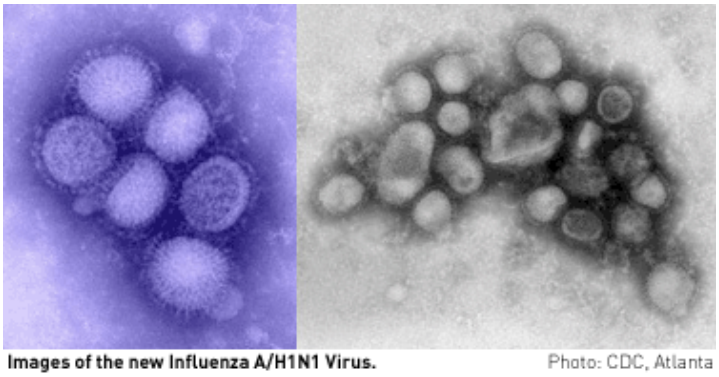
FAOAIDEnews
Avian Influenza Disease Emergency

Situation Update 59
20 May 2009

Influenza A/H1N1 in Humans and Swine



Images of the new Influenza A/H1N1 Virus. Photo: CDC, Atlanta

A novel reassortant of the Influenza-A/H1N1 virus is currently circulating in humans. Human clinical cases, and sustained human-to-human transmission of the novel virus, were detected initially in North America (Mexico and the USA). Since its recognition as a novel strain by the CDC in the third week of April 2009, a total of 10,243 confirmed human cases including 80 deaths have been reported from 41 countries (WHO: 20 May 2009). The majority of the cases suffered only mild illness and recovered quickly.

The emergence and rapid spread of a novel virus in North America among humans, although not accompanied by either severe illness or deaths, prompted the WHO to move from Phase-3 of the pandemic alert level to Phase-4. Following the observance of sustained human-to-human transmission in two countries of a WHO region, the Director-General of WHO Dr Margaret Chan declared a move to Phase-5 on 29 April 2009. Declaration of Phase-5 indicates that a pandemic is imminent. By definition, Phase-6 can be declared if the virus is seen to be circulating efficiently in more than one WHO region.

Recent sequencing results made public from CDC Atlanta demonstrate that the Influenza A/H1N1 virus currently circulating among humans in the USA, Mexico and other parts of the world, contains genetic reassortment of three viruses which have been circulating in pigs in Europe, Asia and America since 1998. This new information suggests that the progenitor virus strain was a virus circulating in swine and has evolved in humans through gradual mutations over a 10-12 year span, and has components of avian and human origin.

cont'd on Page 2

Contents

AIDEnews is an FAO ECTAD publication
Editor: Satya Sarkar, Coordinator and Team Leader, ECTAD Communication Unit
(*Satya.Sarkar@fao.org*)

An animated depiction of the CDC findings is being made available on the FAO website at http://www.fao.org/ag/againfo/programmes/en/empres/AH1N1/Background.html.

On 2 May 2009, the Canadian Food Inspection Agency (CFIA) announced that it had found H1N1 flu virus in a swine herd in Alberta, and that it was highly probable that the pigs were exposed to the virus from a worker who had recently returned from Mexico and had been exhibiting flu-like symptoms. Signs of illness were subsequently observed in the pigs. The individual, as well as all the pigs, recovered within a few days. Further analysis confirmed the presence of Influenza A/H1N1 virus in the pigs. As of 14 May 2009, this was the only confirmed report of human-to-animal transmission of the virus.

Globally, investigations on the epidemiologic situation in pigs are still required to understand: i) if the virus is currently circulating widely in pigs; and ii) what other viruses are currently circulating in the pig population.

Typical Swine Influenza (SI) is a widespread and common disease in pig populations worldwide. The disease is very common in industrial holdings. In individual pens, morbidity could be high, but mortality is usually very low. It is not mandatory to notify Influenza A/H1N1 infections in pigs to OIE. In its severe form, it is characterized by an acute, febrile, respiratory disease of swine. It may be caused by a number of different type A influenza subtypes known to circulate in pig populations around the world. The most common types found in pigs belong to the H1N1, H1N2 and H3N2 subtypes. Once pigs become infected, and following a short incubation period of 1-3 days, they may develop clinical signs of a flu-like disease with high fever (40-41C°), ocular and nasal discharge and severe coughing. The animals appear lethargic and anorectic. Virus transmission among pigs occurs primarily through nasal discharges and the disease mostly spreads very rapidly.

Influenza viruses are constantly mutating. If pigs or other animals (and also humans) become co-infected with two different strains of influenza viruses this may cause a partial mixing of the genetic material and, a third new virus may be generated with genes coming from both the original viruses. This mixing (called re-assortment) is largely due to the segmented nature of the genome. These reassortments may also bring changes to other virus characteristics, including virulence and host range. Re-assortments occur frequently, including when viruses from different animal species infect the same host. Swine influenza viruses do not infect humans frequently. When they do, such infections in humans are mostly associated with direct and close contacts with infected pigs. Human-to human transmission is usually not observed.

The risk of infection of H1N1 virus through ingestion has never been established. If at all present, influenza viruses are rapidly killed when meat is cooked, and there are no specific precautions other than the usual guidance of practicing good hygiene during preparation of meat or pork products. Joint statements to this effect have been made by FAO, WHO and OIE and can be found on the FAO website at:
http://www.fao.org/ag/againfo/programmes/en/empres/AH1N1/Statements.html

Avian influenza viruses, swine influenza viruses, and human influenza viruses all belong to the same class of viruses known as Orthomyxoviruses. Both H1N1 and H5N1 are subtypes of the Influenza type A virus. Both viruses contain the neuraminidase 1 (N1) protein helping virus to become released from an infected host cell after replication. While there is some similarity between the viruses, the emerging H1N1 virus in humans does not in any direct way relate to the HPAI H5N1 virus circulating in poultry.

Avian influenza viruses circulate in wild and sometimes also domestic birds populations. Certain sub-types, including the highly pathogenic H5N1, are occasionally transmitted to mammals, including humans. Swine influenza viruses circulate in swine populations and are occasionally, albeit infrequently, transmitted to birds and to humans. Human influenza viruses circulate in human populations and are transmitted from person to person. Human influenza viruses are also transmissible to animals, pigs in

particular. Pigs can therefore harbour viruses from avian and human sources, and act as "mixing vessels" for these viruses. An example of humans infecting pigs is the recent case reported by the Canadian Food Inspection Agency (CFIA) on 2 May 2009, announcing that it had found H1N1 flu virus in a swine herd in Alberta, and that it was highly probable that the pigs were exposed to the virus from a worker who had recently returned from Mexico and had been exhibiting flu-like symptoms.

National authorities are encouraged to carefully investigate possible occurrences of influenza-like events in domestic animals. Virus samples may be collected and sent to national labs and/or international reference centres. National authorities can always get in touch with FAO, and by contacting EMPRES-Shipping-Service@fao.org, avail of support for transporting samples for laboratory testing. Guidance on laboratories accepting samples for analysis, as well as the applicable regulations for the shipment of samples to these labs can be found at the FAO website http://www.fao.org/ag/againfo/programmes/en/empres/AH1N1/Guidance.html

In order to reduce the risk for transmission of influenza A/H1N1 (humans-to-animals or animals-to-animals), FAO recommends that surveillance for porcine respiratory disease should be intensified and all cases of porcine respiratory syndrome should be immediately reported to the national veterinary authorities. The international organizations -- OIE and FAO -- should be informed when presence of the new A/H1N1 Influenza virus is confirmed in any pig populations. Furthermore, movement restrictions should be implemented for all farms or holdings with swine showing signs of clinical respiratory illness until diagnosis of the illness have been made. Where influenza A/H1N1 is confirmed, these restrictions should be in force until seven days after the last animal has recovered. Animals suffering from swine influenza can be separated from healthy herd-mates and allowed to recover; there is no need to cull affected animals. Animal handlers and veterinarians should wear protective gear to minimize risk of being infected by zoonotic agents, including influenza. Persons who work directly with swine should be urged not to go to work if they have any signs respiratory disease, fever or any influenza-like illness. In high risk areas a swine influenza vaccine could be used in swine as long as it is considered effective against the circulating strain, and is permitted by relevant authorities.

