. Because influenza virus can be transmitted prior to the onset of symptoms, programmes to screen for symptoms will not detect all carriers. The very short incubation period leaves too little time to conduct contact tracing. Each influenza patient can be expected to transmit the virus to another person within 2 days; the number of cases will grow exponentially. Moreover, influenza spreads easily through the air via coughing or sneezing; SARS transmission required close face-to-face contact with a patient.

One important lesson from SARS is paramount: The importance of real-time monitoring of the evolving situation, supported by advice from the world's best experts, and immediate communication of information. The effectiveness of nonpharmaceutical measures for control will depend on the characteristics of the pandemic virus (attack rate, virulence, principal age groups affected, patterns of spread within

and between countries), and these cannot be known in advance. After a pandemic is declared, WHO will monitor its evolution in real time and issue updated advice accordingly. Recommendations about the most effective control measures will therefore become more precise as the epidemiological potential of the virus unfolds. Virtual networks of experts will advise WHO on such issues as projected patterns of spread, modes of transmission, laboratory diagnosis, and clinical management of patients, and this information will be communicated immediately. All experts hope that use of good risk communications practices at every level and an informed public will facilitate the smooth implementation of control measures, while also reducing some of the social and economic disruption that make pandemics such dreaded events.

WHO will continue to work with its 192 Member States and other international organizations on an ongoing basis to assess the threat of pandemic influenza and to help improve preparedness and response to mitigate the consequences of a pandemic.

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PREPARED STATEMENT OF HON. RUSSELL D. FEINGOLD, U.S. SENATOR FROM WISCONSIN

I thank the chairman for holding this hearing today. I am concerned about America's preparedness for a global pandemic, and I am even more concerned about the global response to an influenza pandemic.

As we all well know, migratory birds are steadily carrying the avian flu virus from throughout Southeast Asia and Siberia, to Romania, Turkey, and now Greece. International health officials predicted that this spread could happen, and it no surprise that this disease is taking this course. In the 20th century alone, three influenza pandemics swept throughout the world, most notably the 1918 flu pandemic, which took 500,000 American lives, and an estimated 20 to 50 million people worldwide. Our knowledge of disease and hygiene has improved dramatically since then, and our ability to ready ourselves has subsequently advanced, but our risk for a pandemic remains a danger.

Scientists and public health officials throughout the world have warned that a flu pandemic will take place, have alerted governments to the possibility of pandemic through the avian flu, and have watched as little has been done to prepare for the occurrence. Despite the warnings of the inevitability of pandemic, research into influenza vaccine and therapy has been continually underfunded, as have our programs that would provide emergency health care relief in a time of crisis, Hurricane Katrina illustrated our lack of preparedness for a true disaster, and the government's failure to quickly bring relief to our friends along the gulf coast should send a resounding message that we must better prepare for an emergency in the future. That emergency may very well be the avian flu pandemic. Let us not be caught unaware. While there is no guarantee that this will occur this winter, next winter, or even the year after that, we know that it is only a matter of time, and we should use that time to build our stockpiles of vaccines and medicines, and to support global initiatives to help prevent the spread of the disease through containment strategies and alerts.

I am pleased that I was able to join many of my colleagues in sending a letter to President Bush on October 4, 2005, that urged the administration to release a finalized Pandemic Influenza Response and Preparedness Plan, which the World Health Organization has deemed essential to planning a strategy in the case of a global pandemic. I am glad the President released this plan, but I also have many questions regarding the strategies and responses.

I look forward to hearing from our witnesses about the President's plan, about the next steps that the administration will be taking to help develop and stockpile vaccines, and what is being done to protect our country and the rest of the world through surveillance and containment.

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PREPARED STATEMENT OF HON. BARBARA BOXER, U.S. SENATOR FROM CALIFORNIA

Mr. Chairman, thank you for holding this hearing today. This is an extremely important issue because if we do not focus on the avian flu, the results could be devastating. The avian flu is the most lethal flu the world has encountered—killing 55 percent of the people who are infected.

In the last 4 years, this Nation has been unprepared for terrorist attacks and natural disasters. And, now, we are unprepared for an epidemic.

Health and Human Services Secretary, Michael Leavitt, has said, "The world is woefully unprepared."

I agree. We should have been developing a vaccine. We should have a plan in place to contain the disease before it spreads around the world. We should have enough of the antiviral treatment stockpiled to save millions from the avian flu. But, we don't.

Since this is the Foreign Relations Committee, today's hearing will focus on the international aspect of this issue. We will hear what the international community needs in order to stop the avian flu. We will hear about what we should be doing in the United States to help other countries.

If it is not stopped abroad, the avian flu will make it to the United States. And, we must have a plan. That is why I was pleased the Senate passed my amendment requiring the administration to implement procedures for U.S. airports and air carriers to deal with suspected cases of the virus.

Specifically, the Transportation Secretary, in consultation with the Secretary of Health and Human Services (HSS) and the Administrator of the Federal Aviation Administration, would be required to develop a plan for airports and air carriers in case a passenger on a flight from a country that has cases of avian flu shows symptoms of the disease. These standard operating procedures would help ensure that airports and air carriers know how to respond appropriately to minimize the spread of the virus.

We know that avian flu poses a huge public health threat to our country. By establishing clear guidelines for airports and airlines, my amendment will help ensure that our country responds quickly and appropriately to prevent the spread of the deadly avian flu virus.

I hope, Mr. Chairman, it doesn't come to that. And, I hope we will get some insights today about what we can do to stop it now.

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RESPONSES OF PANEL I WITNESSES FROM THE STATE DEPARTMENT TO QUESTIONS SUBMITTED BY SENATOR JOSEPH R. BIDEN, JR.

*Question.* Recent statistical modeling studies hold out the hope that an initial outbreak of human-transmissible H5N1 could be stemmed. The assumptions underlying that conclusion are daunting, however. Aside from assumptions regarding characteristics of the virus itself, they include: Location of the outbreak in a rural area or small town, so that it does not immediately spread great distances; identification of the outbreak within a few weeks, before more than some tens of people have become infected; immediate medical intervention with Tamiflu or a similar medication, both to treat victims and as a prophylactic for tens of thousands of people; and restriction of population movements so as to limit the spread of the disease. Will the President's funding request for fiscal year 2006 provide other countries and international organizations the ability to meet those modeling assumptions regarding both the speed of identification and the speed and extent of social and medical intervention? If not, how short of that objective will it leave us and how many years (and/or how much other outside assistance) will be needed to achieve that objective?

Answer. As was noted in the statement prefacing your question, the assumptions are daunting. There is no doubt that the President's funding request for fiscal year 2006 will greatly enhance the speed of identification efforts and the speed and extent of social and medical intervention. However, it must be noted that the administration's 2006 funding request is the U.S. Government's initial effort to jumpstart and support an ongoing preparedness process in coordination with the activities of other multilateral, bilateral, and private sector donors. The reality of the threat of pandemic influenza is that it is too large for any one country to address, and requires a comprehensive and coordinated response from the international community. In addition to supporting the World Health Organization and the Food and Agriculture Organization as key international authorities in human and animal health respectively, USAID and HHS are working closely with the Department of State to support the International Partnership for Avian and Pandemic Influenza. CDC experts have been seconded to WHO to assist in developing a containment strategy. WHO has consulted with Asian experts and will hold a meeting in March to finalize its plan for adoption by the World Health Assembly in May. Experts will then work with nations to adapt their national plans and develop their capacities to implement the strategy. U.S. assistance funds will support this effort.

Increasing human population numbers and emerging and re-emerging diseases will continue to create conditions ripe for new pandemics, and U.S. support for enhancing the capacity of countries to respond to emerging infectious disease threats such as the one posed by avian influenza will require time, effort, dedicated work, funding, and close collaboration with the international community.

*Question.* Dr. Margaret Chan of the World Health Organization (WHO) warns that disease surveillance in Southeast Asia "is impeded by weak laboratory support and the complexity and high costs of testing." She adds: "In Vietnam, detection of human cases has often been the first signal that outbreaks in poultry were occurring in a given area. In Cambodia, all human cases were detected only after patients crossed the border for medical care in Vietnam." What can be done, and what will be done, to improve dramatically and quickly the animal and human disease surveillance capabilities in Vietnam, Cambodia, and Laos?

Answer. International sharing of disease surveillance information and laboratory resources or support is specifically called for in the International Coordination Support Annex of the Homeland Security Department's December 2004 National Response Plan. It is a part of the draft National Implementation Plan.

The Department of Health and Human Services (HHS) has been pursuing a policy of developing and supporting active and aggressive international detection and investigation capability. Activities are supported with ongoing funds and have been greatly enhanced with the addition of $15 million in emergency supplemental funding in FY 2005. HHS is providing bilateral support to the Ministries of Health in 12 countries for the development of influenza surveillance networks. These networks will enhance the capacity to detect influenza in people, including avian influenza.

One focus for HHS is to assist the development of regional capacity in Southeast Asia in epidemiology and laboratory surveillance of influenza. This includes developing and teaching an avian influenza curriculum to epidemiologists and laboratorians. Through its Center for Disease Control and Prevention (CDC), HHS also conducts training for public health leaders to develop a national network of public health field staff, and allied health personnel for detecting and reporting human cases of influenza.

HHS is also working with the World Health Organization (WHO) and countries' Ministries of Health to increase population awareness about the human health risks associated with pandemic influenza, and to advise affected countries concerning prevention or mitigation measures that can be used in the event a pandemic occurs. Methods to increase public awareness include broadcasting radio messages and training local physicians, healthcare workers, and community public health leaders.

To assist in international containment activities, HHS is working to develop, train, and equip rapid field response teams to be deployed in the event of a pandemic influenza outbreak. These teams will be trained to undertake emergency field epidemiology studies, collect samples for shipment to laboratories, and institute emergency control measures, such as quarantine and isolation, in a standardized manner.

In support of these activities, HHS staff have been assigned to Vietnam, Cambodia, and Laos to facilitate improvements in the detection of influenza cases. These senior-level staff will be providing technical assistance on how to investigate cases as well as assisting in the development of a national preparedness plan by the Ministry of Health, with the support of WHO and other partners.

HHS's FY 2005 emergency supplemental funding also provides laboratory support for outbreak investigations. Activities include testing clinical samples and influenza isolates shipped to HHS by affected countries, diagnosing the presence of avian influenza viruses in humans by supplying necessary test reagents to the affected region and globally, and developing vaccine seed stock to produce and test pandemic vaccine candidates. Additional laboratory work will be conducted at HHS on samples and isolates sent from Southeast Asia. HHS is also a WHO Influenza Collaborating Center and conducts routine worldwide monitoring of influenza viruses.

Of the $10 million allocated to USAID for avian influenza in the Tsunami Relief Act supplemental, over 39 percent is supporting activities to increase both human and animal disease surveillance primarily in Cambodia, Laos, and Vietnam. This assistance supports a variety of activities to enhance timely detection and confirmation of outbreaks.

USAID has provided funding to the Food and Agriculture Organization (FAO) and has funded technical assistance from USDA to strengthen active surveillance of avian influenza infections in animals by training national veterinary staff and providing financial, technical, and commodity support to monitor disease in domestic and wild birds. To further increase the timely reporting of new outbreaks, funds are supporting the creation of a grassroots early-warning system comprised of local and international NGOs with established in-country presence. Support also is being provided to enhance national and regional capacities to collect, ship, and analyze animal samples for rapid and accurate laboratory confirmation. In some regions USAID is programming funds for upgrading veterinary laboratories with the latest diagnostic equipment and training to enable them to better diagnose the specific type of virus in a timely manner.

