H5N1 HPAI
Global overview ::: October-December 2011
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Summary

Since 2003, H5N1 has killed or forced the culling of more than 400 million domestic poultry and caused an estimated US$20 billion in economic damage across the globe before it was eliminated from most of the 63 countries infected at its peak in 2006. The H5N1 HPAI virus remains endemic in six nations. The number of outbreaks in domestic poultry and wild bird populations shrank steadily from 2003 to mid-2008. The number of outbreaks rose progressively from mid-2008 to mid-2011. For the latter half of 2011, the number of outbreaks decreased to less than 300.

During the reporting period, there were 107 domestic poultry outbreaks reported from eight (8) countries/territories (Bangladesh, Cambodia, China (including Hong Kong) Egypt, Indonesia, Iran, Nepal and Viet Nam), five (5) confirmed reports of human cases in two countries (Egypt and Indonesia) and two confirmed wild bird events in China and India.

The period October to December is generally considered the start of the H5N1 HPAI season, when outbreak reporting increases after the quiet period (July to September). As expected during the fourth quarter of 2011, the number of countries reporting outbreaks increased (from six to eight) (see Figure 3), but unexpectedly there was a slight decrease in the number of outbreaks/cases reported globally (from 129 to 107; see Figure 2a). This may be due in part to lower reporting numbers from Egypt. Compared to the same period in 2009 and 2010, there was a slight decrease in outbreak numbers from Egypt, partly due to declining surveillance activities in the country. There were no newly affected countries reported during this period.

Since 2003, 63 countries/territories have experienced outbreaks of H5N1 HPAI. The last newly infected country was Bhutan in February 2010 (Figure 2b). Effective control measures for outbreaks in poultry have been associated with a reduced incidence of human infections in several countries. However, an apparent increase in outbreak numbers in poultry (Figure 1a, Figure 2) during the H5N1 HPAI active periods (January to March) for the last three years (2009 to 2011) implies an increased risk of human infections in affected countries. The H5N1 virus has infected 576 people since it first appeared in 2003, killing 339 of them, according to WHO figures. The latest countries with reported human deaths in December include China, Egypt and Indonesia. Given the continued reports of human infection, there is an urgent need to identify the drivers or factors responsible for the changes in the H5N1 HPAI situation globally and to understand newly emerging disease dynamics in endemic settings such as China, Viet Nam, Egypt and Indonesia.

Although H5N1 AI continues to be a global threat for poultry and humans; most countries rely on passive surveillance based on the reporting of clinical cases in poultry. As a result, outbreak information are underestimated. Active surveillance in poultry and wild bird species therefore needs to be maintained by governments in endemic countries and countries at risk globally.

In Egypt H5N1 HPAI control activities have been reduced due to the civil unrest and change of authorities. However most of reported A/H5N1 infections in poultry in Egypt are being detected through CAHO (community-based animal health outreach) structures and staff . The CAHO program was developed in 2008 as a modification of the PDS system used elsewhere to better reflect the community and communication outreach and extension services, in addition to surveillance, reporting and response.

Virus clade 2.3.2 may continue to expand its geographic range from South East Asia to other regions.

Worldwide situation: observed trends

Over the last three months (October to December 2011), 107 H5N1 HPAI outbreaks in poultry were reported officially from the following countries: Bangladesh, Cambodia, China (including Hong Kong) Egypt, Indonesia, Iran, Nepal and Viet Nam. Two wild bird events were reported during the same period in China (Hong Kong) and India (Figure 1). Analysis and interpretation of the HPAI data, as presented in this report, obtained through official reports is limited as the data on outbreaks in many endemic countries is incomplete. A number of endemic countries are currently implementing active surveillance for H5N1 HPAI with assistance from FAO, the outputs of which are considered essential to understand the dynamics of H5N1 outbreaks in those endemic areas and consequent risks to poultry and humans. Reporting of sick poultry is masked in some countries using vaccination against H5N1 AI as part of disease control strategies (China, Viet Nam and Egypt) and with little information on the disease situation in the poultry commercial sector.