FAO is working in close coordination with the World Health Organisation (WHO), the World Organization for Animal Health (OIE), as well as other national and international actors, to clarify and interpret the evolution of this new disease, and advise member countries on how to best deal with this worrying turn of events, with maximum efficiency.

For more information on the current Influenza-A/H1N1 crisis please visit http://www.fao.org/ag/Influenza-A-H1N1.html

Up-to-date information on the disease situation in humans can be found at the WHO website:
http://www.who.int/csr/don/2009_05_13/en/index.html

The fourth Regional Steering Committee of GF-TADs for Africa

GF-TADs[1] for Africa is, simultaneously, the animal health component of ALive (African Livestock Partnership, www.alive-online.org) and the African component of the GF-TADs initiative which combines the strengths of the FAO and OIE for the prevention and control of transboundary animal diseases worldwide. The main objectives of GF-TADs for Africa are to (i) provide its Members and Partners with updated information on the animal health situation in Africa[2]; (ii) discuss current and forthcoming animal health strategies; (iii) present how the GF-TADs global and regional tools (GLEWS, CMC-AH, OFFLU, Networks and RAHCs[3]) support the fight against priority animal diseases, and; (iv) share information on the animal health portfolios of the main stakeholders in Africa with the objective of strengthening collaborations. The GF-TADs for Africa Steering Committee (SC) is composed of 15 members from political, technical and financial institutions under the leadership of the FAO CVO (SC chairman) and OIE (SC Vice-President and Secretariat). The Fourth Steering Committee meeting of the GF-TADs for Africa (SC4) was held in Nairobi in March 9-10 2009, back-to-back with the ALive 13th Executive Committee meeting (EC13) and the 4th SPINAP[4] Steering Committee meeting (SC4). The agenda addressed specific diseases (HPAI, FMD, rinderpest, PPR, RVF, T&T, CBPP) and cross cutting issues (strengthening of national Veterinary Services, trade, Veterinary Public Health (VPH), biosecurity); the role of various GF-TADs tools (epidemio-surveillance, laboratory and socio-economic networks, ALIVE INAP[5] studies, the OIE Laboratory-twinning programme, the OIE PVS[6] tool, and the Regional Animal Health Centres (RAHCs)); and the development of the One World One Health (OWOH) strategy. The SC4 Recommendations (officially endorsed during the ALive EC13) reflect the main issues discussed: the results of the HPAI prevention and control programmes; the importance of considering long term and cross cutting issues beyond HPAI (biosecurity, strengthening of animal health systems, and sectors involved at the human-animal-wildlife-ecology interface); development of an OWOH Strategy for Africa[7]; the necessity to maintain and strengthen emergency capabilities to respond to outbreak events; the necessity to continue addressing the prevention and control of specific diseases which are still very important in Africa; the continuation of the INAPs exercise, the OIE PVS assessments, and the PVS gap analysis for the evaluation of the Veterinary Services and assessment of the needs for investment; the strengthening of the epidemiology, laboratory and socioeconomic networks, as well as the development of communication and VPH networks; strengthening of future reference laboratories (OIE twinning programme); continuation of the use of tools such as the CMC-AH, GLEWS platform and OFFLU network; the need to strengthen the FAO-OIE-IBAR RAHCs.

The GF-TADs next three-year Action Plan (2010-2012) – composed of 5 specific activities[8] - was also discussed. Next steps include its finalization among FAO, OIE and IBAR and its inclusion in the ALive second Three-year Action Plan. All the supporting documentation of the meeting, including the recommendations and information on the SC5 will soon be available on the GF-TADs global website (www.gf-tads.org) which is currently under development.

---

[1] GF TADs: Global Framework for the Progressive Control of Transboundary Animal Diseases

[2] Seven priority diseases are targeted: Rinderpest, FMD, HPAI, RVF, T&T, CBPP, and PPR; however any major sanitary event can be discussed. (FMD: Foot-and-mouth disease; PPR: *Peste des petits ruminants*, RVF: Rift Valley fever, T&T: Tsetse and Trypanosomosis, CBPP: Contagious bovine pleuropneumonia)

[3] GLEWS: Global Early Warning System; CMC-AH: Crisis Management Centre – Animal Health; OFFLU - the joint OIE-FAO network of expertise on influenza

[4] SPINAP: Support Program for Integrated National Action Plans

[5] INAP: Integrated National Action Plans

[6] PVS: Evaluation of Performance of Veterinary Services

[7] this issue should be presented and discussed at the next conference of the AU Ministers in charge of Livestock

[8] (i) Prevention and control of animal diseases of economic and public health importance in SSA; (ii) Public- Private Partnerships in animal health; (iii) TADs epidemiosurveillance strengthening and networking in SSA; (iv) Strengthening and networking of animal health national, regional and reference laboratories in SSA; (v) Transboundary Animal Diseases At the Livestock–Wildlife Interface

MOST RECENT HPAI OUTBREAKS 2006-09

Note: This list has been compiled on the basis of information up to 20 May 2009.

2009

May	Bangladesh, China, Egypt, Viet Nam
April	China (Hong Kong)
March	Germany, India, Indonesia
February	Lao PDR, Nepal

2008

December	Cambodia
November	Thailand
October	Germany
September	Togo
July	Nigeria
June	Pakistan
May	Japan, Korea (Republic of), United Kingdom
April	Russian Federation
March	Turkey
February	**Switzerland**, Ukraine
January	Israel, Saudi Arabia

2007

December	Benin, Iran, Myanmar, Poland
November	Romania
October	Afghanistan
August	France
July	Czech Republic
June	Ghana, Malaysia
April	Kuwait
January	Côte d'Ivoire, Hungary

2006

August	Sudan
July	**Spain**
June	**Mongolia**, Niger
May	**Bulgaria**, Burkina Faso, Denmark
April	Djibouti, Sweden, West Bank & Gaza Strip
March	Albania, Austria, Azerbaijan, Cameroon, **Croatia**, **Greece**, Jordan, Kazakhstan, Serbia, **Slovenia**
February	**Bosnia-Herzegovina**, **Georgia**, Iraq, **Italy**, **Slovakia**

***Green**: areas which never had outbreaks in poultry*

Sources: World Organisation for Animal Health (OIE), European Commission (EC), FAO and national governments

This overview is produced by the FAO-GLEWS team, which collects and analyses epidemiological data and information on animal disease outbreaks as a contribution to improving global early warning under the framework of the Global Early Warning for Transboundary Animal Diseases (TADs) including Major Zoonoses.
glews@fao.org

WORLDWIDE

Two hundred and fifty outbreaks of H5N1 HPAI in poultry were reported officially worldwide in February 2009 from eight countries: Bangladesh, China, Egypt, India, Indonesia, Lao People's Democratic Republic, Nepal and Viet Nam. H5N1 infections were also confirmed in four wild birds in Hong Kong, China. The number of reported outbreaks/cases by country and their geographical location are illustrated in Figures 1 and 2, respectively.