To enhance surveillance for AI infection in humans, USAID is working with HHS/CDC to mobilize staff and technical support resources in the region to work closely with Ministries of Health to strengthen national surveillance systems. USAID assistance will provide for deployment of specialized technical assistance, training, and equipment to increase the capacity of national public health staff to detect new infections and ensure timely and accurate laboratory diagnosis and confirmation. USAID has provided support to the WHO to further enhance human surveillance and diagnostic capacity in the region. Finally, USAID and HHS have long supported the development of CDC's Field Epidemiology Training Programs (FETPs) which build the epidemiological capacity needed to conduct field investigations and establish the surveillance systems needed to detect and track new viruses such as avian influenza. This investment is paying off by supplying the human capacity needed for improved national surveillance systems in the affected areas.

*Question.* Ms. Garrett cited in her written statement the need for "a rapid saliva-based dipstick assay specific for H5N1" that would be affordable in developing countries. How feasible is this, how long would it take to develop it, what would be the cost, and what U.S. agency could best oversee the effort?

Answer. According to CDC, currently, H5N1 virus infection is best detected by testing respiratory specimens by reverse transcriptase polymerise chain reaction which takes 4 hours, or by isolation of H5N1 viruses in appropriate laboratory settings. Rapid diagnostic tests are available to test respiratory specimens, but have poor accuracy and are not specific for H5N1 viruses. A rapid test that is accurate and specific for H5N1 and inexpensive would be very useful for use in developing countries. Based on the current state of scientific knowledge, it is not likely that an acceptably rapid, accurate, specific, and inexpensive saliva-based test for detection of H5N1 viruses or H5N1 antibodies can be developed.

According to USAID, other types of rapid screening tests for detection of influenza viruses in animals are available and can be used under field conditions in developing countries, but the validity and sensitivity of these tests has not been determined. In addition, such tests only indicate whether the influenza virus is present and are not sensitive enough to provide conclusive evidence of the H5N1 subtype, which currently requires testing in an advanced laboratory with access to sophisticated equipment and supplies not available in many areas likely to be affected by avian influenza outbreaks.

A number of private companies are developing other types of rapid avian influenza diagnostic tests. Rockeby Biomed, a Singapore-based biotechnology company, developed an avian virus antigen detection test for diagnosing avian influenza in birds and humans. Results are obtained in 10 minutes, and the test has been approved for use in Thailand, Malaysia, and Brunei even though field validation tests have not been conducted. The cost for this test ranges from $6 for birds up to $12 for human diagnostics. Penn State has developed a prototype and applied for a patent on a rapid diagnostic called the "dot-ELISA." This test is being promoted as a rapid diagnostic test that can inexpensively detect all subtypes of avian influenza virus—one test costs approximately 50 cents. However, because the test is based on detecting a specific monoclonal antibody, the test won't work if the current H5N1 virus mutates or reassorts, as we believe it will.

It will only be a matter of time before a reliable rapid-test technology is developed by the private sector, but ensuring that such a technology is affordable and can be produced for use in developing countries without public sector involvement is a key concern.

With adequate support, a simple rapid test could be developed for epidemiological applications to detect H5N1 antibodies post-infection in humans or animals in a year or less. In order to detect H5N1 in birds or humans while they are still sick, however, a test would need to detect the virus directly. A relatively rapid field test for the virus is feasible with known core technologies, but some additional advanced techniques such as Polymerase Chain Reaction-on-a-strip may be needed. Such antigen tests would require some hand-held instrumentation. Several tests under development for other diseases probably could be adapted for this purpose. An accelerated development program, conducted synergistically with these other development projects and with facilitated access to screening panels, might reasonably achieve a functional test in 18 months.

*Question.* Dr. Chan states that avian flu "is now considered endemic in Indonesia," in parts of Cambodia, China, and Thailand, and possibly in Laos. Assuming the level of effort reflected by the President's request for FY 2006, how long will it take before H5N1 is no longer endemic in those areas? Or is achieving that objective simply not feasible?

Answer. According to HHS and USAID, the current poultry outbreaks of highly pathogenic avian influenza A (H5N1), which began in Southeast Asia in mid-2003, are the largest and most severe on record. Many countries have been affected simultaneously, and the loss of millions of birds has resulted in serious economic disruptions. The causative agent, the H5N1 virus, has proved to be especially tenacious. Despite the death or destruction of an estimated 150 million birds, the virus is now considered endemic in many parts of Southeast Asia, and control of the disease in poultry is expected to take years. It is probably not possible to eradicate H5N1 viruses from poultry and wild birds in Asia. The goal should be toward control and reduction of H5N1 viruses among birds and poultry populations, but not eradication.

Our approach is to quickly detect the virus in birds and contain it by quickly culling infected animals and vaccinating exposed animals. Some countries such as Indonesia and Vietnam use a combined approach of both culling and vaccination to reduce the chance of the virus passing to humans. We also support surveillance systems that monitor ducks, pigs, and other animals sold in live-animal markets in Southeast Asia.

In addition, improving animal handling practices is essential to address the root causes of disease transmission between animals and from animals to humans. USAID will work at the community level by educating commercial and backyard farmers and work to create incentives—such as replacements for culled animals—to identify and report cases quickly. A comprehensive approach also includes conducting communications campaigns and training to ensure use of best practices for poultry producers, transporters, processors, and retailers; and building national and local capacity to provide animal health services that support effective detection, diagnostics, and containment.

This is important to address the current outbreak and to develop long-term animal health and management capacities in these countries to better prepare them against future threats. USAID has proposed the development of a National Poultry Sector Action Plan bringing together key players in each national government to identify clear organizational responsibilities and a chain of command for implementation of the above activities. In addition, USAID, in concert with other U.S. Government agencies, is coordinating its activities closely with a wide variety of players in the international community, including other donors, multilaterals, environmental and veterinary organizations, and private sector organizations to ensure a comprehensive response that will stem the spread of H5N1.

*Question.* Dr. Chan states that "most developing countries will have no access to a vaccine during the first wave of a pandemic and perhaps throughout its duration." That leaves the world dependent upon antiviral medicines that have to be given within 48 hours of a person becoming symptomatic. Is the WHO capable of providing that instant response, or will it be dependent upon U.S. logistics and/or medical personnel?

Answer. According to USAID, given the limited availability of antivirals, it is unlikely that during a pandemic most developing countries will have large quantities of antiviral medications. Widespread use of these medicines using internal stockpiles will not be possible. Countries will need to determine which key people (e.g., health staff, first responders) will receive the limited quantities. So far, all discussions of international stockpiles of antiviral medications have focused on containing an outbreak of AI that is spreading from human to human before it becomes a pandemic.

CDC notes that it is important to distinguish the difference between the use of antiviral medications for treatment of influenza and their use for the control of an epidemic. The 48-hour timeframe is relevant in terms of the effectiveness of treatment for individuals who have contracted influenza. This type of clinical treatment with antivirals would be undertaken within the context of national healthcare systems. However, there is also an important use for antivirals in the control of an epidemic. WHO along with CDC and all of our international partners, are working together to establish systems that would enable us to detect the earliest possible signal of person-to-person spread of H5N1 and other strains of influenza. At the point that such person-to-person transmission is identified, a rapid public health response would be initiated. Such a response would require deployment of personnel, appropriate protective equipment, an effective communications plan, and a stockpile of antiviral medications. The goal of the response would be to undertake ring containment of the emerging epidemic through isolation and treatment of affected individuals, and prophylactic treatment of contacts and others within a defined radius. This type of ring containment, if implemented within 2 to 3 weeks after person-to-person spread has begun, may slow an epidemic in the early stages. To achieve success in this type of unique endeavor, WHO, CDC, other international organizations

and Health Ministries across the world are working closely together as was the case with smallpox eradication and SARS, and is the case in the ongoing efforts to eradicate polio. The critical factor in determining our success is open and transparent processes for identifying and reporting human-to-human transmission of these diseases, and rapid deployment of the appropriate response tools.

The U.S. Government is now considering how to participate in international efforts to stockpile antiviral medications, and has already allocated funding to support the stockpiling of associated medical supplies and personal protective equipment under international auspices.

*Question.* What is being done to prepare for the spread of H5N1 to sub-Saharan Africa, which has even fewer public health resources than Southeast Asia and larger HIV-positive populations?

Answer. According to CDC, while the current focus of the H5N1 outbreak is in Asia, it is agreed that avian influenza is a global problem. CDC has developed an extensive network with Ministries of Health and other partners in Southeast Asia for H5N1 activities. We recognize that other areas are also particularly vulnerable. According to UNAIDS, Sub-Saharan Africa (SSA), for instance, is home to nearly 26 million people living with HIV—this represents nearly 60 percent of the global epidemic. In many SSA countries, prevalence of HIV is very high. The prevalence among pregnant women in South Africa was nearly 30 percent in 2004, and an estimated 1.5 million people were living with HIV in Ethiopia. Persons with immunocompromised states like late-stage HIV infection may not only suffer magnified effects from influenza infection negatively impacting their HIV infection, but also potentially shed influenza virus longer, theoretically increasing the risk of transmission. Thus, effective immunization practices for the HIV seropositive persons would need to be considered.

In terms of expanding into other areas, CDC has a close working relationship with portions of the Department of Defense, in particular with the Naval Medical Research Unit (NAMRU). CDC provides funding for, and collaborates with, NAMRU3 in Cairo, Egypt, to support training and the expansion of influenza surveillance networks to countries where none exist. CDC's work with NAMRU3 includes the enhancement of the quality of surveillance in other countries to enhance outbreak detection, seroprevalence studies in populations at risk for avian influenza such as poultry workers, and enhanced outbreak response in the region.

Furthermore, CDC has full-time staff in 43 countries, including countries in Africa. CDC is already working closely with our staff in all 43 countries to provide them with the latest information about the current situation, assess country preparedness, assist in the development of pandemic influenza plans, and provide policy and technical guidance as requested. In addition, previous investments, such as the establishment of International Emerging Infections Programs (IEIP) in Thailand and Kenya, provide the foundation for rapid response to an emerging pandemic. The IEIP program in Kenya is undertaking similar activities, and recently convened representatives from eight African countries to coordinate CDC efforts across Africa to detect the introduction of H5N1 into the continent. Finally, CDC has longstanding collaborative relationships with others working in the global arena, such as USAID, the DOD, WHO, and the World Bank, which can facilitate a coordinated and effective response to international needs. The staff, programs, and capabilities developed by CDC over several decades to address a broad range of global health challenges are well-positioned to play a critical role in responding to an influenza pandemic.

In Africa where outbreaks in animal populations due to bird migration from affected countries in Europe and Asia are possible, USAID missions are providing assistance to host governments to assemble donors, establish task forces, and develop pandemic preparedness plans in cooperation with other U.S. Government agencies, FAO, and WHO. In addition, countries with USAID support are strengthening disease surveillance programs to include a strong focus on detecting, diagnosing, and responding to avian influenza.

USAID has designated a person as point of contact for avian influenza in every mission and regional office and, through their efforts, has received assessments from 40 African countries detailing country activities, preparedness level, and potential roles of USAID. These assessments are being used in the planning and resource distribution process. In addition, some African countries, including Ethiopia, Uganda, Senegal, Tanzania, and Nigeria have provided detailed plans for avian influenza preparedness activities. Many countries are building upon existing SARS and influenza preparedness plans and task forces and focusing on strengthening existing surveillance and laboratory capacity.

Tanzania and Ethiopia, for example, have moved ahead quickly to address the potential threat of avian influenza. USAID/Ethiopia has reallocated $600,000 to sup-

port surveillance and diagnostics for H5N1 outbreaks in animal populations and to begin communications campaigns. The USAID mission in Tanzania has reallocated $75,000 of existing surveillance funds to focus on wild bird surveillance and has been asked to write the wild bird risk assessment section of the health sector National Preparedness Plan. The mission has also supported multisectoral work on avian influenza, including the convening of a multisector task force with participation of the Ministries of Health, Water and Livestock Development, and Natural Resources and Tourism.