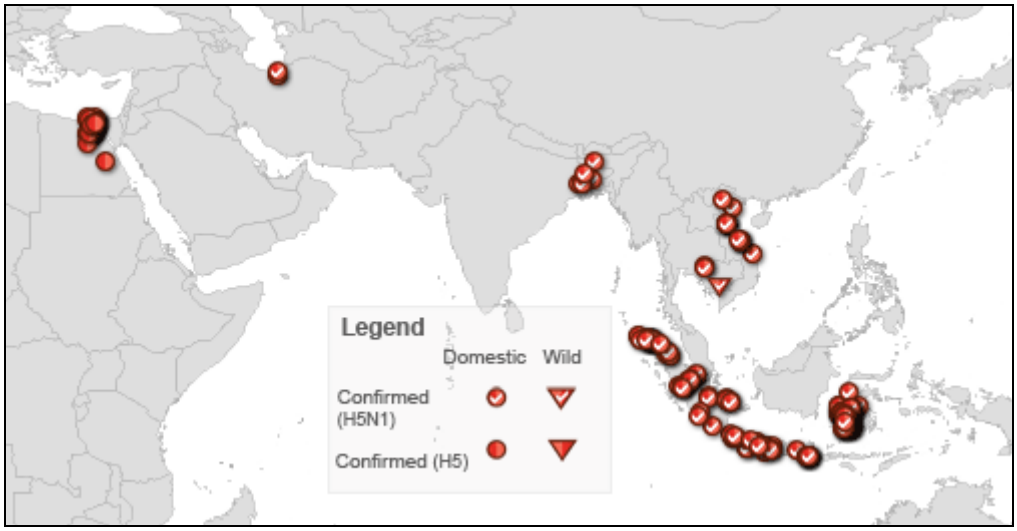
Figure 2 presents the total number of H5N1 HPAI outbreaks/cases in wild birds and poultry reported globally since December 2003, classified by continent, and Figure 3 displays the number of countries reporting outbreaks/cases during the same period.

Since early2011, a number of countries in Asia have experienced new virus introductions, particularly of virus clade 2.3.2.1, which in most cases involved wild birds. These include India, the Republic of Korea, Japan and Myanmar. Of those countries experiencing new virus introductions, Japan and the Republic of Korea have not reported outbreaks this quarter, having apparently eliminated the virus by applying stamping out policies. Bangladesh, which experienced a new introduction of virus clade 2.3.2.1 in 2010, has had continued reports of outbreaks during all four quarters of 2011, with apparent spill-over to poultry in India, as suggested by similarities in the genetic characteristics of viruses involved in both countries. India reported only one event in wild birds during this period. Indonesia, Viet Nam and Egypt, where the disease is considered endemic, continued to report outbreaks in poultry with no new virus introductions. Confirmation of clade 2.3.2 in Nepal during the last quarter of 2011, two years since the last outbreaks, implies continued risk for poultry in the South Asia region. Clade 1.1 viruses, which evolved from Clade 1, continue to circulate in the lower Mekong. Clade 2.1 variants, both in Indonesia and in new viruses introduced to Viet Nam, are now the dominant strains, replacing Clade 2.3.4. Virus clade 2.3.2 in its various forms is the main type in China, although Clade 2.3.4 has not disappeared. However, the available information on virus clade distribution should be interpreted carefully since this may not represent the true distribution of clades in poultry populations globally. This is because affected countries send only a proportion of positive samples to reference laboratories for clade identification.

FIGURE 1

(a) Map showing the location of H5N1 HPAI outbreaks/cases in poultry, H5 and H5N1 infection in wild birds reported between October to December 2011, (b) Bar chart of H5N1 HPAI outbreaks/cases in poultry and H5 and H5N1 infection in wild birds reported per quarter between 2003 to 2011.
(Source: FAO EMPRES-i, OIE WAHIS)

(a)



(b)