FIGURE 1
H5N1 HPAI outbreaks in poultry/cases in wild birds Worldwide in February 2009
(Source: FAO EMPRES-i)

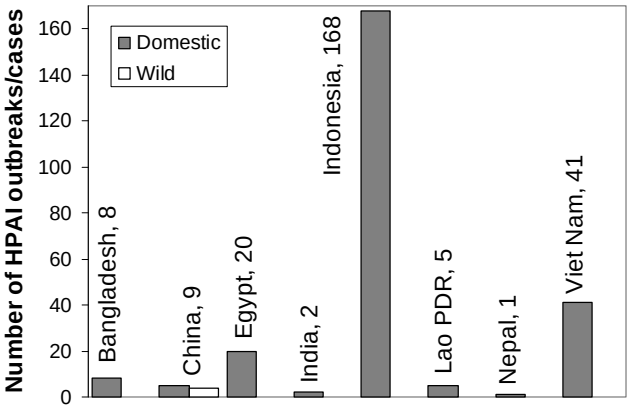
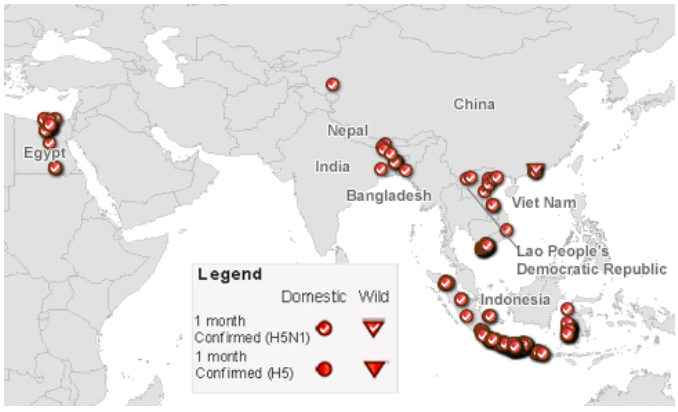


Figure 2
H5N1 HPAI outbreaks in poultry and cases of H5N1 infection in wild birds in February 2009
(Source: FAO EMPRES-i)



NOTE: H5 cases are represented for outbreaks where N-subtype characterization is not being performed for secondary cases or if laboratory results are still pending. Countries with H5 and H5N1 occurrences only in wild birds are not considered infected countries according to OIE status. The original data have been collected and aggregated at the most detailed administrative level and for the units available for each country.

The evolution of the number of outbreaks/cases over the last six months by species group (wild or domestic) and by geographical area is represented in Figures 3 and 4, respectively. The evolution of the number of confirmed cases of H5N1 AI infections in humans reported to the World Health Organization (WHO) by country between November 2003 and February 2009 is illustrated in Figure 5.

FIGURE 3
Weekly number of H5N1 HPAI outbreaks/cases per species (poultry vs. wild birds) between September 2008 and February 2009
(Source: FAO EMPRES-i)

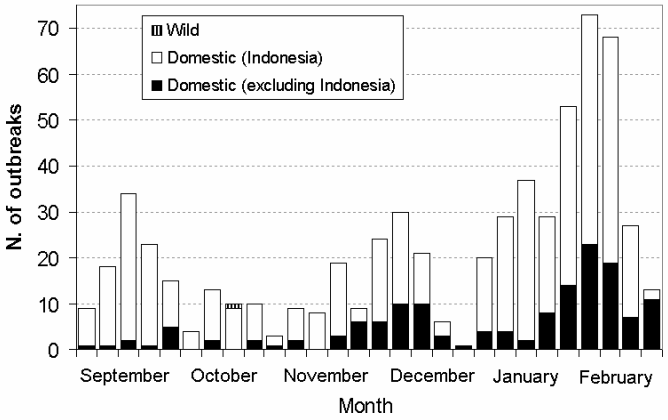


FIGURE 4
Weekly number of H5N1 HPAI outbreaks/cases by region between September 2008 and February 2009
(Source: FAO EMPRES-i)

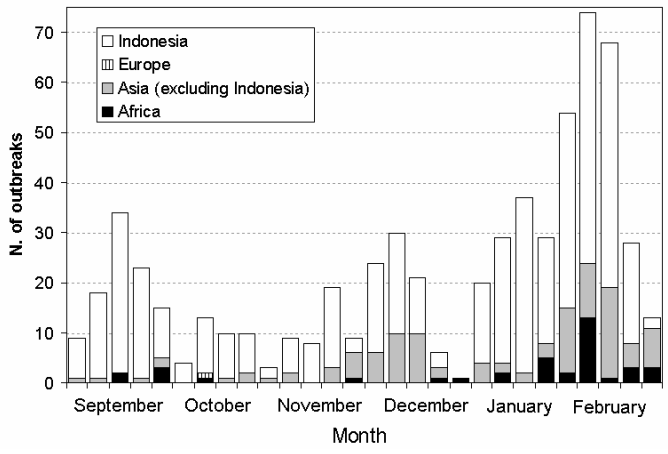
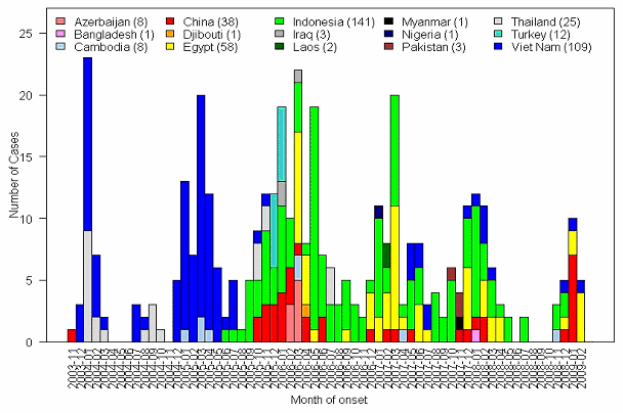


FIGURE 5
Confirmed cases of H5N1 AI infections in humans by country between November 2003 and February 2009
(Source: World Health Organization)

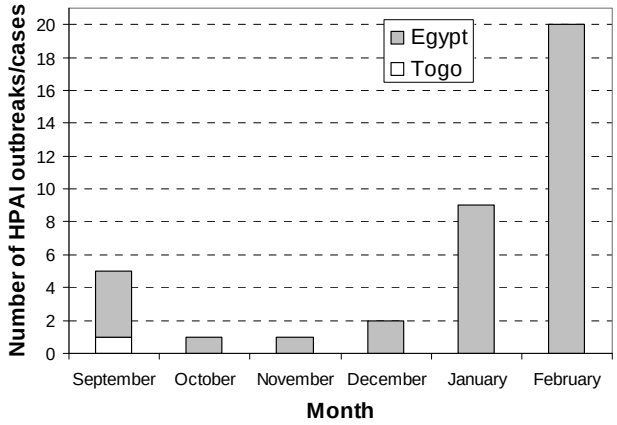


SITUATION BY CONTINENT / REGION

Africa

Confirmed outbreaks of H5N1 HPAI in Africa over the last six months are presented in Figure 6.

FIGURE 6
Number of H5N1 HPAI outbreaks in poultry between September 2008 and February 2009 in Africa
(Source: FAO EMPRES-i)



Egypt, which reported its first H5N1 HPAI outbreak was in February 2006, is considered today endemic with ongoing reports of outbreaks in almost all of the 29 governorates. The Egyptian veterinary authorities reported 20 H5N1 HPAI outbreaks in backyard poultry in ten governorates in February 2009: Aswan (2), Gharbia (2), Fayoum (2), Sixth of October (2), Minoufiyah (1), Behaira (4), Giza (1), Sharkia (2), Suez (1) and Helwan (3). Comparable to Indonesia's efforts, participatory disease surveillance (PDS) activities are now implemented through a pilot program implemented in Sharkia, Behaira and Gharbeia Governorates. During February 2009, the PDS teams detected 12 suspected HPAI outbreaks in poultry that matched the HPAI case definition. These reports were from one urban centre and 11 villages from a total of 25 villages visited in four districts. Four of them (20% of February outbreaks) were identified as H5N1 HPAI by RT PCR test. On the other hand, two suspected HPAI outbreaks that were positive to the rapid field test were negative when tested by RT PCR.