At USAID headquarters, the Bureau for Africa (AFR) has been engaged in activities to support and guide the work of missions and harmonize plans and activities with other USG agencies and partners. In October, AFR convened a conference call with the head of FAO and USAID missions and held a briefing for African Ambassadors to provide general technical information on avian influenza and discuss steps countries can take to prepare for the disease AFR has met with officials from the Africa Regional Office at the Department of State and technical experts from the U.S. Department of Agriculture to ensure collaboration and appropriate next steps for AFR missions in avian flu preparedness and surveillance.

*Question.* If U.S. assistance is required, who will have the authority to order the immediate diversion of sufficient resources to meet this need? In light of our sluggish response to Hurricane Katrina and to the earthquake in Pakistan, what steps have been taken to assure that the United States will be there to help the WHO immediately when an avian flu crisis emerges?

Answer. If there is a sustained outbreak of H5N1 in large population clusters overseas, the Department of State, as set forth in the International Coordination Support Annex of the National Response Plan, will coordinate the efforts of all USG departments and agencies and work with other international organizations and affected countries to address the outbreak.

The FY06 budget for avian influenza includes $56 million for USAID to preposition, in close coordination with HHS, USDA, and the World Health Organization, supplies that can be mobilized at a short notice to contain outbreaks of H5N1. This stockpile, to be managed by USAID's Office of Foreign Disaster Assistance (OFDA), will contain key medical commodities that may include personal protective equipment, disinfectant, medicines (excluding Tamiflu), and materials and equipment for communications. This strategy is for a rapid response capacity that will enable the international community to control the disease as it develops into a more transmissible form.

Additionally, the United States mobilized interagency teams to assess the avian flu situation. In mid-January a team of experts in animal and human health surveillance, laboratory capacity, and public health communication from DOS, USDA, USAID, and HHS went to Turkey, Azerbaijan, Georgia, Armenia, and Ukraine to meet with government officials and representatives of international organizations working locally on avian influenza. The Navy Medical Research Unit (NAMRU) and WHO teams are in Iraq meeting with government officials, investigating the outbreak and providing support.

*Question.* In some past medical emergencies, multiple agencies and entities provided confusing and conflicting messages to the public. This happened in the anthrax attacks, which we in the Senate remember very well. How will you ensure that information provided to the public, next time, is clear and accurate? Who will be in charge of communicating with the American public?

Answer. In the case of Incidents of National Significance, the Department of Homeland Security has the primary responsibility for coordinating communications to the public, as set forth in the Public Affairs Support Annex of the National Response Plan.

In the current situation, HHS is fully engaged in pandemic flu planning, including aspects of communications. For communications during a potential pandemic influenza emergency, a formal plan has been developed and is in place. This plan commits HHS and its agencies to consistency and accuracy with messaging based on science and cleared through subject matter experts.

Risk communication planning is critical to pandemic influenza preparedness and response. CDC is committed to the scientifically validated tenets of outbreak risk communication. It is vital that comprehensive information is shared across diverse audiences, tailored according to need, and is consistent, frank, transparent, and timely. In the event of an influenza pandemic, clinicians are likely to detect the first cases; therefore messaging in the prepandemic phase must include clinician education and discussions of risk factors linked to the likely sources of the outbreak. Given the likely surge in demand for health care, public communications must in-

clude instruction in assessing true emergencies, in providing essential home care for routine cases, and in basic infection control.

CDC provides the healthcare and public health communities with timely notice of important trends and details necessary to support robust domestic surveillance. CDC also provides guidance for public messages through the news media, Internet sites, public forums, presentations, and responses to direct inquiries. This comprehensive risk-communication strategy can inform the nation about the medical, social, and economic implications of an influenza pandemic, including collaborations with the international community. USG agencies are working through the International Partnership on Avian and Pandemic Influenza, established by President Bush in September 2005, and with the WHO Secretariat to harmonize their risk-communication messages as much as possible with all international partners.

*Question.* What is the administration's policy on the stockpiling and provision of Tamiflu for use by U.S. personnel or other American citizens overseas?

Answer. U.S. embassies and consulates are actively engaged in outreach to all Americans abroad, to ensure they have accurate and timely information in order to make appropriate plans in light of their personal needs. This includes the holding of townhall meetings and use of the warden system to disseminate information quickly to all American citizens, as would be done in the event of an emergency.

State Department physicians and medical staff have an obligation to treat only those official employees and their families, who are under Chief of Mission authority, and are participants in the International Cooperative Administrative Support Services (ICASS) system. The Department of State lacks the legal authority to provide any type of medication, including Tamiflu, to private American citizens. MED has already stockpiled Tamiflu for the USG Missions in Southeast Asia. Funding is available in the FY 2006 Department of Defense, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico, and Pandemic Influenza Act, 2006, for additional Tamiflu sufficient to provide global coverage for this population of USG employees and family members.

Because of restrictions against the Department's ability to administer Tamiflu or any medication to private American citizens, and because Tamiflu may not be readily available overseas, the State Department has conducted an active outreach program to encourage American citizens traveling or living abroad to consult with private physicians about obtaining Tamiflu prior to travel, or to determine if Tamiflu is readily available in the country where they reside. In addition, the Department of State has asked its embassies and consulates to develop plans that take into consideration the possibility that travel into or out of a country may not be possible, safe or medically advisable.

We have taken steps to inform American citizens traveling to, or living in, countries where avian influenza is prevalent to consider the potential risks and keep informed of the latest medical guidance and information in order to make appropriate plans. Specific CDC travel information relating to avian influenza, including preventive measures, is available at http://www.cdc.gov/flu/avian/index.htm. WHO guidance related to avian influenza is available at http://www.who.int/csr/disease/avian_influenza/en/. Guidance on how private citizens can prepare for a "stay in place" response, including stockpiling food, water, and medical supplies, is available on the CDC and pandemicflu.gov Web sites.

It is also likely that governments will respond to a pandemic by imposing public health measures that restrict domestic and international movement, further limiting the U.S. Government's ability to assist Americans in these countries. The vast majority of the known human cases have resulted from direct contact with poultry, and there is only limited evidence to suggest possible human-to-human transmission. However, the Centers for Disease Control and Prevention (CDC), the WHO, and the Department of State are nonetheless concerned about the potential for human-to-human transmission of this highly dangerous flu strain, and are working closely with other partners in an effort to monitor any potential outbreak.

DOD is maintaining a stockpile for its Service members overseas for the purpose of force protection, as well as DOD dependents and other beneficiaries. However, medication from this stockpile will not be available for general use by private American citizens traveling abroad.

*Question.* Who will be the senior public health official handling pandemic response? What powers will that official be given, and how will he or she rank by comparison with Cabinet officers and the relevant military commanders?

Answer. The Secretary of HHS is the senior public health official responsible for the overall response to pandemic influenza and other public health and medical emergencies. The Secretary is a Cabinet officer and reports directly to the President.

The Secretary determines the nature and scope of the HHS response, and may delegate to the Assistant Secretary for Public Health Emergency Preparedness (ASPHEP) the authority to coordinate and direct HHS-wide efforts with respect to preparedness for, and response to, public health and medical emergencies, including pandemic influenza preparedness and response activities. Under the Public Health Service Act, the ASPHEP is authorized to coordinate these activities on behalf of the Secretary and in conjunction with other Federal agencies and State and local entities.

Under the National Response Plan the Department of State has overall responsibility for international coordination in support of the USG's response to pandemic influenza. HHS, domestically, under the National Response Plan is the primary Federal Agency responsible for public health and medical emergency planning, preparations, response, and recovery when one or more of the following apply:

- State, local, or tribal resources are insufficient to address all of the public health needs.
- The resources of State, local, or tribal public health and/or medical authorities are overwhelmed and HHS assistance has been requested by the appropriate authorities.
- The Federal Government has the lead responsibility under public health authorities.
- A Federal department or agency acting under its own authority has requested the assistance of HHS.

In order to carry out its responsibilities for public health and medical emergencies, HHS relies primarily on authorities contained in the Public Health Service Act, the Federal Food, Drug and Cosmetic Act, the Stafford Act and the Social Security Act. For example, the Public Health Service Act authorizes the Secretary of HHS to:

- Declare a public health emergency and take such action as may be appropriate to respond to the emergency.
- Make and enforce regulations to prevent the introduction, transmission, or spread of communicable diseases into the United States or from one State or possession into another, including isolation and quarantine.
- Conduct and support research and investigations into the cause, treatment, or prevention of a disease or disorder.
- Direct the deployment of officers of the Public Health Service in support of public health and medical operations.
- Assist States and localities to provide public health and medical services.
- Provide for the licensure of biological products.

Additionally, HHS can issue an Emergency Use Authorization under section 564 of the FFDCA. It also has authority under that act to permit emergency use of investigational products and to expedite approval of drugs and devices. The Stafford Act authorizes agencies of the Federal Government, including HHS to use their authorities and resources for emergency preparedness and response, as directed by the President. Under section 1135 of the SSA, HHS can waive certain requirements of the Medicare, Medicaid, and State Children's Health Insurance Programs, such as preapproval requirements, sanctions for violating self-referral prohibitions, and sanctions for impermissible redirection of patients under the Emergency Medical Treatment and Active Labor Act.

*Question.* By definition, pandemics cross national boundaries. Their control may require highly coordinated actions by many nations. But WHO has only advisory and supportive powers. Does the world need a new international structure to deal with this type of international emergency? Or will the U.N. Security Council issue binding resolutions on pandemic response? What is being done to plan for and exercise the international coordination and decisionmaking that will be required?

Answer. The world needs neither a new international structure to deal with avian and pandemic influenza nor Security Council resolutions on a pandemic response. The World Health Organization (WHO), is one of a number of intergovernmental organizations, including the United Nations Food and Agriculture Organization (FAO) and the World Organization for Animal Health (OIE), that is urgently addressing concerns related to an avian flu outbreak. Acting in accordance with its mandate WHO is engaged in a concerted effort to coordinate actions involving its Member States, including the United States, as well as its other partners to urgently address issues of international preparedness, rapid containment, and response. WHO Member States, in May 2005, adopted the International Health Regulations (2005) which will enter into force in June 2007, and in so doing, replace the current regulations that are narrower in scope. The WHO International Health Regulation (2005)

(IHRs) will place new requirements on WHO Member States which will facilitate effective responses to public health emergencies of international concern such as avian flu through improved disease surveillance, reporting, response, and containment actions. The United States, along with many other nations, has strongly supported voluntary early implementation of relevant provisions of the IHRs.

The International Partnership on Avian and Pandemic Influenza (IPAPI) announced by President Bush at the United Nations on September 14, 2005, helps to facilitate high-level political attention. The objective of the Partnership is to bring together countries that share a set of core principles to generate and coordinate political momentum and action for addressing the threats of avian and pandemic influenza. The Partnership's work will supplement ongoing and planned international and regional efforts and support the work of the relevant international organizations, including the WHO, the World Organization for Animal Health (OIE), and the United Nations Food and Agriculture Organization (FAO). The new Office of the United Nations Coordinator for Avian Influenza, responsible for coordinating the efforts of WHO, FAO, and other U.N. agencies involved in the international response, will further strengthen the capacity of the U.N. system to provide a coordinated international response. USAID provided over $7.6 million in FY05 for avian influenza activities in partnership with WHO and FAO, including $879,000 to support the new U.N. Coordinator. Within the President's FY06 request for avian flu containment USAID estimates that approximately $26 million will go to support the WHO and FAO.