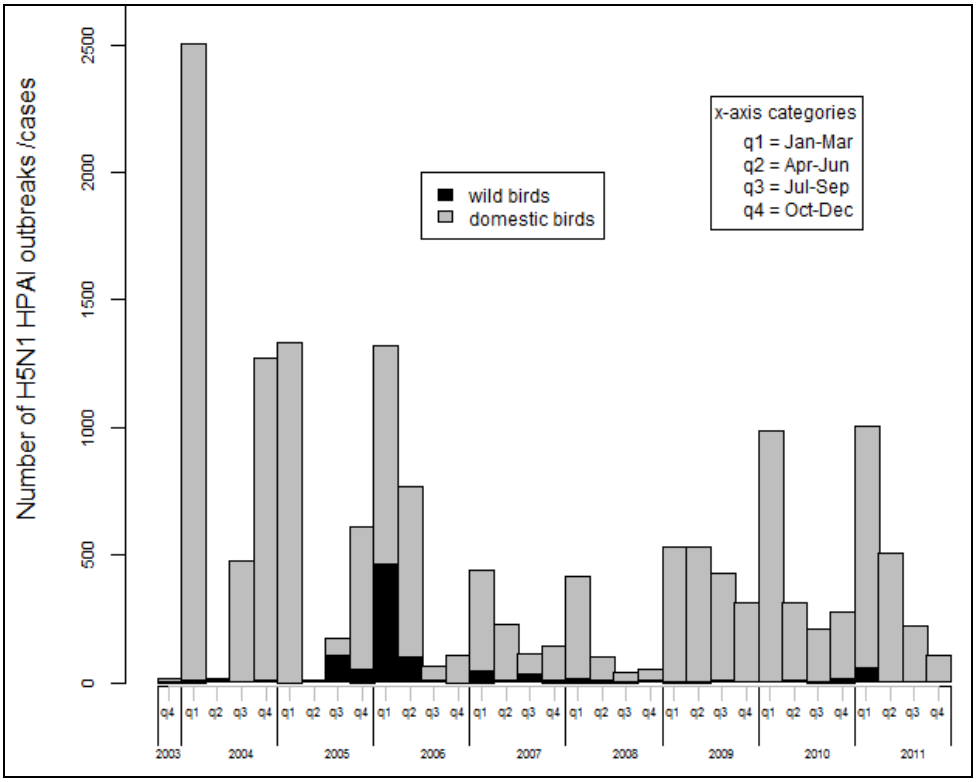
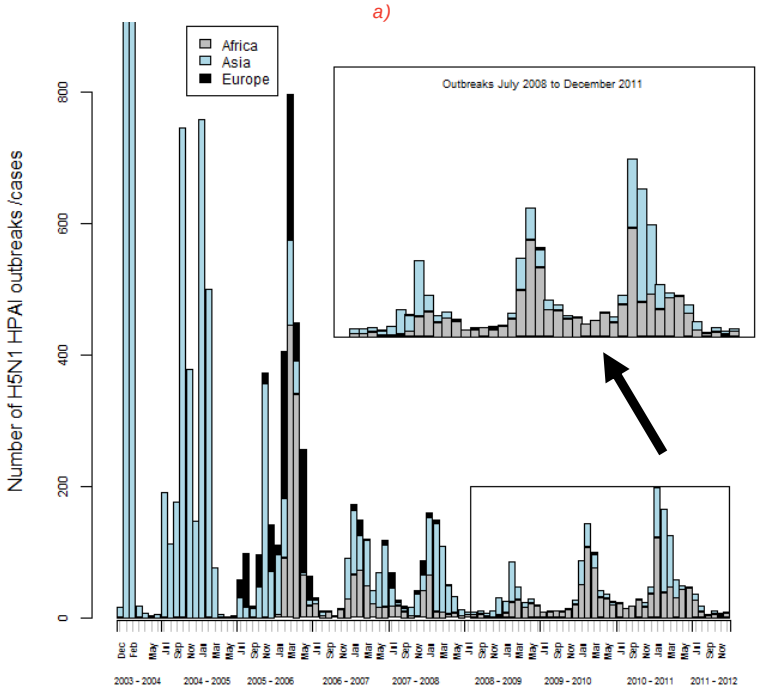


Figure 2

Epidemic curve showing: (a) the monthly and, (b) annual number of H5N1 HPAI outbreaks/cases reported between December 2003 and September 2011 stratified by continent