Surveillance activities are being undertaken targeting both poultry and migratory wild birds around selected Important Bird Areas (IBAs) during winter. Together with government and NGO partners, FAO is undertaking a telemetry project to better understand wild bird habitat use and migration in the region. Poultry farms are required to test their birds and receive certification as negative for HPAI infection status prior to any planned transportation. During February 2009, 1,052 samples were taken for that purpose. Due to weak monitoring of such movements, however, compliance is sub-optimal. Samples were also taken as part of road check points (one negative sample during February 2009) and active surveillance in poultry farms (22 negative samples in February 2009).

Vaccination against H5N1 AI in farms started in March 2006, one month after the first outbreak was confirmed, as one of the measures aimed at controlling the HPAI epidemic. Mass vaccinations free of charge in households started in June 2007. There are at least 21 imported vaccines used in Egypt including both H5N1 (Chinese strain) and H5N2 (Mexican strain) vaccines. No national vaccine production currently exists. The current government policy is to vaccinate poultry in backyard settings and to permit commercial companies to vaccinate their flocks with registered vaccines of their choice. Vaccine was used widely in the commercial sector and available data showed that this reduced disease and commercial losses in poultry, but vaccination campaigns in sectors 3 and backyard (sector 4) have had limited impact on disease incidence, maybe due to difficulties in obtaining widespread vaccine coverage in backyard and small village farms and because of not well defined vaccine strategies. Absence of sustained surveillance in vaccinated flocks is another major limitation of the vaccination campaign. As part of SAIDR (Strengthening Avian Influenza Detection and Response) project, CIRAD (Centre de coopération internationale en recherche agronomique pour le développement) assisted in the assessment of the current vaccination strategy and other alternative strategies in collaboration with FAO and the Ministry of Agriculture and Land Reclamation (MALR). In particular, the final report will assess the feasibility of each of these alternative

strategies from the economic, logistic and social points of view, and provide recommendations to select the best strategy.

Due to the continuous evolution of H5N1 which can lead to a virus-poultry vaccine mismatch or potentially lead to virus variants that may increase human disease incidence, the OFFLU team of FAO in collaboration with one of the laboratories of the network (USDA-ARS/SEPRL) and the Egyptian NLQP (the National governmental laboratory authorized for AI testing in Egypt of the MOLR) developed the Avian Influenza Vaccine Efficacy Project in Egypt (AIVEP). The aim of this project is to characterize the circulating H5N1 viral strains in Egypt and to evaluate the efficacy of current used vaccines against the identified strains. The two-year project includes capacity building as a major component. Intensified collection, characterization of AI viruses through genetic characterisation and antigenic mapping, and challenge tests will take place.

Three cases of H5N1 infection in humans were reported in February 2009: a 2-year old baby girl from Suez Governorate, an 18-month old baby boy from Minya Governorate, and a two-year old male from Fayoum Governorate. All had history of close contact with dead and sick poultry prior to becoming ill. Of the 56 cases confirmed until February 2009 in Egypt, 23 have been fatal. Remarkably, all cases recorded so far this year have been children under three years of age.

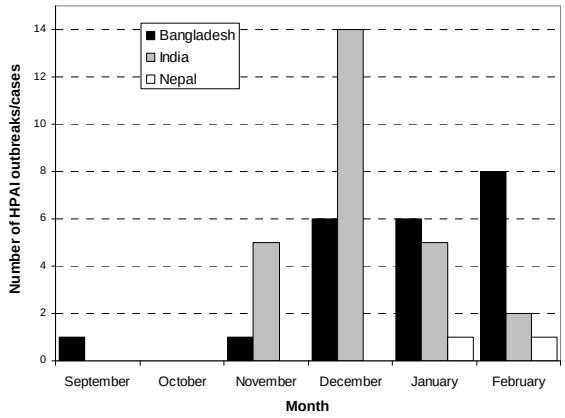
In **Togo**, no additional outbreaks of H5N1 HPAI have been reported since September 2008.

South and Central Asia

Confirmed outbreaks/cases of H5N1 HPAI in South Asia over the last six months are presented in Figure 7.

FIGURE 7

Number of H5N1 HPAI outbreaks/cases in poultry/wild birds between September 2008 and February 2009 in South Asia (Source: FAO EMPRES-i)



In **Bangladesh**, eight H5N1 HPAI outbreaks were reported in Dinajpur, Thakurgaon, Manikganj (3), Gazipur, Narayanganj and Chittagong Districts. With H5N1 HPAI outbreaks reported almost every month since the first occurrence in February 2007, the status of the country is believed to be endemic. The government has prohibited poultry vaccination against H5N1 AI. As of 28 February 2008, a total of 307 outbreaks were recorded in 47 out of 64 districts in both commercial farms and backyard holdings. Over 1.6 million birds have been culled through 28 February 2009. FAO organized and supported active surveillance, which is currently conducted in 150 upazillas (sub-districts) across the country, including the innovative use of Short Message Service (SMS) gateway (=method of sending and receiving SMS messages between mobile phones and a computer) as a reporting tool when monitoring disease and death in poultry. Daily, some 1,200 SMS coded text messages were received at the Department of Livestock Services, which include negative as well as positive findings.

In **India**, two outbreaks were reported in West Bengal (Darjiling and Medinipur Districts). This new wave of outbreaks started in November 2008 (five outbreaks), when it had been over five months since the previously reported outbreak. During the period between 2 and 22 February 2009, 15,396 active surveillance samples were received at the High Security Animal Disease Laboratory (HSADL), Bhopal. Testing was completed on 15,444 samples and another 6,535 are pending. The periodical reports (available on-line at http://www.dahd.nic.in/birdflue.htm) also include the number of samples received and tested per state. An Uttar Pradesh Wildlife Department project has collected about 240 samples so far since January 2009, mostly from migratory bird species. Another 150 wild bird samples have been submitted from samples collected at Chilika Lagoon, Orissa and Koothankulam Reserve, Tamil Nadu, from birds trapped as part of an FAO-facilitated satellite tag marking project (http://www.fao.org/avianflu/en/wildlife/sat_telemetry_india.htm). Samples are in the process of testing at the High Security Animal Disease Laboratory (HSADL). The project is to continue for a three-year period.

Nepal reported its second H5N1 HPAI outbreak, which killed 150 birds. It was declared by government on 20 February 2009 by the Shranamati Village Development Committee (VDC) of same district and lead to 2,558 chickens, 24 ducks, 54 pigeons and 264 eggs being destroyed on premises in the immediate vicinity of the infected premises judged as being at risk of infection. Measures taken have so far succeeded in containing the disease to

one district (Jhapa). The major threat is to the intensive commercial production areas in the central region. Both H5N1 and H9N2 subtypes have been isolated by VLA (Veterinary Laboratory Agencies, Weybridge, UK). Co-infection by Newcastle disease virus and H9N2 AI virus was found in one sample. The haemagglutination (HA) gene from the virus isolated from the index case was sequenced at VLA, demonstrating ~99% similarity with publicly available sequences from contemporary viruses in Eastern Asia, including viruses originating from India and West Bengal. The Bird Flu Coordination Committee, Central Region, decided to strictly prohibit the supply of birds like ducks, pigeons, chickens and their eggs, which are brought from India through the Nepal-India border to Kathmandu on passenger buses and vehicles. Similarly, the committee decided to prohibit the local hens and roosters to be kept for sale at the weekly open markets that are organized in different districts of the Central Region. The committee likewise decided to render the animal quarantine check post set up along the East-West Mahendra Highway more effective by deploying the technical human resources and the police personnel.