The U.S. Government is providing regional and bilateral support to help our IPAPI partners train personnel, expand surveillance and testing, draw up and enhance preparedness plans, and take action to detect and contain outbreaks. The U.S. Government is working with our IPAPI partners and the WHO to support the development of integrated national plans for avian influenza control and human pandemic influenza preparedness and response. Integrated country plans will build on and strengthen existing systems and mechanisms. Response mechanisms should be rehearsed through simulation exercises.

On November 1, 2005, the White House issued the U.S. National Strategy for Pandemic Influenza. Department-specific implementation plans are being developed and simulations and tabletop exercises are being conducted by relevant U.S. Government agencies and similar efforts are underway in many other countries. The U.S. Government is working to develop an integrated response plan that will be consistent with the WHO response plan for avian and pandemic influenza. The WHO plan will reflect a coordination framework building on existing mechanisms at the country level, and at the global level, building on international best practices.

Furthermore, WHO, as a key actor in directing and coordinating international health work, has demonstrated its ability to significantly influence the public health actions of its 192 Member States. For instance, WHO played an effective role during the 2002–2003 SARS epidemic and was instrumental in urging better cooperation and transparency from Chinese health authorities.

While the transmission rate of SARS may have been lower than that of influenza, the public health response to the SARS epidemic is illustrative. During the SARS outbreak, WHO initiated and coordinated much of its response through its Global Outbreak Alert and Response Network (GOARN). GOARN provides technical and operational resources from scientific institutions in WHO Member States, medical and surveillance initiatives, regional technical networks, networks of laboratories, United Nations organizations, the Red Cross, and other international humanitarian nongovernmental organizations. WHO issued recommendations to airlines for screening of passengers and advisories to avoid nonessential travel to high-risk areas. While these recommendations are advisory, the travel advisories may have helped to control SARS, as travel volume decreased and countries experiencing outbreaks responded with effective infection control, isolation, and quarantine strategies.

*Question.* Ms. Garrett's testimony notes the need to prepare for giving nongovernmental organizations a major role, both at home and abroad. NGOs have approached me with the same concern. What plans are there for enlisting their support for using their scientific and logistical expertise, and how are they reflected in the President's budget request for fiscal year 2006?

Answer. Responding to AI and a pandemic will require the expertise of a broad coalition of partners including governments, international organizations, businesses, and NGOs. The Department of State is working with other Federal agencies on its international outreach strategy, which covers a number of issues involving work with the private sector writ large including the NGO community vis-a-vis their capabilities and needs in prevention of, and response to, a flu pandemic. DOS has en-

gaged the private sector—businesses, the scientific community, as well as NGOs to urge pandemic preparedness, and additional meetings are being planned. We are working with USAID and HHS to address the particular needs of NGOs and businesses for protecting the health of their workers, both U.S. and host country nationals. We are also providing guidance on their need to address a range of contingency planning concerns, including security-related issues.

The NGO community is especially critical to mobilize local action against the threat of avian influenza, and USAID and CDC have already taken steps to engage the NGO community under the $25 million supplemental appropriations provided in FY05. USAID is partnering with a number of private sector organizations, such as Veterinarians without Borders (VSF) in Vietnam, to train 5,000 private and public veterinarians and "paravets"—serving over 1 million people in 10 high-risk provinces in the Mekong and Red River Deltas—to use and disseminate national and international guidelines for avian flu prevention and control in backyard poultry farms. An increasing number of NGOs are becoming involved in the effort to control bird flu in Vietnam, and they have expressed the need to share information, and ensure consistency in messages and coordination in programming. USAID is partnering with WHO and Plan International to support a Web site in conjunction with the NGO Resource Center in Hanoi that will facilitate information-sharing and coordination between NGOs, donors, and the Vietnamese Government.

USAID's newly established Avian and Pandemic Influenza Response Unit already is working to engage NGO networks through NGO umbrella organizations such as the Core Group for Child Survival and InterAction on their possible role in bringing together a broad coalition of NGOs representing all relevant sectors to support effective containment.

USAID plans to use $7 million of the Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico, and Pandemic Influenza Act, 2006, to develop "early warning" surveillance networks that will include the on-the-ground capacity of NGOs in affected countries as part of an alert network for suspicious poultry die-offs or illness among people. In addition, NGOs will be critical partners for increasing public awareness of avian flu and promoting safe practices to prevent infection. When outbreaks are confirmed among either poultry or humans, NGOs will frequently be the first line of action to ensure timely and effective response in coordination with local, national, and international health authorities.

*Question.* What should American poultry producers do to limit the risk to their flocks from H5N1? Should live markets be shut down or more tightly controlled in the United States? If so, are the necessary authorities in place and have those with the authority prepared to exercise it? Should U.S. poultry be vaccinated? If so, when and by whom? What will all this cost? And how will we ensure that everybody is included—not just the big companies, but also the mom-and-pop operations?

Answer. USDA is committed to preventing the introduction of any avian influenza viruses, especially highly pathogenic H5N1 into the United States. Moreover, the Department works closely with State and local authorities and with individual producers to limit the risk of H5N1 and other animal diseases. USDA has engaged in extensive education and outreach to inform American poultry producers how to safeguard against AI. Our "Biosecurity for the Birds" outreach initiative has been widely successful. That initiative describes biosecurity as the first line of defense against all AI viruses. Reducing the likelihood of the introduction of AI by minimizing contact among commercial poultry and wild birds, swine farms, and live bird markets is a common and successful practice. However, occasionally when AI is introduced into the U.S. poultry population, USDA along with State governments and industry act to eliminate the virus.

A successful strategy requires multiple controls. The components of a control strategy can vary but generally include five categories: (1) Biosecurity (including quarantine); (2) diagnostics and surveillance; (3) elimination of infected poultry; (4) decreasing host susceptibility to the pathogen (for example, through vaccination when appropriate); and (5) education of personnel in the animal production chain and allied industries to better understand how diseases are transmitted so personnel with responsibility to prevent transmission or spread can be incorporated into action plans.

Live bird markets in the United States should not be shut down. Closing these markets would not eliminate the demand for purchasing live/fresh slaughtered birds in these communities throughout the United States. Consequently, closing the markets would only drive this marketing system underground. Since we have identified an H7N2 low pathogenicity avian influenza (LPAI) virus in the live bird marketing system in the Northeast in recent years, APHIS has partnered with the States in the region to assist these markets in controlling this virus. These efforts have re-

sulted in significant reduction of the prevalence of LPAI in these markets. With full implementation of this program, we expect to keep introductions of LPAI into these markets to a negligible level.

APHIS is developing a federally coordinated and state-assisted domestic LPAI program that will enhance surveillance for H5 and H7 avian influenza for the U.S. commercial broiler, layers, and turkey industries and the live bird marketing system. The national program is designed to: (1) Diagnose, control, and prevent the H5 and H7 LPAI subtypes; (2) improve biosecurity, sanitation, and disease control at participating operations; and (3) minimize the effects of LPAI on the U.S. commercial poultry industry. The National Poultry Improvement Plan (NPIP) is developing the commercial poultry segment of this program. NPIP participants have adopted a new LPAI program that is currently proceeding through the regulatory process that will fully establish this voluntary program as part of the NPIP.

Vaccination alone is not an effective strategy to combat avian influenza. Vaccine alone would never fully eradicate the AI virus and would be unlikely to even slow down an outbreak; however, the use of highly efficacious vaccines may be an essential component of any AI countermeasure program to reduce disease transmission (including zoonotic spread) and economic impact. Furthermore, vaccinating poultry can have deleterious trade implications. However, vaccination can be a very useful component of an overarching AI control strategy. The current APHIS policy, as described in VS Memorandum No. 565.12, allows "H5 and H7 vaccines to be used as a tool for combating any potential outbreak of HPAI in the United States." AI vaccines may be prepared from any serotype, including H5 and H7, and may be recommended for use in chickens or turkeys subject to the requirements and restrictions specified in VS Memorandum No. 800.85. This memorandum allows H5 and H7 vaccines to only be used under the supervision or control of USDA, APHIS, VS, as part of an official USDA animal disease control program. The USDA, APHIS, VS, Center for Veterinary Biologics, implements the provisions of the Virus-Serum-Toxin Act to ensure that veterinary biologics available for the diagnosis, prevention, and treatment of animal disease are pure, safe, potent, and effective.

Cost is determined by a number of variables. How and when AI vaccine from the H5/H7 vaccine stockpile is used is dependent upon the type of birds (broilers, layers, parent flocks, etc.), the level of biosecurity, and how geographically spread out the disease situation may be. Vaccine use needs to be tailored to the specific set of disease circumstances. It is a component of a disease control strategy, not the whole program.

APHIS supports the general concept of vaccination as a tool in the eradication of notifiable AI. However, vaccination should be available as part of a science-based influenza control strategy that includes: (1) Enhanced biosecurity; (2) an eradication plan; (3) controlled vaccination for flocks deemed to be at risk; (4) suitable monitoring of all flocks at risk and of all vaccinated flocks; and (5) a repopulation plan. Thus, who would be included in a vaccination program would be the result of a science-based strategy, not the size of the producers.

*Question.* We must do all that we can to change livestock production and marketing practices in developing countries, so as to reduce contact between animals and humans. This applies not just to poultry, but also especially to pigs. How does the President's new pandemic influenza strategy address this concern? Are American poultry and livestock producers being mobilized to help other countries bring their animal husbandry and marketing practices into the 21st century?

Answer. U.S. Government officials understand the importance of the long-term investment aimed at changing livestock production and marketing practices in other countries and strengthening the systems to reduce contact between animals and between humans and animals. In the new pandemic strategy, USAID plans to make significant investments in countries to mitigate the risk of transmission. Activities which contribute to this goal include: Profiling the livestock and poultry sector, identifying, organizing, and mobilizing local stakeholders, identifying areas of greatest risk for transmission such as farm practices and live (wet) markets, implementing risk management practices such as application of appropriate biosecurity measures at both backyard farm and commercial poultry/livestock operations, building on existing awareness raising and education campaigns aimed at improving farming practices and response measures to reduce risk of transmission. USAID understands the importance of engaging the American poultry and livestock sector in these efforts and is in close contact with USDA, which has met with U.S. industry groups seeking partnerships to mitigate the economic, social, and security impact of highly pathogenic avian influenza.

USDA has gathered information about private sector efforts on emergency preparedness in this area to identify and create opportunities for partnering with in-

dustry and to identify technical resource experts to apply best practices for technical assistance activities. The goal of these efforts is to encourage farmers in other countries to participate in surveillance and adopt desirable farm-level biosecurity measures and influence changes throughout the poultry supply and marketing chain. To date, the industry groups that have participated include: The U.S. American Poultry Egg and Export Council, American Egg Board, United Egg Producers, National Turkey Federation, National Chicken Council, and the American Soybean Association. Under the President's pandemic influenza strategy, USAID and USDA will continue to engage with American producers to strengthen the animal husbandry and marketing practices in developing countries.

The President's FY06 Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico, and Pandemic Influenza includes support for USAID to take immediate action to improve animal handling practices by training veterinary workers, conducting targeted communications campaigns, and working directly with Ministries of Agricultures to improve practices for handling diseased animals. USAID will also continue its work with private companies and other donors and organizations—including in the livestock industry—to increase the availability of incentives, technical support, and financing to increase biosecurity in livestock production and marketing.

Engaging the American poultry and livestock sector—a global leader in promoting biosecurity practices—will be essential in promoting safe practices abroad. USAID is working closely with USDA and provided $1.5 million in FY05 in partnership with USDA to increase U.S. technical assistance for avian influenza control efforts, including activities to improve biosecurity and engage and leverage private companies. USDA has met with U.S. industry groups seeking partnerships to mitigate the economic, social, and security impact of highly pathogenic avian influenza and has gathered information about private sector efforts in order to identify opportunities for public/private partnerships that will increase the use of best practices abroad.

