

This story on the web

- ➔ [Flash page](#)
- ➔ [Non-Flash page](#)



Listen to podcast
(6min, 3MB)

Download transcript
(PDF, 227K)



Solutions

IBM is on call

IBM is in the lab and in the field



Services

Ready for the big IF

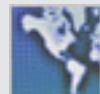
Worse case scenarios.
Best case solutions.



Webcast

➔ **Understanding Pandemics**

The human side of business
continuity planning



Outside IBM

➔ **WHO monitors bird flu**

The World Health Organization at
work



**Stay on top of innovation
that matters**

• [More Ideas from IBM](#)

The race against bird flu

Science and technology versus H5N1

While deadly, the H5N1 “avian flu” virus isn’t easily transmissible between humans today. But influenza viruses tend to mutate—and that’s what worries public health experts.



Modern influenza pandemics

- **Spanish Flu, 1918-20:** The H1N1 virus caused at least 40 million deaths and another half million illnesses during a pandemic most often compared to the potential threat of the avian flu virus.
- **Asian Flu, 1957-58:** The H2N2 virus is responsible for one to 1.5 million deaths worldwide.
- **Hong Kong Flu, 1968-69:** Three-quarters to 1 million people die from infection by the H3N2 virus.

Source: Wikipedia

Glossary

Virus: a piece of nucleic acid (DNA or RNA) wrapped in a thin coat of protein that replicates itself within cells of living hosts.

Vaccine: a substance that stimulates an immune response, especially the production of antibodies. The word derives from the Latin for “cow” (vacca), because the cowpox virus was used to create the antigen that protected humans against the smallpox virus.

H5N1: the virus that is the causative agent of what is commonly known as avian influenza or, more commonly, bird flu. **H5** stands for the fifth of several known types of the protein hemagglutinin. **N1** stands for the first of several known types of the protein neuraminidase.



Endemic: disease that is constantly present in people of a certain class or in people living in a particular location.

Epidemic: a disease that affects a disproportionately large number of people within a population, community, or region. The nonhuman equivalent of an epidemic, affecting large numbers of animals, is called an "epizootic."

Pandemic: an epidemic that is geographically widespread; occurring throughout a region or even throughout the world.

Deadly migration

The supercomputer has replaced the petri dish. See how technology is working right now to stop the next outbreak and save millions of lives.

Watch this video (6:29 min)

[High bandwidth](#)

[Low bandwidth](#)

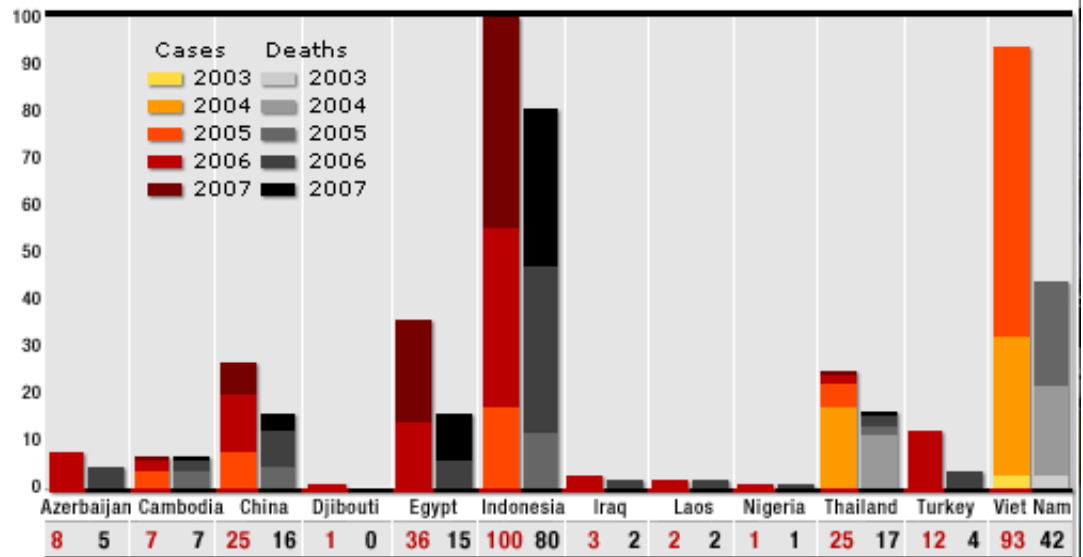
Download transcript (244KB)