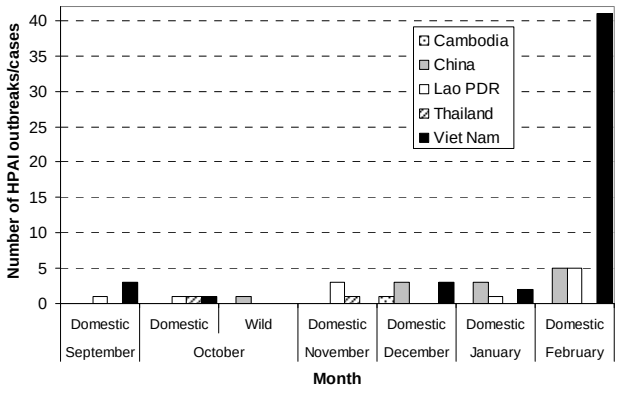
South East Asia

Confirmed outbreaks/cases of H5N1 HPAI in South East Asia over the last six months are presented in Figures 8 and 9.

FIGURE 8

Number of H5N1 HPAI outbreaks/cases in poultry/wild birds between September 2008 and February 2009 in South East Asia (excluding Indonesia)

(Source: FAO EMPRES-i)



In **Cambodia**, after the human case and poultry outbreak reported in Kandal Province in December 2008, no additional H5N1 HPAI events have been reported. Cambodia regularly reports the results obtained from their surveillance activities through an animal health hotline at the National Veterinary Research Institute (NaVRI) that receives reports on suspicious cases from the field. During February 2009, NaVRI received seven calls reporting sick and dying poultry, and received seven samples of different types of sparrows collected by the Wildlife Conservation Society, all with negative results.

In **China**, a number of H5N1 positive poultry carcasses (four chickens and one duck) were found washed ashore in a beach in Lantau Island and in Tuen Mun, Hong Kong SAR, during the first week of February. There is still no official explanation for what may have caused this event, which started in January 2009. There are no poultry farms within 3 km of the area, so the government launched an investigation on the possible causes of the recent discovery of bird carcasses; whether illegal backyard poultry keeping is involved, or if prevailing water currents could have brought the carcasses from the mainland. It has been speculated that carcasses could come from China's Pearl River Delta, which flows out into the South China Sea surrounding Hong Kong SAR. Also, the carcasses of four wild birds (a crested myna, a large-billed crow, a peregrine falcon and a grey heron) found at different locations in Hong Kong, tested positive for H5N1. However, no live healthy positive wild birds were documented at the time of these outbreaks and Hong Kong University has tested 30,000 samples from healthy wild birds in the Deep Bay wetland, Mai Po Reserve since 2003, none which tested positive for H5N1.

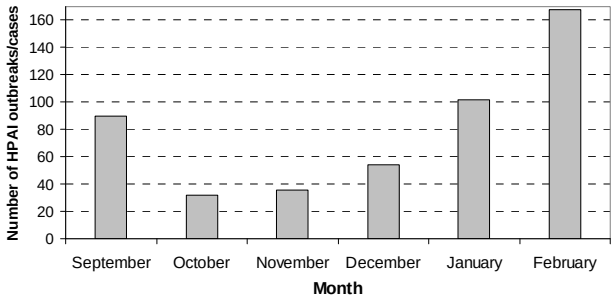
In mainland China, vaccination coverage officially reported is still very high (and higher than previous years) in all provinces. Mean vaccination coverage through September 2008 is reported to be higher for most provinces than for the same period in 2007. Additionally, all but two provinces, Xinjiang and Bingtuan, report 80% vaccination coverage or higher.

After the seven human cases reported during January 2009, no additional human cases were reported during February 2009.

Indonesia continues to report a high number of H5N1 HPAI outbreaks in poultry, as it has for the past three years. HPAI is endemic on Java, Sumatra, and Sulawesi islands with sporadic outbreaks reported from other areas. Incidence varies widely. Only two of its 33 provinces have not reported the occurrence of H5N1 HPAI. The high number of reported outbreaks each month is partially explained by the implementation of the 'participatory disease surveillance and response' (PDSR) programme that targets village-type poultry production systems (both backyard and small-scale intensive) and reports evidence of virus circulation in the village environment. The programme is supported by FAO with USAID financial support and is operating in 331/448 (74%) districts through 31 Local Disease

Control Centres (LDCCs) in 31 out of 33 provinces in Java, Sumatra, Bali, Sulawesi and Kalimantan, including all known endemically infected areas. Larger, less densely-populated provinces report HPAI outbreaks more infrequently than more densely populated provinces. It appears that H5N1 HPAI is more sporadic in the smaller, more dispersed poultry populations.

FIGURE 9
Number of outbreaks of H5N1 HPAI between September 2008 and February 2009 in Indonesia
(Source: FAO EMPRES-i)



During February 2009, PDSR officers visited 1,483 villages of which 204 (13.8%) were infected (this includes villages that were already infected during the previous month). This was noticeably higher than the January 2009 infection rate of 8.5%. During the previous 6 months, PDSR officers visited 20.2% of villages (11,345) in the 331 districts under PDSR surveillance. Since May 2008, they have visited 32.4% of villages in the areas covered by PDSR. An average of 6.4% of the villages visited during the previous 6 months were classified as infected at the time of visit. During February 2009, when compared to January 2009, an increased percentage of villages were classified as 'infected'. HPAI positive villages were reported in Bali for the first time since March 2008. Infected villages are reported throughout Java, mainly in East Java. South Sulawesi reported more infected villages than last month, while Kalimantan continues reporting no infection. Cases over the last 6 months were concentrated in Yogyakarta, Banten and Lampung.

A recent surveillance study reported on 4,067 captive, resident, and migratory birds comprising 98 species in 23 genera that were sampled between October 2006 and September 2007. The most commonly collected birds were the common sandpiper (6% of total), striated heron (3%), and the domestic chicken (14%). The overall prevalence of H5 antibodies was 5.3%. A significantly higher percentage of captive birds (16.1%) showed antibody evidence of H5(N1) exposure when compared to migratory or resident birds. The greatest number of seropositive birds in each category were Muscovy duck (captive), striated heron (resident), and the Pacific golden plover (migratory). Seven apparently healthy captive birds yielded molecular evidence of H5N1 infection. Phylogenetic analysis of the HA gene showed that the isolates were 97% similar to EU124153.1 A/chicken/West Java/Garut May 2006, an isolate obtained in a similar region of West Java. The original paper can be found at http://www.ncbi.nlm.nih.gov/pubmed/19271996.

In February 2009, **Lao People's Democratic Republic**, H5N1 was diagnosed in five villages in Khoua District, Phongsaly Province. This resulted in the establishment of three 1 km culling zones comprising of 11 villages, where a total of 2,662 poultry were culled. Compensation was paid at 60% of the market value (total amount, nearly USD 5,200) within four weeks, according to the National Compensation Guidelines. The outbreaks were reported by Village Veterinary Workers and were followed by immediate disease investigation efforts including sampling by district livestock staff.

In total, Lao People's Democratic Republic reported outbreaks in February 2008 (Luang Namtha, clade 2.3.4.), in August/September 2008 (Oudomxay and Luang Prabang, clade 2.3.2.), in November 2008 (Sayaboury, clade 2.3.2.) and in February 2009 (Phongsaly, sample about to be sent). We can conclude from this that the virus has been re-introduced in Oudomxay and since then, it has been circulating at low level (Sayaboury).