*(Source: FAO EMPRES-i, OIE WAHIS; Note 1: Indonesia data are not included in this graph, because the epidemiological unit definition for the PDSR data was modified from household level to village level in May 2008 and is not comparable to global HPAI data); Note 2: * 2009 – 2010 refers to the period 1 July 2009 to 30 June 2010; Note 3: Months with more than 800 outbreaks have been truncated so the rest of the graph is not distorted). The insert in figure 2a and b highlights outbreaks from July 2008 to June 2011. Data for H5N1 HPAI from Indonesia is displayed in figure 7.)*

a)



b)

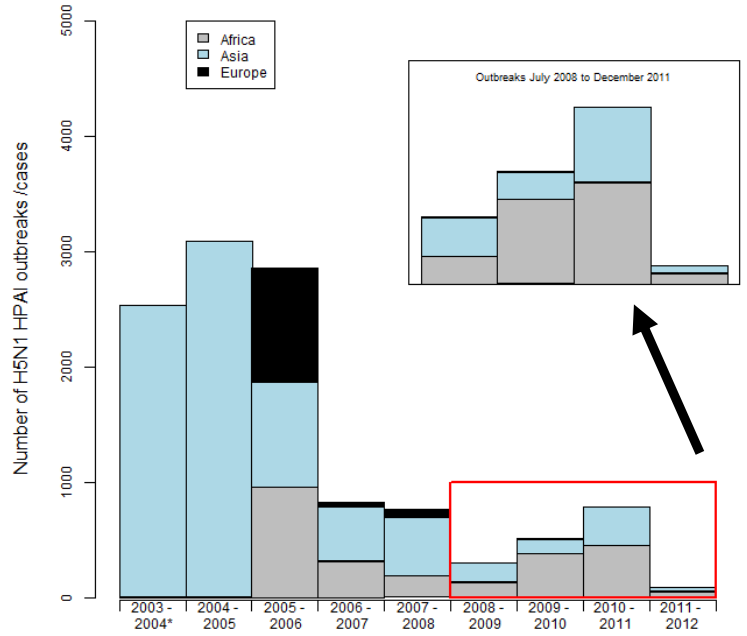
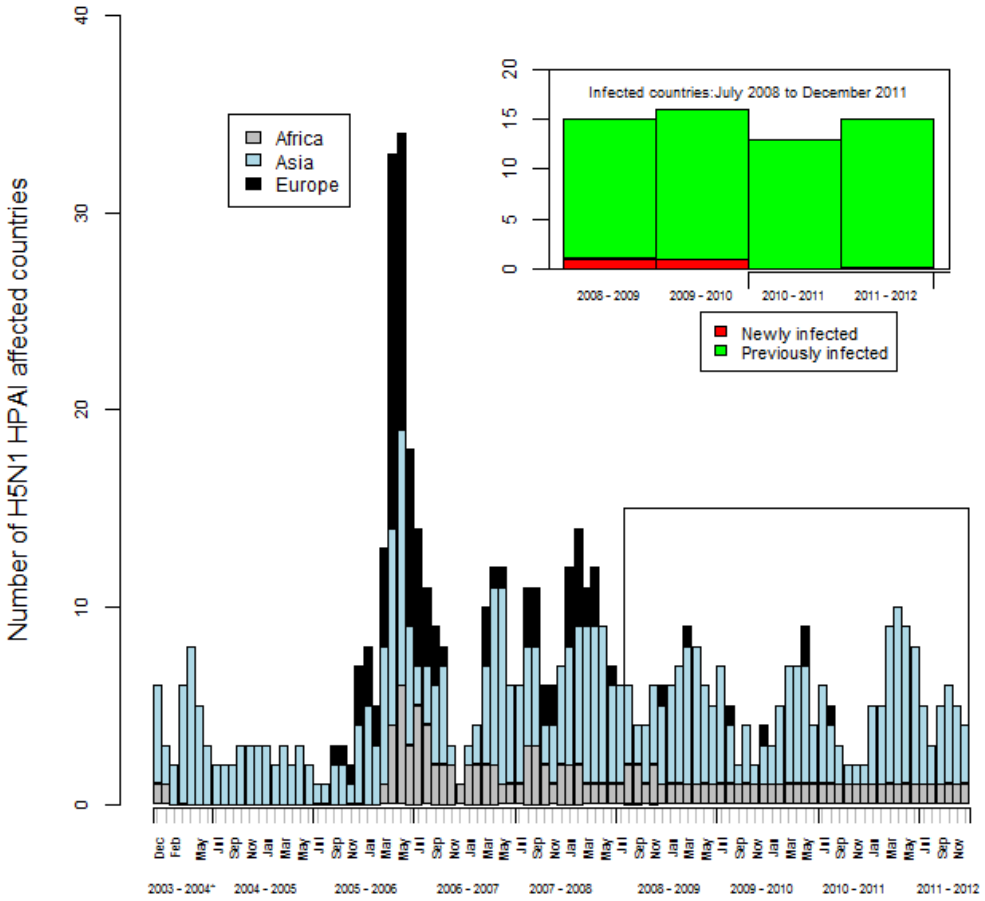