*Question.* One indicator of how effective our country will be in implementing a response to pandemic flu might be how well we handle the existing seasonal flu. In Delaware and elsewhere, we have seen widespread and growing unavailability of this year's flu vaccine. These shortages appear to affect all providers (doctor's offices, companies, public health agencies) and involve the Sanofi as well as Chiron vaccines. Yet the CDC has routinely said that there is no shortage of vaccine. How do you reconcile the contradiction between what is happening on the ground with what public health officials in Washington and Atlanta are saying?

Answer. CDC planned for multiple scenarios of influenza vaccine shortages and even for a greater supply than usual. We are in what we thought would be the best case scenario in that there are four manufacturers providing influenza vaccine in the United States this season: Chiron, GSK, Medlmmune, and Sanofi Pasteur. To date, more than 80 million doses of influenza vaccine have been distributed and approximately 86 million doses have been produced. There is vaccine still available for purchase from at least one manufacturer and one distributor. Influenza vaccine is also available for children who are eligible for the Vaccines for Children (VFC) program as part of the VFC influenza vaccine stockpile. The very last doses of influenza vaccine are currently being produced (3.5 million doses from Sanofi Pasteur and 680,000 doses from Chiron) and were available late in December or January as part of the CDC influenza vaccine stockpile.

Despite the total number of doses available this season, however, the delay and decreased production of vaccines by one of the manufacturers has resulted in a mismatch between supply and demand for influenza vaccine that has left a number of providers, facilities such as hospitals and long-term care facilities, and vaccine distributors without sufficient vaccine.

To assess the extent of this mismatch, CDC has begun systematic assessments of vaccine supply problems experienced by various key stakeholders, including State and local public health officials; private providers; other providers and facilities who administer influenza vaccine; the public; and vaccine distributors to understand the extent and duration of problems associated with vaccine supply and access to influenza vaccine this season. The information collected will help CDC evaluate and respond to challenges in the current influenza season and to plan for next year's influenza season.

We recognize that it is necessary to ensure an enhanced and stable domestic influenza vaccine market to improve the response to both annual and pandemic influenza. CDC continually works to improve our response to vaccine shortages and to unusual situations, such as the one occurring this year when the timing of demand and supply is not synchronized. We will continue to work with private industry

manufacturers and our international partners to find solutions to the challenges we face related to influenza vaccine supplies.

*Question.* As you know, I have long advocated greater U.S. support for disease surveillance capabilities overseas, with a special emphasis on those diseases that might be the result of some bioterrorist activity. As the United States helps to improve disease surveillance efforts in the context of avian influenza, will it also train personnel to identify other diseases? Could it readily include training to spot the diseases that have been associated with past bioweapons programs? What would it cost to include a module of that sort for a significant proportion of those persons who receive U.S. training?

Answer. All CDC bioterrorism training is maintained online as long as the content remains up-to-date (http://www.bt.cdc.gov/training/). The training sessions have been viewed and adapted by several countries to train their public health staff.

CDC has developed other types of training currently in use by other countries. One of CDC's earliest international collaborations for training was with WHO to develop the course "Smallpox: Disease, Prevention and Intervention" (http://www.bt.cdc.gov/agent/smallpox/training/overview/). The course provides a set of teaching slides that can be easily customized for a country's specific plan.

In addition, CDC's Bioterrorism Preparedness and Response Program (BPRP) has assisted other countries in preparation for the Olympic Games. During the Athens games, BPRP staff worked over a 9-month period to conduct trainings of clinical staff in Greece to recognize possible bioterrorism. They also helped establish a syndromic surveillance system to detect patterns in illness syndromes that might detect events. Most recently, BPRP staff worked with the Italian Government to develop a training plan and Web site for its clinicians in preparation for the upcoming Olympics, as well as for general preparedness. Italy will be adapting CDC courses and information from the Emergency Preparedness and Response Web site (www.bt.cdc.gov) for this purpose.

HHS, through its Office of Global Health Affairs and its CDC, is currently participating in the DOD project concerning "Threat Agent Detection and Response" (TADR) in countries of the former Soviet Union. This is a multiyear collaborative project with the Ministries of Health of Uzbekistan, Kazakhstan, Georgia, Azerbaijan, and Ukraine, to rapidly design and implement biothreat surveillance and response plans, build laboratory capacity, and promote biosafety and biosecurity for biothreat agents and other highly pathogenic diseases, including human and veterinary surveillance for avian influenza. The objectives of this collaboration are to enhance local surveillance to protect U.S. forces and local populations in the region, to detect highly pathogenic diseases early in their transmission cycle, and also to develop a sustainable surveillance system that will improve the public health infrastructure in participating countries. CDC has developed laboratory, surveillance, and epidemiology training modules, which have been used in Uzbekistan and will be used in Kazakhstan. Furthermore, these modules are being used by colleagues at the Walter Reed Army Institute of Research for training in Georgia and Azerbaijan. Similar or identical modules will be used in Ukraine and other countries in the future. Training is centered on a list of TADR diseases including anthrax, plague, tularemia, brucellosis, Crimean Congo Hemorrhagic Fever, and avian influenza. CDC is also involved with the information technology component of this project, which is designed to support rapid reporting of these diseases to the United States.

Funding for all projects is contingent upon the bioterrorism budget and the other priorities for that budget in any given year. Bioterrorism training is coordinated through CDC's Terrorism Training and Education Working Group. This group of representatives from all CDC response centers prioritizes training projects and funding for the year. All projects are developed with the view of their applicability to a wide group of people. The costs to ensure that all trainings are available to as many other countries as possible are principally the costs of hiring translators for the materials. The total cost would depend upon the languages requested and the number of items translated.

The capacity USAID is building in surveillance and response to infectious disease outbreaks will help countries to better respond to new threats from natural disease or bioterrorism. The ability to detect unusual events quickly is vital to responding to avian influenza as well as bioterrorism. Better national surveillance and laboratories will allow countries to be better partners in detecting and tracking acts of bioterrorism. Investment is building capacity in surveillance, laboratories, epidemiology and disease control measures that are needed to control other diseases such as SARS, measles, cholera, etc. The extensive surveillance network developed by the Polio Eradication Program already is being employed to act as an early warning sys-

tem for avian influenza. Investments are being made in the CDC's Field Epidemiology Training Program (FETP) in Thailand to train more local field epidemiologists. These individuals receive extensive training in how to detect and respond to outbreaks from a variety of disease, including those that could possibly be used by bioterrorists. This investment will enhance the capacity of the pharmaceutical industry to respond to infectious diseases by developing new technologies for more effective vaccines and drugs.

Additional training can always be provided, but it must be matched with the absorptive capacity of the country. Right now, USAID is working to raise that capacity so that more sophisticated skills can be developed and countries can become more self-reliant in their ability to detect and respond to new biothreats. USAID, in cooperation with HHS, is supporting new CDC FETP programs in Pakistan and Africa in order to better equip countries with the technical skills needed for rapid detection of disease threats, both natural and intentional. The Threat Agent Detection and Response (TADR) project in the DOD has just recently added on avian influenza as a biothreat subject to surveillance.

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RESPONSES OF PANEL II TO QUESTIONS SUBMITTED FOR THE RECORD BY SENATOR JOSEPH R. BIDEN, JR.

*Question.* Mr. Newcomb advocates "improving biosecurity standards and practices for the poultry industry globally." What improvements do you recommend? What changes are needed in poultry biosecurity standards here at home? Should U.S. manufacturers be sent overseas to help other countries improve the safety and efficiency of their poultry production?

Answer. At a minimum, Asian countries must move away from live animal sales and home-slaughter of poultry, creating centralized slaughter and meat packaging facilities. To avoid salmonella and other bacterial diseases, the wealthy world should assist in creating hygienic, refrigerated facilities for these endeavors.

*Question.* Do you expect quarantines to be useful in the United States? Or do you agree with Dr. Chan of the WHO, who says, "pandemic influenza is considered unstoppable once international spread is fully under way?"

Answer. Though virtually all political leaders will feel compelled to order quarantines of one kid or another, or shut down borders and human movement, these efforts will have little or no positive impact on the pandemic. Worse, they could hamper the flow of vital goods, such as medical supplies and food.

*Question.* Some people suggest that more limited restrictions on personal movements might be more useful. This might include closing schools, canceling public events, changing work venues, and the like. What do you think?

Answer. Parents will withdraw their children from schools, whether or not the facilities are officially closed. Similarly, as occurred in Asia with SARS, employees will stay home, restaurants and movie theaters will close, and most large-scale group activities will halt. These steps will occur whether or not they are ordered by government, as people will take their own actions. Airports and airlines, passenger buses and trains, and other forms of mass transit will empty of passengers because people will be afraid to use them. Again, this will occur whether or not government mandates it. Employers and schools are wise to consider now how they could continue their business and scholastic activities via telecommuting.

*Question.* Do you anticipate a need to use the U.S. Armed Forces in controlling the domestic travel of U.S. citizens during an emergency, controlling access to medicines, or preventing riots over such access?

Answer. I do not share the grim views expressed by some regarding riots and irrational human behavior. Having been at Ground Zero on 9/11, I know that most people respond to massive crisis with humanity and decency. If government does its job properly, providing equitable access to information, medicine, and services to all Americans, there will be no cause for rioting. In 1918 civil unrest generally occurred where poor and immigrant populations felt they were either singled out for punitive health action (e.g. quarantine), or were denied services that were accessible to richer, or native populations of their communities. As New Orleans showed us, government has a special duty to demonstrate that it cares about all its citizens and residents. The only reasons to draw on U.S. military personnel, assuming equity and clear communication are provided by government, are logistic. The military is uniquely capable of mobilizing large movements of personnel, supplies, food and medicine—both domestically and overseas.

*Question.* Ms. Garrett noted the need to prepare for giving nongovernmental organizations a major role, both at home and abroad. NGOs have approached me with the same concern. What roles ought they to fill, and how should their activities be coordinated, both here and overseas?

Answer. I was surprised to learn this summer that the American Red Cross did not envision a role for itself in a pandemic beyond, perhaps, lining Americans up for vaccination. Americans will expect the Red Cross and other volunteer organizations to provide tender loving care to ailing patients who are warehoused outside of hospital facilities. Certainly, there will be inadequate numbers of trained health professionals to meet the patient care demands of a pandemic.

In addition, because millions of people will be home-bound, afraid to venture into perceived contagion, there will be a strong need for coordinated volunteers to ensure deliveries of food, water, basic nonflu medicines (e.g. insulin for diabetics), and other essential supplies on a door-to-door basis. If well coordinated by government, such volunteer energy could be drawn from forces ranging from Boy and Girl Scouts to United Way and CARE.

Overseas, history has repeatedly shown that NGOs and humanitarian relief organizations are among the first to spot outbreaks. Groups like MSF and WorldVision, with vast networks of volunteers and paid staff deployed in remote and troubled parts of the world, are uniquely positioned to spot an outbreak. They must be coordinated, and know to whom they ought to direct their alerts, how samples should (and should not) be collected and shipped, and what sorts of logistic and care support they can best provide internationally.

Finally, government must consider how it can creatively marshal private sector skills and energy in a prolonged pandemic. Companies like DHL, FedEX, General Motors, Microsoft, and hundreds more may well have skilled labor forces capable of augmenting government activities in dramatic ways. These must be considered now, at local, federal, and international levels, as their utility can only be felt if bridges and planning between government and the private sector commence well in advance of a crisis.

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## Responses of the State Department to Questions Submitted by Senator Barbara Boxer

*Question.* The recently published Pandemic Influenza Plan states that the Department of Health and Human Services has greatly intensified its global surveillance activities. Can you describe those global surveillance activities?