From 1 January 2009 to 28 February 2009, the National Animal Health Center of the Department of Livestock and Fisheries (NAHC / DLF) received the following notifications of sick or dead poultry: 36 through the hotline via the National Avian Human Influenza Coordination Office (NAHICO), and 168 directly from the provincial and district livestock offices (final data compiled for 7 provincial offices). Reports were followed by disease investigations, with samples taken for laboratory confirmation where necessary. From 1 January 2009 to 28 February 2009, the avian influenza laboratory of the NAHC / DLF tested a total of 29 poultry carcasses, 1,706 cloacal swabs and 1,723 sera. All collected samples, except those that identified the outbreaks in Phongsaly, have yielded negative results during these two months. Also from 1 January 2009 to 28 February 2009, active surveillance supported by FAO was conducted in 14 out of 17 provinces, in all registered or known commercial farms, and in 64 live bird markets. Additionally, a total of 352 villages were visited for clinical surveillance targeted activities. Samples were taken in villages where poultry mortality was observed or reported to have occurred during the preceding four weeks.

Thailand did not report any HPAI activity after the two outbreaks recorded in October and November 2008. From 10 November 2008 to 11 February 2009, the Department of Livestock Development (DLD) received 285 notifications of sick or dead poultry that fit the HPAI case definition. All reports were followed by prompt investigation. If necessary, additional samples were collected for laboratory confirmation. To present, there has been no laboratory evidence of HPAI.

In terms of active surveillance, from 10 November 2008 to 11 February 2009, a total of 101,153 poultry premises were visited for clinical surveillance targeted activities. 205 poultry keepers (0.2%) reported their observations on poultry deaths. From these households/farms, 265 poultry carcasses and 15,304 cloacal swab samples (from totally 83,957 birds) were submitted to the DLD laboratories for diagnosis. All collected samples have yielded negative results thus far.

In **Viet Nam**, 41 HPAI outbreaks were reported in poultry (chickens, ducks and Muscovy ducks) during February 2009 in the following provinces: Bac Lieu, Bac Ninh, Ca Mau, Dien Bien, Hau Giang, Khanh Hoa, Nghe An, Ninh Binh, Quang Ninh, Quang Tri and Soc Trang. This compares to only two outbreaks the previous month, but this upsurge follows a similar pattern every year of increasing disease occurrence immediately before and after the Tet period in January/February and in its extent is no greater than previous years (Tet 2007: 91 outbreaks; Tet 2008: 79 outbreaks; Tet 2009: 43 outbreaks). Disease control measures include stamping out of infected farms, movement restrictions for 21 days, compensation (up to 70% of market value; about USD 1.3/bird) and vaccination. Vaccination is implemented throughout the country through two annual campaigns (March/April and October/November), but in some areas age-based vaccination is being applied. The vaccination strategy for 2009-10 has been announced with the continuation of two mass campaigns per year in high risk areas (main river deltas) with cost recovery now being applied to small commercial flocks over 500 birds.

Based on the monitoring of surveillance activities, three currently circulating virus clades have been isolated: 1) HA clade 1 (predominant in Southern Viet Nam and also isolated in Cambodia); 2) HA clade 2.3.4 (predominant in Northern Viet Nam and also circulating in China); and 3) HA clade 7 (detected in poultry seized at Chinese border and at markets near Hanoi on active surveillance samples). This pattern suggests periodic introduction of new virus into northern Viet Nam and occasional introduction into southern Viet Nam.

Regarding the clade 7 findings, 15 out of 495 chickens seized at the border with China (Lang Son Province) in the first five months of 2008 were positive for clade 7 H5N1 HPAI, which had not been found in an outbreak since the one in China's Shanxi province in 2006. The genetic distance between these clade 7 viruses and the isolates used to make vaccines raises doubt as to whether antibodies generated by the vaccines would protect against clade 7 viruses. It was recommended that intensive monitoring for antigenic variants should be conducted so that appropriate antigens could be used in vaccines.

Two new human cases were reported in February 2009 in Northern Viet Nam. The first was a 23-year old woman from Dam Ha District, Quang Ninh Province, who developed symptoms on 28 January 2009. The second was a 32-year old man from Kim Son District, Ninh Binh Province. These two cases had recent contact with sick poultry prior to the onset of illness and were both fatal. Of the 109 cases confirmed to date in Viet Nam, 54 have been fatal.

Europe

The last case or outbreak in Europe was reported in a wild duck shot in Bavaria, Germany. This was the first and, so far, only case of H5N1 infection in Europe in 2009. The last H5N1 HPAI outbreak in poultry was detected last October 2008 in a mixed poultry farm, also in Germany.

Non-infected countries/territories

There have been no HPAI outbreaks in the **Pacific Community**, **Oceania**, **Papua New Guinea** (outbreaks have occurred in the Indonesian province of West Papua) or **the Philippines**. To date, no outbreaks have been reported in **Timor-Leste**, but here surveillance capacity is weak. In South Asia, **Sri Lanka**, **Maldives** and **Bhutan** have not experienced disease. Some Asian countries regularly report the negative results obtained from their surveillance activities and suspected cases. **Bhutan** produces a clinical surveillance report weekly for each administrative level (available at http://www.moa.gov.bt/birdflu/main/reports.php?show=all).

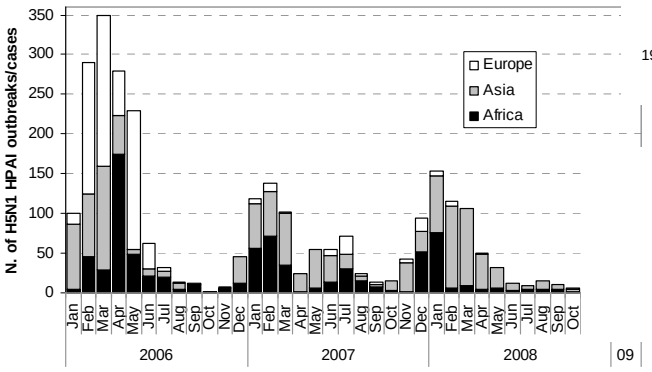
Iraq, where the last H5N1 HPAI outbreak was in February 2006, reported recent laboratory results of their surveillance activities for February 2009 for all governorates except Kurdistan Province, in the north of the country. All samples taken were negative for H5N1 [poultry farms (453), backyard poultry (1,608), game and wild birds (298), and markets and slaughterhouses (30)]. Poultry farms in Babel were found infected with a H9 low pathogenic strain of AI.

CONCLUSIONS

Since 2003, 62 countries/territories have experienced outbreaks of H5N1 HPAI. Effective control measures for outbreaks in poultry have been associated with reduced risk of human infections in several countries. However, H5N1 HPAI remains entrenched in poultry in parts of Asia and Africa (Egypt) and thus the risk of human infection remains, as proven by the five human cases reported this month in two countries considered endemic.

Data from previous years have shown a peak in the number of outbreaks/cases during the January-March period in both poultry outbreaks (Figure 12) and human cases (Figure 5). In fact, February 2009 represents a peak in this period.

FIGURE 10
Number of H5N1 HPAI outbreaks/cases by continent since January 2006
(Source: FAO EMPRES-i)



It is difficult to undertake thorough epidemiological analysis of the situation of HPAI globally, based only on official disease reporting and the poor disease outbreak investigations carried out in some affected countries. HPAI prevalence and incidence are likely much greater. A number of countries that had not reported HPAI activity for some time have faced outbreaks in the last few months. That is the case of Cambodia, China, India and Thailand. It remains unknown whether these new cases are because of (a) a re-introduction of the infection, or (b) if the virus was circulating at low level.