FIGURE 3

Number of countries that reported H5N1 HPAI outbreaks since December 2003 by continent, month and year. Insert shows the number of countries infected (new, previous) between July 2008 and December 2011. (Source: FAO EMPRES-i, OIE WAHIS)



Situation by continent / region

Africa

During this period, **Egypt** reported 15 outbreaks in poultry from eight (8) governorates, mostly from the household sector (14 out of 15; Figure 4). These occurred mostly in non-vaccinated flocks as only one outbreak was confirmed in a vaccinated commercial flock. Ten of the 15 outbreaks were detected by Community Animal Health Outreach (CAHO) practitioners. CAHO teams operate in high-risk governorates and collect samples only from suspected HPAI cases. Only one was confirmed positive of the 2198 samples collected as part of a regular pre-movement testing from commercial poultry farms. In addition, none of the 263 commercial poultry farms subjected to ongoing active surveillance activities tested positive for H5 HPAI infection. Active surveillance was also carried out in the household poultry sector in 148 villages and only two (2) samples from two (2) governorates were found positive for H5 HPAI. There were no suspected outbreaks of H5 HPAI notified from commercial farms. In contrast, there were eight (8) suspected outbreaks notified from the household sector with two of these confirmed positive. During the reporting period, no samples were collected from road check points and Live Bird Markets (LBM). Eighty (80) samples tested from commercial farms in nine (9) governorates were confirmed positive for low pathogenic H9 influenza virus.

Five human avian influenza (AI) type A H5N1 cases were confirmed during the three-month period, of which three were fatal. This brings the total number of human confirmed cases in Egypt since 2006 to 157 with 55 fatalities (CFR=35%). While most cases in 2009 were in children under four years of age, in 2010 and 2011, 75% of confirmed human infections occurred in patients above that age. The CFR in 2011 is lower than in 2010 (39% vs. 45%), but higher than that reported in 2009 (10%).

Generally, due partly to the prevailing civil unrest, HPAI surveillance activities showed an apparent decline during 2011. Any inferences drawn from the above stated figures thus need to consider the socio-political dimensions and animal health activities on the ground.

Egypt first reported outbreaks of H5N1 HPAI in poultry in February 2006. Despite a vigorous initial response to the disease, including the culling of over 40 million birds, Egypt is considered an endemic country where outbreaks are regularly reported from different governorates. Circulating viruses belong to Clade 2.2.1 and cluster in two major genetic groups, indicating that there have been no new introductions of H5N1 viruses since 2006. The work on gene sequencing indicates that currently there are two major groups of A/H5N1 viruses: i) The group which is closely related to the originally introduced viruses and is circulating mainly in household poultry flocks; and ii) the variant group that emerged in late 2007 and which is circulating mainly in commercial poultry farms. In 2010, the latter group (variant group) has been further divided into two minor subgroups (1 and 2). A new clade nomenclature for avian influenza viruses has indicated the continued presence of Clade 2.2.1.1 in the commercial poultry sector, implying further evolution of clade 2.2.1 in Egypt.

http://www.who.int/influenza/resources/documents/2011_09_h5_h9_vaccinevirusupdate.pdf

South Asia

In October, November and December 2011, **Bangladesh** experienced four outbreaks of H5N1 HPAI in poultry. The virus clade(s) involved in these outbreaks is currently unknown. Virus clades from outbreaks between April and Junebelonged to clade 2.3.2.1 and 2.2.2. The virus isolates from the 2010 outbreaks belonged to Clade 2.2, sublineage III and clustered with sequences of viruses from Bangladesh isolated from 2007 to 2009. This provides supporting evidence that the same virus is being maintained unnoticed within the country. However, a new incursion of clade 2.3.2.1 was confirmed for the first time in Bangladesh in crows and chickens in January and February 2011, and this is now the dominant strain with spillover into India. Clade 2.3.4 was identified from poultry in February 2011 in Potiya Upazila, Chittagong District.