Answer. The Centers for Disease Control and Prevention has been pursuing a policy of developing and supporting active and aggressive international detection and investigation capability. This is supported with ongoing funds and has been greatly enhanced with the addition of $15 million in emergency supplemental funding in FY 2005. CDC is providing bilateral support to 12 Foreign Ministries of Health for the development of influenza surveillance networks. These networks will enhance the capacity to detect influenza, including avian influenza.

One area of particular focus is developing regional capacity in Southeast Asia in epidemiology and laboratory management in pandemic influenza. This includes developing and teaching an avian influenza curriculum to epidemiologists and laboratorians. Training also involves public health leaders to develop a national network of public health field staff, and allied health personnel for detecting and reporting human cases of influenza.

CDC is also working with the World Health Organization (WHO) and Ministries of Health to increase population awareness about the human health risks associated with pandemic influenza, and to advise affected countries concerning prevention or mitigation measures that can be used in the event a pandemic occurs. Methods to increase public awareness include: Broadcast radio messages, training local physicians, healthcare workers and community public health leaders.

In order to assist in international containment activities, CDC is working to develop, train, and equip rapid field response teams to be deployed in the event of a pandemic influenza outbreak. These teams will be trained to undertake emergency field epidemiology studies, collect samples for shipment to laboratories, and institute emergency control measures such as quarantine and isolation in a standardized manner.

In support of these activities, CDC staff will be assigned to Vietnam, Cambodia, and Laos to facilitate improvements in the detection of influenza cases. These senior-level staff will be providing technical assistance on how to investigate cases as well as assisting in the development of a national preparedness plan by the Ministry of Health, with the support of WHO and partners.

CDC's FY 2005 emergency supplemental funding also provides laboratory support for outbreak investigations. Activities include testing clinical samples and influenza isolates shipped to CDC by affected countries, diagnosing the presence of avian influenza in humans by supplying necessary test reagents to the affected region and globally, and developing vaccine seed stock to produce and test pandemic vaccine candidates. Additional laboratory work will be conducted at CDC/Atlanta on samples and isolates sent from Southeast Asia. CDC is also a WHO Influenza Collaborating Center and conducts routine worldwide monitoring of influenza viruses.

CDC is also working with the Department of Homeland Security in the National Biosurveillance Integration System (NBIS) program to conduct near-real-time monitoring of avian flu progression. NBIS will have the capability to detect indicators suggesting the development of a potential biorisk amidst the daily background noise of activity, processes, and routine anomalies within our health communities. NBIS will facilitate collaborative interagency analysis to ensure fully integrated biosurveillance situational awareness is developed and maintained.

*Question.* Can you also describe the comprehensive infection control strategies that you are developing to be used on an international basis? And when will these strategies be in place?

Answer. Developing infection control strategies are an ongoing USG-wide responsibility drawing on many authorities encompassing many activities. CDC is preparing Web-based training programs for infection control that will be applicable to national and international settings. CDC is in the process of using this training to increase the agency's capacity for providing expert infection control consultation for infectious disease emergencies, both abroad and in the United States. Laboratory detection support for outbreak investigations is also an important part of infection control. CDC is also working to develop laboratory capacity in Southeast Asia. As a World Health Organization Collaborating Center on Influenza, we expect these capacity-building efforts to extend within the next 9 to 18 months. CDC tests clinical samples and influenza isolates shipped to CDC by affected countries; diagnoses the presence of avian influenza in humans by supplying necessary test reagents to the region and globally; and develops vaccine seed stock to produce and test pandemic vaccine candidates.

CDC has taken steps to strengthen infection control through the development of rapid field response teams that would be deployed under WHO auspices in the event of a pandemic. These teams, comprised of local and international staff at individual field sites, are trained to undertake emergency field epidemiology studies, collect samples for shipment to laboratories, and institute emergency control measures such as quarantine and isolation in a standardized manner. Over the next 12 months, the teams will develop a regional stockpile of essential materials, including Personal Protective Equipment (PPE). CDC staff have been assigned to Vietnam, Cambodia, and Laos to facilitate improvements in the detection of influenza cases and to provide technical assistance on how to investigate cases. CDC is working with Ministries of Health in these countries to develop national preparedness plans, with assistance from WHO and other partners, within 12 months.

*Question.* I understand there is a concern that certain nations in Asia have not been aggressively dealing with outbreaks of avian flu in birds. What is the United States doing in conjunction with its international partners to ensure that birds infected with the flu are destroyed?

Answer. USDA believes it is critical that the H5N1 strain of avian influenza circulating in Southeast Asia be effectively addressed in the region's poultry populations. USDA strongly believes that implementation of effective biosecurity measures and control and eradication programs will go a long way toward reducing the amount of virus in these H5N1-affected countries and minimize the potential for the virus to spread to poultry in other areas of the world. These actions, if effectively implemented, would diminish the potential for a human influenza pandemic.

Dr. Ron DeHaven, Administrator of USDA's Animal and Plant Health Inspection Service (APHIS), traveled extensively in Southeast Asia in early December 2005 in an effort to evaluate the animal health infrastructure in Southeast Asia and determine what steps can be taken to improve disease safeguarding and surveillance programs in the region. During his trip, Dr. Ron DeHaven assessed the animal disease situation in several countries and the steps being taken in response. The information and observations he collected are helping USDA develop its plan to work with international organizations, primarily the United Nations Food and Agriculture Organization, to deliver the best possible technical assistance to these countries. In this regard, APHIS is opening a new office in Bangkok, Thailand, that will be responsible, among other things, for working with nongovernmental organizations and

coordinating efforts in the region to assess countries' veterinary infrastructures and steps that need to be taken to address the Asian H5N1 virus in poultry populations. To further assist with these important efforts in the coming months, APHIS will also be placing contractors with animal health expertise in U.S. Embassies in Laos, Cambodia, Vietnam, and Indonesia. A foreign service national will also be placed in the U.S. Embassy in Burma.

The National Strategy for Pandemic Influenza, announced by President Bush on November 1, reflects the importance of these proactive measures on the animal health front. The Congress provided $91 million in emergency funding for USDA to further intensify its surveillance here at home and to deliver increased assistance to countries impacted by the disease, in hopes of preventing further spread of avian influenza. On the international front, $18 million of the emergency funding for USDA will be used for additional bisosecurity, surveillance, and diagnostic measures. This funding will significantly advance USDA's efforts that build on the Food and Agriculture Organization's work to prevent, control, and eradicate avian influenza where it currently exists in Asia. USDA believes it is most appropriate to continue working through international organizations like the FAO to address the disease situation in Southeast Asia.

Having said that, the Food and Agriculture Organization, as well as other international animal health standard-setting organizations, recommend that high pathogenicity avian influenza be dealt with by stamping out (bird depopulation) when active infection is detected; and by implementing movement controls; cleaning and disinfection protocols; and other related steps. Animal vaccination is another tool that can be used as part of a multifaceted approach to managing the disease, given that conditions in each country in the region can vary widely.

Former USAID Administrator, Andrew S. Natsios, declared avian influenza a top priority for the Agency and stressed the importance of an early and effective response. USAID is fully engaged in the U.S. Government's response to this threat by supporting prevention and containment efforts in affected countries and working with developing nations around the globe to prepare for a possible pandemic. These efforts are being closely collaborated with those of the Departments of State, Agriculture, Defense, and Health and Human Services. USAID is also working closely with international and private sector partners, including WHO, the U.N. Food and Agriculture Organization (FAO), and NGOs to ensure a well-coordinated and strategically sound response to this global threat.

A key part of limiting the spread of H5N1 among birds and from birds to humans is identifying and culling poultry that are sick or have been exposed to the virus. In order to improve identification of sick birds, USAID is taking several approaches, including: Working with affected countries to promote active surveillance of AI infection in animals; strengthening diagnostic capacities; and facilitating the availability of incentives to farmers to minimize underreporting of bird deaths. The incentives may include: Compensation in the form of cash, replacement chicks, or technical assistance. On the response side, USAID is supporting public awareness and education activities for farmers on appropriate behaviors and training and supporting rapid response teams to conduct appropriate control measures, including culling and disposal.

*Question.* Also, what actions is it taking to make sure that all cases of avian flu in humans are reported?

Answer. For AI cases to be reported, two criteria are necessary—the affected country must have the capacity to detect cases, and it must be willing to share that information and patient samples with the WHO. The United States is working with several affected countries and with the WHO to establish the public health infrastructure necessary for effective surveillance for avian influenza cases. In addition, we are working to build relationships with countries and to address all of the various disincentives which impair transparency and reporting. These include studies of effective means for compensation for farmers' losses due to culling, as well as diplomatic initiatives through the President's International Partnership of Avian and Pandemic Influenza to encourage countries to rapidly and transparently share information and samples. Recognizing this threat can only be averted through coordinated international effort, President Bush announced the establishment of the Partnership in September 2005 during the high-level segment of the U.N. General Assembly meeting. The Partnership is built on a set of 10 core principles which call for enhanced preparedness, surveillance, and transparency.

Actions the U.S. Government has taken include mobilizing interagency teams to assess the avian flu situation. In particular, in mid-January, a team of experts in animal and human health surveillance, laboratory capacity, and public health communication from the State Department, USDA, USAID, and HHS went to Turkey,

Azerbaijan, Georgia, Armenia, and Ukraine to meet with government officials and representatives of international organizations working locally on avian influenza. The purpose of the visit was to assess the avian flu situation there and to make recommendations on what the United States could to support efforts in Turkey to deal with and prepare for avian flu. The team experts met with Turkish Government officials and with representatives of international organizations, such as the World Health Organization, the U.N. Food and Agriculture Organization (FAO) and the European Centre for Disease Prevention and Control, which are working locally on avian influenza. Teams have also been sent to Iraq to support WHO and the Navy Medical Research Unit (NAMRU) and to meet with government officials to investigate the outbreak and provide support.

*Question.* The United States is stockpiling Tamiflu and other antivirals for the U.S. population. Have there been any discussions or agreements between the United States and any other country or organization like the World Health Organization to provide antivirals to other countries that are most vulnerable to the avian flu?

Answer. Although no final decisions have been made, discussions are currently underway regarding possible U.S. support for an international stockpile and the parameters of such support.

No one knows with any certainty, if a pandemic can be prevented. The best way to prevent a pandemic would be to eliminate the virus from birds, but it has become increasingly doubtful if this can be achieved within the near future. One of several important steps to enhance a rapid response anywhere in the world is to develop an international stockpile which can be deployed quickly by health authorities. The United States is working closely with the WHO to develop a doctrine for deploying this stockpile, and we are assessing how we and other countries could best contribute to this stockpile and to facilitate its rapid distribution to an affected country.

*Question.* Do you have any plans to assist in surveillance activities for Africa or in other potentially vulnerable regions?

Answer. Avian influenza is a global problem. CDC has developed an extensive network with Ministries of Health and other partners in Southeast Asia for H5N1 activities. In terms of expanding into other areas including Africa, the Centers for Disease Control and Prevention has a close working relationship with portions of the Department of Defense, in particular with the Naval Medical Research Unit (NAMRU). CDC provides funding for and collaborates with NAMRU3 in Cairo, Egypt, to support training and the expansion of influenza surveillance networks to countries where none exist. CDC's work with NAMRU3 includes the enhancement of the quality of surveillance in other countries to enhance outbreak detection, seroprevalence studies in populations at risk for avian influenza such as poultry workers, and enhanced outbreak response in the region.