February 2009 showed a similar activity wh compared to February 2008 both in terms affected countries (8 vs. 11 - Figure 11) a the number of outbreaks (86 vs. 116 - Figu 12). When compared to February 2006 and 2007, however, HPAI activity seems to be much lower in February 2009. February 2006 experienced a particularly high activity (33 countries reporting 292 outbreaks/cases), reflecting when the panzootic was spreading across Europe. Although there has been an improvement in disease awareness, outbreaks/cases of HPAI are likely still under-estimated and under-reported in many countries and regions because of limitations in the capacity of veterinary services to implement adequate and effective disease surveillance for HPAI, and because of the weakness in compensation schemes.

FIGURE 11
Number of countries by continent that reported H5N1 HPAI in February 2006, 2007, 2008 and 2009
(Source: FAO EMPRES-i)

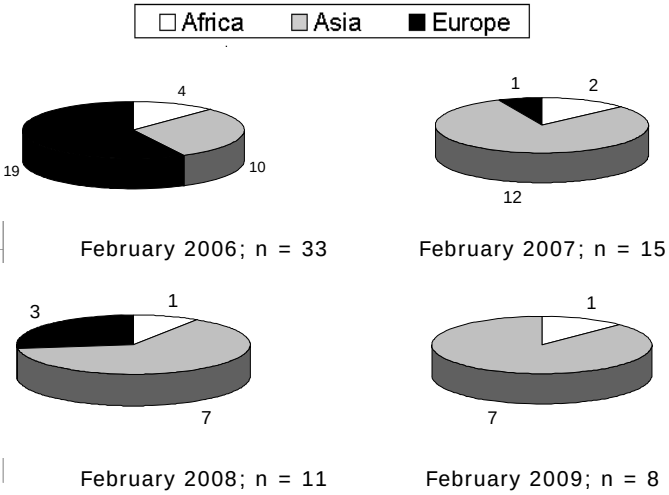
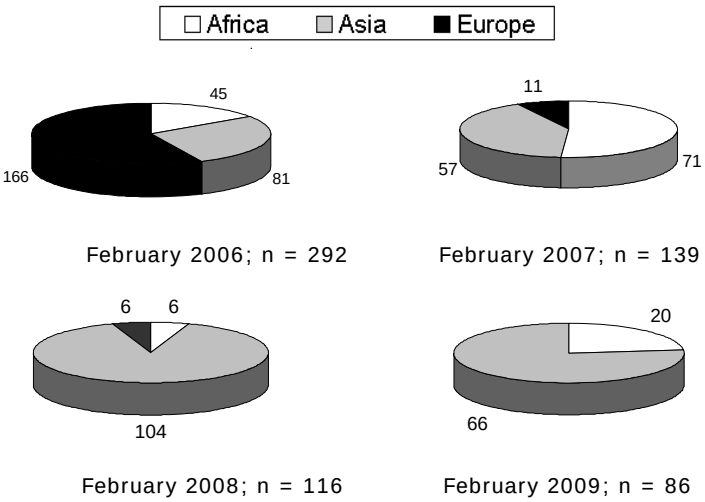


FIGURE 12
Number and distribution of H5N1 HPAI outbreaks/cases by continent in February 2006, 2007, 2008 and 2009
(Source: FAO EMPRES-i; Indonesia data are not included, because the epidemiological unit definition for the PDSR data was modified from household level to village level in May 2008 and is not comparable)



A recent paper reports on the phylogenetic analysis done on African H5N1 HPAI isolates from the 11

countries affected from its emergence in Nigeria in early 2006 to early 2008. The research group generated 494 full gene sequences from 67 African isolates and applied molecular analysis tools to a total of 1,152 A/H5N1 sequences obtained from viruses isolated in Africa, Europe and the Middle East between 2006 and early 2008. Detailed phylogenetic analyses of the eight gene viral segments confirmed that three distinct sub-lineages were introduced that persisted and spread across the continent over this two-year period. Additionally, the molecular epidemiological studies highlighted the association between genetic clustering and area of origin in a majority of cases. Molecular signatures unique to strains isolated in selected areas also gave a clearer picture of the spread of A/H5N1 viruses across the continent. Mutations described as typical of human influenza viruses in the genes coding for internal proteins or associated with host adaptation and increased resistance to antiviral drugs have also been detected. These findings raise concern for the possible human health risk presented by viruses with these genetic properties and highlight the need for increased efforts to monitor the evolution of H5N1 viruses across the Africa. The paper is available at http://www.ncbi.nlm.nih.gov/pubmed/18387755.

An animated map showing the evolution of outbreaks over the last six months including February 2009 is available at: www.fao.org/ag/againfo/programmes/en/empres/maps.html.

EMPRES welcomes information on disease events or surveillance reports on H5N1 HPAI (and other TADs), both rumours and official information. If you want to share any such information with us, please send a message to glews@fao.org.

AT A GLANCE

The latest HPAI outbreaks for the period 1 February 2009 – 20 May 2009

Note
AIDEnews publishes reports of **confirmed HPAI cases** using the following sources: OIE, European Commission, FAO and national governments.

AFRICA

EGYPT

Samples taken from poultry in Alexandria, Assiut, Aswan, Beheira, Beni Suef, Fayoum, Gharbiya, Giza, Helwan, Kafr el Sheikh, Luxor, Menoufiya, Minya, Qalioubiya, Sharkia, Sharkiya, Sixth of October, Sohag, Suez Governorates were found positive for HPAI.

ASIA

BANGLADESH

HPAI outbreaks have been reported in Barisal Division (Mirzaganj Upazilla), Chittagong Division (Anwara, Comilla Sadar, Cox's Bazar City, Pachlaish, Raozan Upazillas), Dhaka Division (Bandar, Daulatpur, Kendua, Manikganj Sadar, Mirpur, Palash, Savar, Sonargaon Upazillas), Rajshahi Division (Biral, Boyalia, Gobindaganj, Sadullapur, Shaghata, Taraganj, Thakurgaon Sadar Upazillas).

CHINA

Reports have been submitted to OIE regarding an HPAI outbreak that started on 1 February 2009 at a farm in Zhawa, Moyu, He'tian, Xinjiang Province; another HPAI outbreak that was detected on 12 April 2009 at the Live Poultry Wholesale Market, Bayi, Chengguan District, Lhasa City, Tibet; and since 8 May, more than 100 wild birds found dead in Genggahu Lake, Hainan Prefecture, Qinghai Province and H5N1 HPAI was confirmed.

CHINA (HONG KONG SAR)

A dead large-billed crow found at the Ancient Kiln Park on Lantau Island (5 February); a dead Crested Myna (12 February) and two chickens (3 March) found and collected in Tung Ping Chau; a dead feral pigeon found in Tuen Mun (27 April) were confirmed to be H5N1 HPAI positive according to the Agriculture, Fisheries and Conservation Department (AFCD).

INDONESIA

In March 2009, PDSR officers visited 1,411 villages of which 212 (15.0%) were found to be infected. This is noticeably higher than the infection rate of January (8.5%), February (13.8%). Since May 2008, PDS officers have visited 34.7% of all villages under coverage. An average of about eight percent (8.5%) of the villages visited during the previous 6 months was classified as infected at the time of visit. The day of 31 March, compared with the situation on the day of 28 February, an increased percentage of villages were classified as 'infected' (HPAI compatible event supported by a positive antigen test result). Infected villages during March were concentrated mainly in Jawa Tengah. No cases were reported in Kalimantan. Cases over the last 6 months have been concentrated in Banten, Central Java, East Java, West Java, and Yogyakarta on Java Island; in Lampung on Sumatra Island; and in South Sulawesi and West Sulawesi on Sulawesi Island. During the previous 6 months, PDSR officers visited 11,050 villages (19.7%) in the 331 Districts under PDSR surveillance. Of these, 935 (8.5%) were classified as infected at the time of their visit.

