From the front lines

As the H5N1 flu virus continues to sweep across the globe, researchers in some of the countries affected describe in their own words the political and scientific challenges that they face.

INDONESIA

Andrew Jeremijenko

Medical epidemiologist and former head of influenza at the US Naval Medical Research Unit No. 2 in Jakarta

With 30 human cases of avian flu since last July — 23 of whom have died — Indonesia is currently the world's avian-flu hotspot. Vietnam and Thailand have stemmed the flow of cases by controlling the disease in animals. But in Indonesia, the cases keep coming. Every human case is a potential stepping stone to a pandemic virus, and each case in Indonesia should therefore be considered both a national and an international emergency.

Controlling the disease in Indonesia is inherently difficult. The country has 240 million people — and 1.3 billion chickens — spread across some 6,000 inhabited islands. Political power in this fledgling democracy is also highly decentralized across the archipelago.

The virus is now endemic in many of the country's millions of backyard farms. One reason is the initial delays in taking action, with Indonesia only belatedly admitting to the presence of H5N1 in poultry in January 2004. It has probably been present since August 2003.

Surveillance and identification of H5N1 in animals and birds need to be substantially improved, as does clinical and epidemiological follow-up, if we are to get a handle on the science of what is happening in Indonesia. There is a need for strong coordination between those involved in public health and in animal health.

Indonesia is now promptly reporting suspected and confirmed human cases to the World Health Organization (WHO); however, it is probably not detecting all cases. The mortality rate is also extremely high, with 12 of the 13 cases this year dying. That gives a 92% mortality rate, far higher than the global 56% rate. We need to identify and address the causes, such as delays in detecting cases.

In particular, we need to compare the sequences of the virus in human cases and in surrounding poultry, to spot any changes in the virus that may be occurring in humans. Indonesia has generally been good at sharing human samples with the international community, but urgent requests for data on animal viruses found in the vicinity of human cases have been ignored.

On the bright side, the country has developed a national control and preparedness strategy that was signed by President Susilo Bambang Yudhoyono on 13 March. National and international pressure must be maintained to ensure that these improvements are sustainable.

THAILAND

Les Sims

Consultant for the Food and Agriculture Organization (FAO)

The outlook for avian flu in Thailand is most encouraging. The country has experienced several waves of animal infection, but since a peak in summer 2004, the number of outbreaks has progressively decreased, and no new outbreaks have occurred in the past three months.

One must be prudent, however, about the extent to which the strategies behind this success can be exported to other countries with structurally different poultry industries. Most of Thailand's poultry is in commercial flocks, in sharp contrast to Vietnam and China, which have many backyard farms.

That said, some of the notable innovations in the Thai programme should be considered elsewhere. In particular, it has used village-level disease-spotters as surveillance sentinels. The procedure began in September 2004, when the government launched a nationwide survey. This involved hundreds of thousands of inspectors carrying out house-to-house searches in an attempt to obtain reliable data on incidence and so target control measures more effectively.

INDIA

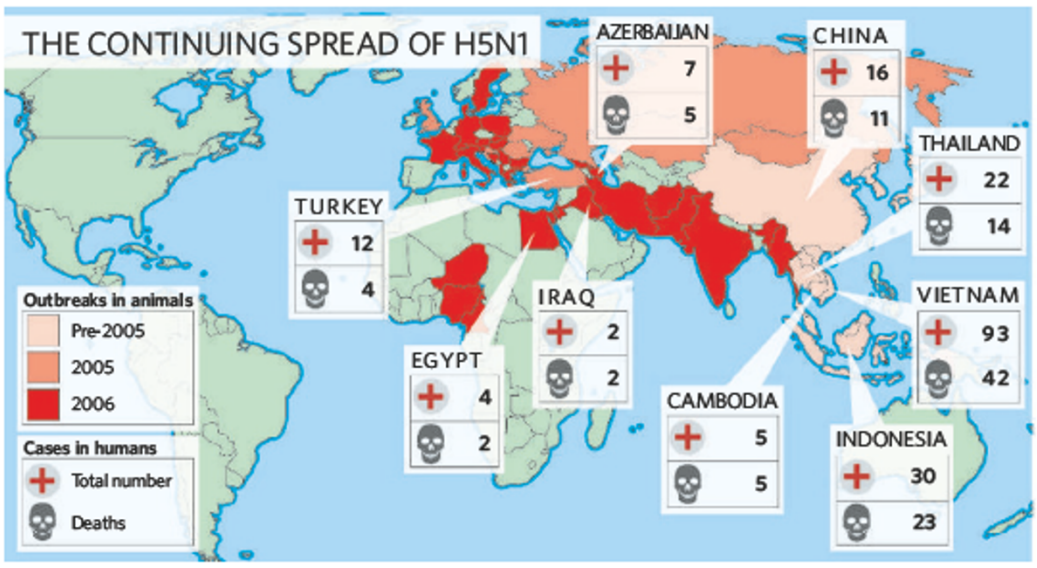
Shahid Jameel

Head of virology at the International Centre for Genetic Engineering and Biotechnology, New Delhi

Avian flu was first reported in India in February in the Navapur district of the western state of Maharashtra. The government response has been fair to good, with a low-key, yet aggressive strategy in which enough manpower, containment gear and medicines were deployed in affected areas.

Control is mainly by surveillance, and by culling birds in a 3-kilometre radius around outbreaks. One big weakness is the lack of laboratories that can carry out rapid surveillance. The entire country has only one facility with the containment security to handle bird H5N1 virus samples and only two that can process human samples.