Furthermore, CDC has full-time staff in 43 countries, including many countries in Africa. CDC is already working closely with our staff in all 43 countries to provide them with the latest information about the current situation, assess country preparedness, assist in the development of pandemic influenza plans, and provide policy and technical guidance as requested. In addition, previous investments, such as the establishment of International Emerging Infections Programs (IEIP) in Thailand and Kenya, provide the foundation for rapid response to an emerging pandemic. For example, the IEIP program in Thailand is working to enhance laboratory diagnostic capacity, and establishing an acute respiratory disease surveillance system. The IEIP program in Kenya is undertaking similar activities, and recently convened representatives from 8 African countries to coordinate CDC efforts across Africa to detect the introduction of H5N1 into the continent. Finally, CDC has longstanding collaborative relationships with others working in the global arena, such as USAID, the Department of Defense, WHO, and the World Bank, which can facilitate a coordinated and effective response to international needs. The staff, programs, and capabilities developed by CDC over several decades to address a broad range of global health challenges are well-positioned to play a critical role in responding to an influenza pandemic.

In addition, USAID is actively tracking migratory birds that carry the virus around the world. For example, USAID is supporting work in Tanzania to monitor migratory birds arriving from Eastern Europe that may carry the virus. This work will soon be expanded to other target countries in East Africa. Further, 107 rapid assessments on the state of preparedness have been completed in countries where USAID could potentially provide assistance. These reports will serve as a baseline for measuring the success of our programs and will guide our efforts in the coming year to mount effective strategies to meet the evolving threat of AI.

USAID has also been supporting the development of infectious disease surveillance activities in Africa, the former Soviet Union, and Eastern Europe for a number of years. In Africa USAID further has supported the development of CDC's Field Epidemiology Training Programs (FETP) in Uganda, Zimbabwe, Ghana, and Kenya. These programs train the epidemiologists that form the core of the national surveillance programs. In Tanzania, USAID worked with the government to redesign the national disease surveillance system and retrain over 250 national surveillance officers.

In Ethiopia, USAID is planning to commit $600,000 to support surveillance activities and purchase equipment for enhancing laboratory diagnosis of animal H5N1 infections. In addition, USAID/Tanzania provided $75,000—and leveraged an additional $70,000 from the German Government—to strengthen surveillance and laboratory diagnosis of wild birds. The administration's request for supplemental FY06 funding for avian influenza activities included $1 million to strengthen animal surveillance in Africa and another $3.25 million to bolster planning and preparedness for avian flu control in the event of an H5N1 outbreak. The request also included $1 million to conduct public communications campaigns to educate at-risk populations on how to recognize outbreaks and limit human exposure.

In the former Soviet Republics, USAID has worked with CDC to strengthen the Central Asian regional FETP and has supported the reform of antiquated Soviet surveillance systems into more efficient and effective programs. This work has taken place in Kyrgyzstan, Ukraine, Belarus, Georgia, and Moldova. In Eastern Europe, USAID is supporting improved avian influenza surveillance in Turkey and Romania and has been working with the WHO regional office to reform the overall disease surveillance program in Bulgaria and Albania. These development efforts will reap true benefits with respect to the ability of these countries to adequately respond to the threat of avian influenza.

*Question.* What are your concerns about the response so far of the individual countries where avian flu has occurred in both birds and humans?

Answer. Seven countries (Thailand, Cambodia, Indonesia, Vietnam, China, Turkey, and Iraq) so far, according to the WHO, have reported AI cases in both animals and humans. In general, there are three major concerns concerning their responses to date. Some of the countries at greatest risk to experience the first "spark" of a pandemic have the fewest resources and capabilities to detect a problem early and respond. First, the detection systems in place are passive and not sensitive enough to pick up all animal and human cases which limits ability to respond. This is in part due to the varying public health capacities in different countries, and in part due to differences in countries' political situations and their willingness to be transparent. Active surveillance does take place once cases are reported, but underreporting for a variety of reasons limits where active surveillance is conducted.

Second, the existing systems have limited capacity and can be easily overwhelmed if there are simultaneous outbreaks or if investigations are generating large numbers of suspected cases and clinical samples for testing. Last, the response systems are not fast enough and/or comprehensive enough to limit the spread of the virus when there are outbreaks in animal populations and potentially human populations. For the moment, the response systems appear to be able to handle instances of limited human-to-human transmission. However, countries are likely to be unable to contain larger clusters of human-to-human transmission that would likely precede a pandemic.

The issue you have raised was among the topics USDA Administrator DeHaven assessed during his travel to southeast Asia in early December. Greater transparency regarding the timely reporting of suspect H5N1 cases in poultry in the region is vital to ensuring that timely, effective measures are taken to control the spread of the disease in the animal population.

HHS is working with the countries at greatest risk to ensure they have the core capacities in place to detect an outbreak as early as possible, report the findings, and validate the report with laboratory diagnostic confirmation and specific virus characterization. In the same vein, these countries at greatest risk lack pandemic influenza preparedness plans. In recognition of this need, we are using our own National Strategy and our Department of Health and Human Services Plan as an example others can use, as well as encouraging that countries use WHO's plan as guidance for development of their own regional and national plans. To address the concern of lack of coordination among different sectors, through our own efforts toward an integrated cross-sectoral approach to addressing this zoonotic disease threat, we are demonstrating to other countries the importance of strengthening partnerships between agricultural/animal health and human health sectors, as well as including technical experts and policy officials from transportation, commerce,

environmental health, wildlife, law enforcement, and the private sector. Cross-sectoral activities include developing and exercising preparedness and response plans, training, sharing information and diagnostic samples, and working together on risk assessment and communication strategies.

*Question.* What can the international community do to improve these responses?

Answer. Support from the international community is vital to continue building the infrastructure for an international response. One of the most important steps is to ensure that efforts to support activities for technical assistance for avian influenza are well coordinated with global partners. We are working through the International Partnership for Avian and Pandemic Influenza to develop public health capacity to enhance surveillance and to present a broad array of diplomatic initiatives to promote transparency in reporting and rapid sharing of samples.

The Partnership is truly a cooperative effort. It includes not only key U.N. agencies and international organizations such as the World Health Organization, the Food and Agriculture Organization, the World Organization for Animal Health, and the World Bank, but also regional organizations such as the Asia Pacific Economic Cooperation (APEC) forum, the Association of Southeast Asian Nations (ASEAN), the African Union, the European Union, and the Summit of the Americas. Significantly, a number of countries have supported the Partnership by taking leadership roles in several key areas. As a result of the Senior Officials Meeting, Canada agreed for example, to spearhead follow-on discussions on international stockpiling of vaccines and antiviral medicines as an important component of readiness. We held discussions with representatives of the European Union on a comprehensive strategy for vaccine research, development, and production. Australia and Japan agreed to collaborate on rapid response and containment, including the economic and social impacts of a pandemic.

Since the October Senior Officials Meeting, work is progressing on the issues of stockpiles, rapid response and containment, and vaccines. Much of this work was carried forward at a meeting cohosted by the WHO, FAO, OIE, and the World Bank in Geneva on November 7–9, 2005, and at the annual Ministerial meeting of the Global Health Security Action Initiative (GHSI), in Rome on November 17–18, 2005, which brought together the Health Ministers of Canada, France, Germany, Italy, Japan, Mexico, the United Kingdom, and the United States, along with the Commissioner of Health and Consumer Protection of the European Commission and the Director General of the WHO. The next meeting of IPAPI is planned for June.

The three areas of concern mentioned in the response to the previous question—passivity of the detection systems; limited capacity of existing systems; and lag time of response systems—are areas where the USG and international community are providing support. Surveillance and laboratory capacity, for example, are being strengthened to improve detection so that response can be targeted where needed. Sample processing capabilities are being expanded to deal with increasing needs. Existing and additional rapid response teams are being trained for outbreak investigation/containment, and additional containment measures (e.g., vaccination) are being added to contain the virus. In addition, the U.S. Government is discussing with international partners how to participate in the international stockpiling of antiviral medicines to help developing countries deal with clusters of human-to-human transmission.

On October 10, 2005, Cabinet-level officials conducted an extremely important exercise related to the Federal Government's preparedness to deal with an influenza pandemic. The Department of State has encouraged foreign government officials to engage in similar exercises to test their degree of preparedness. Japan and WHO hosted a meeting January 12–13 in Tokyo to address early detection and reporting; issues and challenges to implement rapid response measures at the country level; and regional and international coordinated mechanisms. A donors meeting cosponsored by the EC and China was held January 17–18 in Beijing to address international funding for pandemic influenza. Among major contributions, in addition to the U.S. pledge of $334 million, the European Union pledged $150 million euros; Japan pledged $125 million; and Australia pledged $100 million AUD. The Asian Development Bank also plans to contribute $430 million to avian influenza efforts.

*Question.* WHO is developing a stockpile of antiviral drugs. How many doses does it have to date and how many will be acquired?

Answer. Roche, the manufacturer of Tamiflu, is stockpiling the antiviral drug in concert with WHO and expects to have 3 million doses ready by the second quarter of 2006 between the Roche factories in Connecticut and Switzerland. Roche has pledged another 2 million courses which will be available in September 2006 to help poor developing countries, which have reported H5N1 outbreaks, to prevent human

transmission. The WHO hosted a meeting in Geneva on December 12, 2005, to put together an international strategy for stockpiling and containment of avian influenza. U.S Government officials were actively involved in these discussions.

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RESPONSES OF THE STATE DEPARTMENT TO QUESTIONS SUBMITTED BY SENATOR BARACK OBAMA

STOCKPILES FOR POOR NATIONS

*Question.* Some experts believe that the impact of an avian flu pandemic can be mitigated if it is identified and isolated early enough. A key part of this would include administering antiviral drugs quickly enough to people—presumably in Southeast Asia—who have been exposed to the virus. However, most developing countries do not have sufficient antiviral drugs stockpiled to treat an outbreak.

What should we be doing to address this shortcoming? Should we allocate a portion of our future stockpile toward the prevention of early outbreaks in developing countries? Should we establish some sort of international fund to help address this issue?

Answer. No one knows with any certainty, if a pandemic can be prevented. The best way to prevent a pandemic would be to eliminate the virus from birds, but it has become increasingly doubtful if this can be achieved within the near future. One of several important steps to enhance a rapid response anywhere in the world is to develop an international stockpile of antiviral drugs, which can be deployed quickly by health authorities. The United States is working closely with the WHO to develop a doctrine for deploying this stockpile, and we are assessing how we and other countries could best contribute to this stockpile and to facilitate its rapid distribution to an affected country.

Roche, the manufacturer of Tamiflu, is stockpiling the antiviral drug in concert with WHO and expects to have 3 million doses ready by the second quarter of 2006 between the Roche factories in Connecticut and Switzerland. Roche has pledged another 2 million courses which will be available in September 2006 to help poor developing countries which have reported H5N1 outbreaks to prevent human transmission. Recent studies, based on mathematical modeling, suggest that these drugs could be used prophylactically near the start of a pandemic to reduce the risk that a fully transmissible virus will emerge, or at least to delay its international spread, thus gaining time to augment vaccine supplies.

However, stockpiling antivirals alone is not sufficient nor synonymous with being prepared to respond to pandemic influenza. The success of this strategy, which has never been tested, depends on several assumptions about the early behavior of a pandemic virus, which cannot be known in advance. Success also depends on excellent surveillance and logistics capacity in the initially affected areas, combined with an ability to enforce movement restrictions in and out of the affected area. To increase the likelihood that early intervention using the WHO rapid-intervention stockpile of antiviral drugs will be successful, surveillance in affected countries needs to improve, particularly concerning the capacity to detect clusters of cases closely related in time and place.

U.S. Government support for the creation of early-warning surveillance networks and for national surveillance systems can also help limit the number of infections by reducing response time and improving the information that reaches authorities. U.S. Government support for training and equipping rapid responders to treat infection and prevent further spread can reduce the impact and spread of an outbreak. Supporting risk-communications campaigns in local languages to raise public awareness of high-risk behaviors can help people recognize infections early and take appropriate measures to prevent infection. We are working toward this end.