INDIA

H5N1 HPAI has been reported in West Bengal in: Baramahar Village, Harirampur Block, Dakshin Dinajpur District; Daspara Village, Chopra Block, Uttar Dinajpur District; Bara Chenga Village, Mirik Block, Darjeeling District; Punding Forest Busty Village, Kurseong Block, Darjeeling District.

LAO PDR

Poultry mortality was first reported on 5 February 2009 in backyard chickens in five villages (Phosay Tai, Phosay Neua, Ban Muang Kua and Houey Mouane Neua, Hatpone) in Muang Khoua District, Phongsaly Province, which were PCR positive for HPAI at the National Animal Health Centre (NAHC) laboratory. The outbreak started on 30 January 2009, during the Lunar New Year celebration.

NEPAL

After the first ever H5N1 HPAI outbreak in the country in January, another outbreak was reported in backyard poultry in Jhapa, Sharamatinamati on 17 February 2009, also in Jhapa District, Mechi Zone.

VIET NAM

The Department of Animal Health (DAH) reported HPAI outbreaks in 11 out of the 64 provinces: [North] Bac Ninh Province (Tien Du District), Dien Bien Province (Dien Bien District), Quang Ninh Province (Ha Long City, Mong Cai District), Thanh Hoa Province (Quan Hoa District); [Central] Khanh Hoa Province (Nha Trang City), Quang Tri Province (Trieu Phong District), Quang Ngai Province (Son Tinh District); [South] Bac Lieu Province (Gia Rai, Phuoc Long Districts), Ca Mau Province (Ca Mau City, Phu Tan, Tran Van Thoi, Thoi Binh, U Minh Districts), Dong Thap (Cao Lanh district), Hau Giang Province (Nga Bay Town, Long My, Vi Thuy Districts), Soc Trang Province (My Tu, My Xuyen, Nga Nam, Thanh Tri Districts), Vinh Long (Binh Tan district).

SUMMARY OF CONFIRMED HPAI OUTBREAKS

(as of 20 May 2009)

Sources: OIE, European Commission (EC), FAO and national governments – WHO for human cases/deaths
Note: Highlighted countries indicate those in which there has been only one officially confirmed outbreak or occurrence

AFRICA	First outbreak	Latest outbreak	Animals affected to date	Human cases / deaths to date
Benin	7 November 2007	15 December 2007	Domestic poultry	-
Burkina Faso	1 March 2006	20 May 2006	Domestic poultry - wild birds	-
Cameroon	21 February 2006	28 March 2006	Domestic poultry – wild birds	-
Côte d'Ivoire	31 March 2006	31 January 2007	Domestic poultry – wild birds	-
Djibouti	6 April 2006	6 April 2006	Domestic poultry	**1 / 0**
Egypt	17 February 2006	13 May 2009	Domestic poultry – wild birds	**69 / 26**
Ghana	14 April 2007	13 June 2007	Domestic poultry	-
Niger	6 February 2006	1 June 2006	Domestic poultry	-
Nigeria	16 January 2006	22 July 2008	Domestic poultry – wild birds	**1 / 1**
Sudan	25 March 2006	4 August 2006	Domestic poultry	-
Togo	6 June 2007	8 September 2008	Domestic poultry	-

ASIA	First outbreak	Latest outbreak	Animals affected to date	Human cases / deaths to date
Afghanistan	2 March 2006	2 October 2007	Domestic poultry – wild birds	-
Bangladesh	5 February 2007	10 May 2009	Domestic poultry	**1 / 0**
Cambodia	12 January 2004	16 December 2008	Domestic poultry – wild birds	**8 / 7**
China	20 January 2004	8 May 2009	Domestic poultry – wild birds	**38 / 25**
China (Hong Kong SAR)	19 January 2004	27 April 2009	Wild birds	-
India	27 January 2006	17 March 2009	Domestic poultry	-
Indonesia	2 February 2004	March 2009	Domestic poultry – pigs (with no clinical signs)	**141/ 115**
Japan	28 December 2003	8 May 2008	Domestic poultry – wild birds	-
Kazakhstan	22 July 2005	10 March 2006	Domestic poultry – wild birds	-
Korea, Rep. of	10 December 2003	12 May 2008	Domestic poultry – wild birds	-
Lao PDR	15 January 2004	25 February 2009	Domestic poultry	**3** / **2**
Malaysia	19 August 2004	2 June 2007	Domestic poultry – wild birds	-
Mongolia	10 August 2005	5 June 2006	Wild birds	-
Myanmar	8 March 2006	23 December 2007	Domestic poultry	**1 / 0**
Nepal	8 January 2009	17 February 2009	Domestic poultry	-
Pakistan	23 February 2006	16 June 2008	Domestic poultry – wild birds	**3 / 1**
Thailand	23 January 2004	10 November 2008	Domestic poultry – wild birds – tiger	**25 / 17**
Viet Nam	9 January 2004	14 May 2009	Domestic poultry	**111/ 56**

NEAR EAST	First outbreak	Latest outbreak	Animals affected to date	Human cases / deaths to date
Iran	2 February 2006	10 December 2007	Domestic poultry - wild birds	-
Iraq	18 January 2006	1 February 2006	Domestic poultry – wild birds	**3 / 2**
Israel	16 March 2006	1 January 2008	Domestic poultry	-
Jordan	23 March 2006	23 March 2006	Domestic poultry	-
Kuwait	23 February 2007	20 April 2007	Domestic poultry – wild birds - zoo birds	-
Saudi Arabia	12 March 2007	29 January 2008	Domestic poultry	-
West Bank & Gaza Strip	21 March 2006	2 April 2006	Domestic poultry	-

EUROPE	First outbreak	Latest outbreak	Animals affected to date	Human cases / deaths to date
Albania	16 February 2006	9 March 2006	Domestic poultry	-
Austria	10 February 2006	22 March 2006	Wild birds – cats	-
Azerbaijan	2 February 2006	18 March 2006	Wild birds – domestic poultry – dogs	**8 / 5**
Bosnia-Herzegovina	16 February 2006	16 February 2006	Wild birds	-
Bulgaria	31 January 2006	30 May 2006	Wild birds	-
Croatia	21 October 2005	24 March 2006	Wild birds	-
Czech Republic	27 March 2006	11 July 2007	Wild birds – domestic poultry	-
Denmark	12 March 2006	26 May 2006	Wild birds – domestic poultry	-
France	17 February 2006	14 August 2007	Wild birds – domestic poultry	-
Georgia	23 February 2006	23 February 2006	Wild birds	-
Germany	8 February 2006	6 March 2009 (mallard, wild)	Wild birds – domestic poultry – cats – stone marten	-
Greece	30 January 2006	27 March 2006	Wild birds	-
Hungary	4 February 2006	23 January 2007	Wild birds – domestic poultry	-
Italy	1 February 2006	19 February 2006	Wild birds	-
Poland	2 March 2006	16 December 2007	Wild birds – domestic poultry	-
Romania	7 October 2005	6 December 2007 (cat)	Wild birds – domestic poultry – cat	-
Russian Federation	15 July 2005	8 April 2007	Domestic poultry – wild birds	-
Serbia	28 February 2006	16 March 2006	Wild birds – domestic poultry	-
Slovakia	17 February 2006	18 February 2006	Wild birds	-
Slovenia	9 February 2006	25 March 2006	Wild birds	-
Spain	7 July 2006	7 July 2006	Wild birds	-
Sweden	28 February 2006	26 April 2006	Wild birds – domestic poultry - game birds - mink	-
Switzerland	26 February 2006	22 February 2008	Wild birds	-
Turkey	1 October 2005	9 March 2008	Domestic poultry – wild birds	**12 / 4**
Ukraine	2 December 2005	11 February 2008	Wild birds – domestic poultry – zoo birds	-
United Kingdom	30 March 2006	22 May 2008 (H7N7)	Wild birds – domestic poultry	-