Communication with the public has been a problem. At the same time that several government health officials ate chicken on live television to show it was safe, chicken was banned from the canteen in the Indian parliament and removed from the menus on state-run Indian Airlines and Indian Railways.



The High Security Animal Disease Laboratory in Bhopal is stretched. It is handling 4,000 samples a week and doesn't have the staff or capacity for this, which is leading to delays. Precious time is being lost in making decisions on where to cull, giving the virus the opportunity to spread. For example, positive results relating to an outbreak in Gujarat that began on 27 January were announced only on 16 March.

The major challenge is to keep the virus out of backyard flocks. And we need to think about vaccination and other strategies besides mass culling, as chicken and eggs are a cheap source of protein for much of the population.

NIGERIA

Claude P. Muller

Director of the Institute of Immunology, WHO Collaborative Center for Measles, Luxembourg

Avian flu broke out in commercial poultry farms in Kano and Kaduna states in northern Nigeria in January, but was misdiagnosed as Newcastle disease. H5N1 is at risk of becoming endemic in large parts of Africa, hitting already fragile food supplies and creating new opportunities for spread to humans. Despite the weakness of surveillance for avian flu in Africa, the international community has been very slow in reacting to its appearance on the continent.

We have helped set up the only laboratory in Nigeria that can diagnose H5N1, with Ademola Owoade, a poultry veterinary surgeon at the University of Ibadan. One lab is not enough for a country of 129 million people. The state organizes the collection of samples, and we supply reagents and staff.

Within a few days of setting the lab up, we found that the virus had already spread to the southwest, the hub of the country's poultry industry and far beyond the cordon sanitaire that the federal government had tried to set up in the north. It is probably safe to say that the virus is now endemic in the region.

The requirement of the World Organisation for Animal Health and the FAO — that samples be confirmed at reference laboratories before being officially acknowledged — is also allowing the virus time to spread. Although the economic impact of false positives may be great, false positives are less important than false negatives in terms of catching the virus before it spreads.

Poultry is the second-largest industry here after oil. Some farms have been very professional in taking comprehensive precautions, but many large farms have not (see www.aphis.usda.gov/birdbiosecurity/hpai.html). I believe that the virus cannot be contained in Africa without vaccination, as most farmers cannot afford to restock after culling their flocks.

AZERBAIJAN

Guenael Rodier

WHO special adviser who coordinated the response in Azerbaijan

Azerbaijan last month reported seven cases in humans, of whom five have died — its first cases of the disease. Worryingly, six of the cases were a cluster, occurring in the small Daikyand settlement in the southeast. As there had been no obvious contact with poultry, this initially raised fears of possible human-to-human spread.

Now, however, we believe we have pinned down the cause: direct contamination from wild birds. It is not proven, but all six were involved in defeathering wild birds. Educating the public about high-risk practices, such as defeathering and slaughtering, will be our key task here.

CHINA

Guan Yi

Virologist at Hong Kong University

China has reported 16 human cases of H5N1 infection, 11 of them fatal. The latest case, reported in Shanghai on 24 March, is puzzling — like another recent case in Guangzhou — in that there were no reported poultry outbreaks nearby, and the victims had no close contact with poultry. We believe we may be looking at a route of contamination that has not been considered previously: direct and indirect contact with birds in live poultry markets.

Work by my group supports this hypothesis. Birds tested in markets in southern China over the past six months show that, despite extensive vaccination, only 20–50% of birds in the markets carry antibodies to H5N1. And H5N1 virus could be isolated from around 1% of the birds in the market, even though they appear healthy. They seem to have some partial protection, but are still shedding virus, as the rest of the poultry population might be doing. And when we test viruses isolated from market poultry in the lab, they are still highly pathogenic in experimental chickens. This means that either these birds have developed some natural immunity or there is a problem with the quality of the vaccines used. Current vaccination programmes have not prevented the virus from becoming prevalent in poultry populations in this region.

Looking back on five years of surveillance, it is also now clear that the incidence of H5N1 in domestic ducks and geese is much higher than in chickens, so these are the major vectors for H5N1. If we want to control H5N1 in China and southeast Asia, we need to control its spread in aquatic poultry. ■

Interviews by Declan Butler

ON THE RECORD

"Luckily criminals wear trainers. If they all wore Oxford brogues we would be in a very difficult position."

Nigel Allinson of the University of Sheffield describes a computerized system being developed in Britain to identify shoeprints at crime scenes.

"This Pope has remained a scientist at heart."

Ernst-Ludwig Winnacker, president of Germany's main research funding agency, is impressed after meeting Pope Benedict XVI.

Sources: BBC, DFG

SCORECARD

▲ **Chinese health** Chinese authorities announce that they have wiped out lymphatic filariasis, a disease that can lead to grossly enlarged limbs. The World Health Organization hopes to eradicate the disease by 2020.

▲ **Ancient coiffure** Cleopatra employed up to three different hairstyles to present the best image to the locals wherever she travelled, says a recent archaeology book.

▼ **Climate change** The UK government admits that it will fail to meet its self-imposed goal of cutting carbon dioxide levels by 20% of 1990 levels by 2010.

NUMBER CRUNCH

ViaGen, a company in Austin, Texas, is cloning champion horses. The animals were all big in cutting, a sport that grew out of cattle roundups and involves singling out a cow from a herd. But what's at stake?

$150,000 is how much ViaGen charges to clone a horse.

$90,000 is how much the company charges for a second copy of the same horse.

$380,000 is how much Royal Blue Boon, the first champion horse cloned, won in its sporting lifetime.

Sources: Washington Post, News8Austin

SIDELINES