While no final decision has been made, we anticipate that we are prepared to contribute a portion of our stockpile toward attempts to contain the disease abroad. This is only a rational decision so long as there is a possibility of containing the outbreak and preventing its introduction into the United States.

The U.S. Government is in a strong position to support the ability of developing nations to effectively respond to H5N1 infections in humans through assistance in a number of areas.

An international fund has been considered, but the consensus of USG agencies is that an actual stockpile, prepositioned in one or more locations in Asia, would avoid delays in making decisions and procuring commodities. The FY 2006 Department of Defense, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico, and Pandemic Influenza, 2006, contains $56 million to stockpile and preposition, in close coordination with HHS, USDA, and the World Health Organiza-

tion, key "non antiviral" commodities that can be quickly mobilized to support outbreak containment.

This stockpile, to be managed under the auspices of an international organization, will contain key "non antiviral" commodities that may include personal protective equipment, disinfectants, soap, and poultry vaccines. This strategy is for a rapid response capacity that will enable the international community to control the disease as it develops into a more transmissible form. USAID and HHS will work closely with the WHO to identify stockpile locations and specific contents, and to develop guidelines and trip wires for deployment.

ENHANCING INCENTIVES FOR SURVEILLANCE

*Question.* Despite human deaths from the H5N1 strain, avian influenza remains overwhelmingly an animal pathogen. In countries like Vietnam and Cambodia—where farmers rely heavily on poultry for income and food—farmers have little incentive to report possible outbreaks when they know that they and their neighbors will be losing what may be one of their only sources of nutrition and income.

Governments lack the means to compensate farmers who lose their poultry to culling. This is a significant impediment to surveillance and control of avian flu and could result in widespread economic damage to countries in the region. As a point of comparison—in 2003, a short-lived and well-controlled outbreak of SARS caused a 2-percent drop in Southeast Asia's GDP in a single quarter.

What efforts are underway to either support the compensation programs of those countries most affected or make alternative sources of income available, such as microfinance programs?

Where is this incorporated into the administration's plans?

Are we putting enough resources into these programs?

Answer. In many of the countries in Southeast Asia that have been affected by H5N1, efforts to detect outbreaks in animals have been hampered by the failure of governments to provide fair compensation to small farmers and households. Recognizing this limitation, USAID began working on issues related to compensation in Vietnam, Indonesia, Cambodia, and Laos, using FY05 supplemental funds. Since the amount of money needed for compensation is very large, USAID's efforts have focused on: (1) Decreasing the need for compensation by minimizing disease risk in the poultry sector through the use of industry best-practices (e.g., farm biosecurity, practices at animal markets), and (2) engaging the local, regional, and international business community to leverage financial, commodity, technical, and in-kind contributions for avian influenza response and containment. Businesses, for example, could provide cash or replacement chicks to farmers who have lost their flocks to disease or culling. This work will be expanded with the funding requested for FY06.

The FY06 supplemental budget contains $7 million for USAID to take steps to increase the availability of key commodities, incentives, technical support, and financing for avian influenza control. USAID has had discussions about the compensation issue with the World Bank and will coordinate with their proposed $500 million effort for AI control.

Compensation will be very expensive and probably beyond the capacity of any single country to manage. Currently, USAID is working with the World Bank to identify resources for compensation. The World Bank is planning a trial compensation program in Turkey. Current funding for international control of avian influenza by the USG, however, does not include contributions to a compensation program, which would require a significant increase in the level of funding.

ENHANCING INFRASTRUCTURE IN DEVELOPING NATIONS

*Question.* In order to fight avian flu in developing countries—and similar viruses that will undoubtedly follow—it is important to have strong public health and veterinary health systems and services to prevent, detect, and contain possible outbreaks.

However, this infrastructure and capacity is lacking throughout Southeast Asia. Due to conflict, poverty, and neglect, the systems and services in Asia are weak and do not have the capacity to respond to an outbreak.

How much funding is included in the administration's request to strengthen these essential services and systems in developing countries? Are we doing enough in this area? Is this something that should be addressed by Congress when trying to reach agreement during the conference committee on the $8 billion appropriated for the avian flu?

Answer. The $280 million included in the enacted FY 2006 Department of Defense, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico, and Pandemic Influenza, 2006, will help strengthen the abilities of na-

tional animal and human health systems in affected countries to more efficiently detect, and more effectively respond to, emerging infectious diseases such as H5N1 avian influenza. Assistance to WHO and FAO will help establish structures that function at the regional and international level to support a robust response to the H5N1 threat. Support for physical infrastructure is not part of the request as it would be costly and divert funds away from emergency containment activities needed right now. Other organizations (e.g., World Bank, Asian Development Bank) and donors traditionally address infrastructure issues.

Since the President's request was developed, a number of new countries have reported outbreaks. As a result, the needs in developing countries for assistance related to AI surveillance and response are greater.

With the spread of AI to previously unaffected countries in Eastern Europe and the Middle East, AI is moving closer to Western Europe and Africa. The continual presence of AI in Southeast Asia is providing more opportunities for the virus to mutate into a form that can be transmitted easily from human to human. Both trends have significant economic and social consequences. Increasing the U.S. investment in international containment efforts could help limit the damage in affected countries and help keep unaffected countries free of the virus for as long as possible.

The Centers for Disease Control and Prevention has been pursuing a policy of developing and supporting active and aggressive international detection and investigation capability. This is supported with ongoing funds and has been greatly enhanced with the addition of $15 million in emergency supplemental funding in FY 2005. CDC is providing bilateral support to the Ministries of Health in 12 countries for the development of influenza surveillance networks. These networks will enhance the capacity to detect influenza, including avian influenza.

One area of particular focus is developing the regional capacity in Southeast Asia in epidemiology and laboratory management for pandemic influenza. This includes developing and teaching an avian influenza curriculum to epidemiologists and laboratorians. Training also involves public health leaders to develop a national network of public health field staff, and allied health personnel for detecting and reporting human cases of influenza.

CDC is also working with the World Health Organization (WHO) and Ministries of Health to increase public awareness about the human health risks associated with pandemic influenza, and to advise affected countries concerning prevention or mitigation measures that can be used in the event a pandemic occurs. Methods to increase public awareness include: Broadcast radio messages, training local physicians, healthcare workers and community public health leaders.

In order to assist in international containment activities, CDC is working to develop, train, and equip rapid field response teams to be deployed in the event of a pandemic influenza outbreak. These teams will be trained to undertake emergency field epidemiology studies, collect samples for shipment to laboratories, and institute emergency control measures such as quarantine and isolation in a standardized manner.

In support of these activities, CDC staff have been assigned to Vietnam, Cambodia, and Laos to facilitate improvements in the detection of influenza cases. These senior-level staff will be providing technical assistance on how to investigate cases as well as assisting in the development of a national preparedness plan by the Ministry of Health, with the support of WHO and partners.

CDC's FY 2005 emergency supplemental funding also provides laboratory support for outbreak investigations. Activities include testing clinical samples and influenza isolates shipped to CDC by affected countries, diagnosing the presence of avian influenza in humans by supplying necessary test reagents to the affected region and globally, and developing vaccine seed stock to produce and test pandemic vaccine candidates. Additional laboratory work will be conducted at CDC/Atlanta on samples and isolates sent from Southeast Asia. CDC is also a WHO Influenza Collaborating Center and conducts routine worldwide monitoring of influenza viruses.

The Department of Defense is participating with CDC and the World Health Organization in the development of surveillance networks in Southeast Asia. DOD currently has three regional laboratories in Asia that are involved in testing for avian influenza, with the specimens taken from the local civilian population as well as military. For example, in Jakarta, NAMRU2 was performing much of the preliminary testing on specimens from the Indonesian outbreaks, and NAMRU3 in Cairo is now involved in testing specimens from civilians in Iraq. CDC, WHO, and DOD have made a cooperative effort to extend their resources as much as possible while avoiding duplications of capabilities.

DEPARTMENT OF DEFENSE ROLE—USAMRIID

*Question.* One important resource that the United States has in dealing with international health problems is the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID).

My understanding is that USAMRIID (pronounced US-AM-I-RID) has achieved positive results, collaborating with the private sector, to develop vaccines and antivirals against some of the most deadly single-strand RNA viruses in the world, including Ebola and Marburg.

I also understand that H5N1 is a single-strand RNA virus, so USAMRIID could be a resource here as well. To what extent are the civilian agencies tapping into the research and expertise provided by the U.S. military—and vice versa—to deal with the avian flu?

Please describe in detail this cooperation. Should we be doing more to facilitate joint research between the civilian and military sides?

Answer. In addition, the Centers for Disease Control and Prevention, has a close working relationship with portions of the Department of Defense, including AMRIID and the DIA's Armed Forces Medical Intelligence Center (AFMIC) as well as the Naval Medical Research Units (NAMRU).

NAMRU has been instrumental in providing assessments and briefings on outbreaks. CDC provides funding and technical assistance for NAMRU2, which is located in Jakarta, Indonesia, for activities in Indonesia to expand avian influenza surveillance network. CDC also provides funding for, and collaborates with, NAMRU3 in Cairo, Egypt, to support training, and the expansion of influenza surveillance networks to countries where none exist. CDC's work with NAMRU3 includes an enhancement of the quality of surveillance in other countries to improve outbreak detection, seroprevalence studies in populations at risk for avian influenza such as poultry workers, and enhanced outbreak response in the region.

AFMIC has been very helpful, providing policymakers with extensive research and analyses on AI developments. AFMIC has provided us with assessments on where AI is occurring and updates on the status of vaccine production efforts worldwide. CDC and USAMRIID both participate in the National Interagency Biodefense Campus (NIBC). The NIBC will leverage and expand key competencies to achieve productive and efficient interagency cooperation in support of homeland security biodefense. At the NIBC, located at Fort Detrick, Federal agencies will colocate laboratories that support our country's biodefense research program. The NIBC will include laboratory, administrative, utility, and support facilities. The colocation and collaboration of partners from DOD, HHS, DHS, and USDA provides a unique opportunity for coordinating and synchronizing areas of common interest among the Federal agencies involved in medical research and/or biotechnology related to biodefense.

The National Institutes of Allergy and Infectious Diseases (NIAID), a component of the National Institutes of Health (NIH) at the Department of Health and Human Services (HHS), maintains a very dynamic biomedical research collaboration with the Department of Defense (DOD). The NIAID collaborates with the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) on research related to the development of safe and effective medical countermeasures against potential agents of bioterrorism.

One important DOD and NIH collaboration on influenza is the Influenza Genome Sequencing Project. This project is a partnership between the NIH (the NIAID and the National Library of Medicine), the Armed Forces Institute of Pathology, and several other organizations including the Institute for Genomic Research. The purpose of the Influenza Genome Sequencing Project is to complete genetic sequences of new virus isolates and rapidly make this sequence information publicly available through GenBank®. This program has enabled scientists to better understand how influenza viruses evolve as they spread through populations, and to match viral genetic characteristics with virulence, easy of transmissibility, and other clinical properties. An important goal of this project is to provide scientists with the knowledge they need to uncover potential targets for new vaccines, therapies, and diagnostics against influenza.

Another research collaboration with the DOD on influenza is accomplished through an interagency Agreement (IAA) between NIAID and the Uniformed Services University of the Health Sciences. This IAA, which was signed in August 2005, established the NIAID/DOD Emerging Infectious Diseases Clinical Research Program. Shortly after being established, this Research Program created an Influenza Working Group to develop clinical research projects for avian influenza that leverage existing NIH and DOD domestic and international scientific capacity to advance

the understanding, diagnosis, prevention, and control of avian influenza. The Working Group is comprised of representatives from NIAID and all branches of the DOD.