Human cases

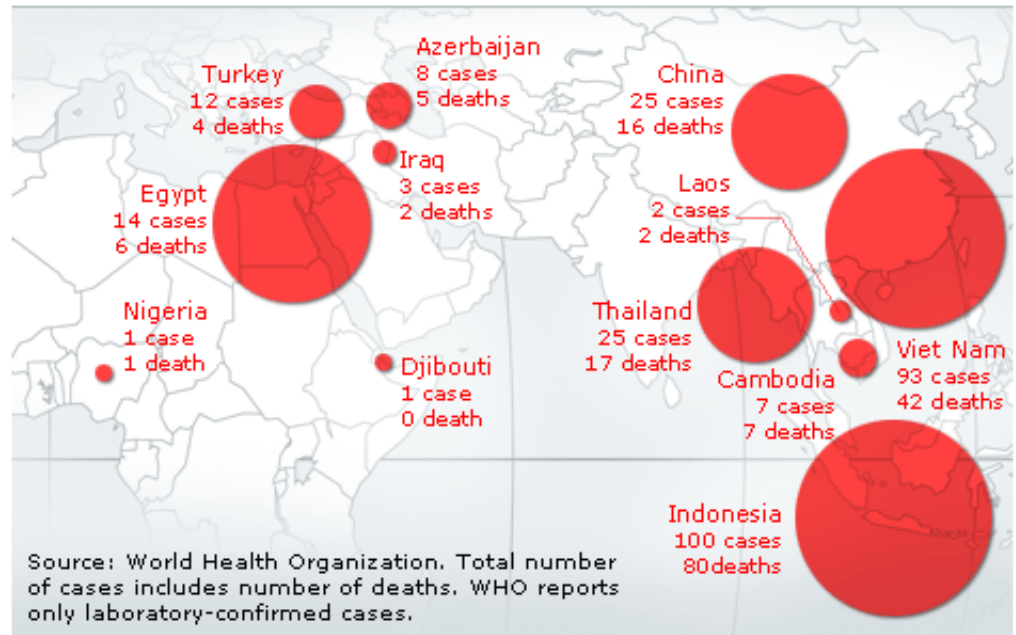


Cumulative Number of Human Cases of Avian Influenza
as of 15 June 2007



Source: World Health Organization. Total number of cases includes number of deaths. WHO reports only laboratory-confirmed cases. All dates refer to onset of illness.

Affected areas with confirmed human cases of H5N1 since 2003
Status as of 15 June 2007



What's being done to head off an H5N1 pandemic?



Interoperable Healthcare Information Infrastructure (IHII)

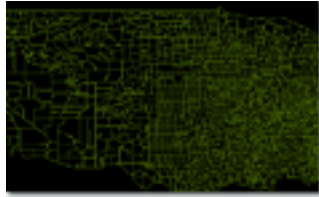
A software framework IBM developed to allow world health organizations to more easily share and analyze electronic health information, such as the outbreak of disease. Designed to aid communication and collaboration among medical facilities in collecting and sharing health data, IHII could expand to facilitate sharing of clinical data among laboratories and public health agencies, as well.

In addition to support for electronic documents and messaging (using IBM's Healthcare Collaborative Network technology), IHII includes support for simulation and analysis tools. One such new tool, STEM, focuses on studying emerging infectious diseases.

The Spatio-Temporal Epidemiological Modeler (STEM)

A potentially powerful tool for scientists and public health officials for understanding and planning more efficient responses to the spread of infectious diseases. Invented at the IBM Almaden Research Center in San Jose, California, STEM facilitates the creation of advanced mathematical models involving multiple populations and interactions between diseases to promote better understanding of epidemiology and to provide new tools for protecting population health.

By using comprehensive data on geopolitical boundaries, populations, and transportation networks, combined with data on infection rates and the availability of vaccines, STEM simulates the geographic spread of an infectious disease over extended time periods. By adjusting the variables—such as when airports might get closed, or when a vaccine could be distributed to a certain population—public health officials can gain insight into the many epidemiological and economic ramifications their decisions could create.



2 min, 2MB

[This video](#), created with STEM, shows a simulation of the 1918 Spanish Flu starting near Boston as it did in 1918, with 20 people infected in two counties near Boston. In this simulation, however, the pandemic takes place in a modern America with interstate highways, air travel, and other modern conveyances and medical advances. (The parameters have also been adjusted to speed up the spread of the disease for video purposes.)

IBM designed STEM as a base upon which software developers and researchers can build other useful applications. IBM made the prototype code available on its early-release Web site ([alphaWorks](#)), to allow developers to explore its potential and provide guidance for its further development, and on June 8, 2007, the company announced that it had released STEM as an open-source technology through the Eclipse Open Healthcare Framework Project. As an open-source project, the global collaboration and knowledge underlying STEM's algorithms and data sets could benefit countries and populations currently underserved by public health research. IBM is also collaborating with leading universities and other institutions to evolve this technology, using STEM to run multiple computer simulations based on real-world situations to identify and create the best policy, treatment and prevention options in the event of an epidemic.

Project Checkmate

A research collaboration (with the Scripps Research Institute) with the objective to anticipate, manage and contain infectious diseases. The project uses the capabilities of supercomputing in IBM's Blue Gene with computational biology algorithms, biopatterning and microfluidics research, along with Scripps's knowledge of biochemical modeling and drug discovery.

In the simplest terms, Project Checkmate is using advanced computing to determine the most likely, most infectious, and most lethal mutations the H5N1 virus might undergo, and then to help determine the best vaccine against such mutations. It represents a "first" for the fields of epidemiology and infectious diseases, since all previous vaccines have been created to combat existing, rather than expected, virus mutations, often with a "wait-and-see" approach which produces and deploys the vaccine often before knowing with any certainty whether that particular mutation will, in fact, turn out to be the most lethal and transmissible.

Project Checkmate, on the other hand, could provide much-needed information about the avian flu virus's future state before it has reached that state—which could even allow pharmaceutical manufacturers to have a vaccine ready in time to head off what might otherwise become a deadly global bird flu pandemic.

IBM Corporation

New Orchard Road, Armonk, New York 10504, USA