The emphasis of the current policy of the government is placed on early detection and containment by culling, as well as the improvement of biosecurity in various production sectors. Poultry vaccination against H5N1 HPAI is officially prohibited. Over 2.4 million birds have been culled and over 3.1 million eggs destroyed since 2007. FAO is coordinating and supporting active surveillance that has been expanded to 306 upazilas (sub-districts) across the country, including the innovative use of the Short Message Service (SMS) gateway (method of sending and receiving SMS messages between mobile phones and a central server) as a reporting tool. Daily, in each upazila, Avian Influenza Workers (AIWs) (formerly called “community animal health workers”, CAHW) employed by the active surveillance programme send SMS coded text messages to the Department of Livestock Services, regardless of the presence or absence of disease and deaths in poultry. SMS messages of suspected HPAI events are automatically forwarded to the livestock officer in the area who will respond by initiating an investigation. In October, November and December, 26 238, 23 571 and 25 812 SMS messages were received, respectively, including 171 suspected HPAI events in backyard poultry and 323 suspected events in commercial poultry farms. The veterinary investigations that followed excluded 494 of these suspect cases and on 47 occasions, diagnostic specimens were collected. Of all specimens collected and reported through the SMS gateway system, four (4) tested positive for H5N1 HPAI and one (1) tested positive from out of the active surveillance area.

As of 31 December 2011, a total of 529 outbreaks were recorded in 52 out of 64 districts. These include 31 outbreaks in 2010, 32 in 2009, 226 in 2008 and 69 in 2007. Out of these outbreaks, 472 occurred in commercial poultry farms and 57 in backyard poultry.

Figure 4
H5N1 HPAI outbreaks in poultry in Egypt between June 2009 and December 2011
(Source: FAO EMPRES-i; 2009 – 2010 refers to the period 1 July 2009 to 30 June 2010)*

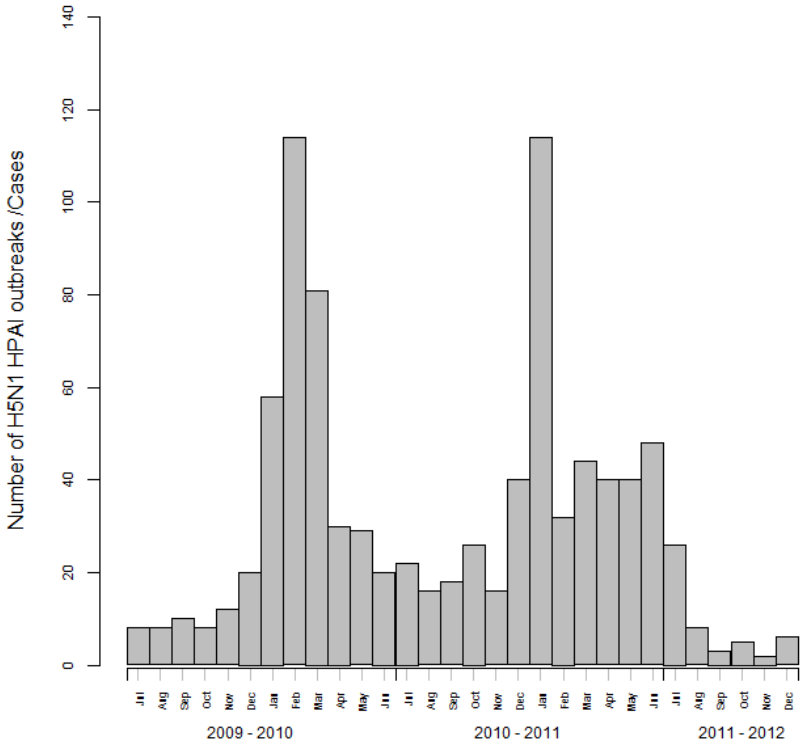
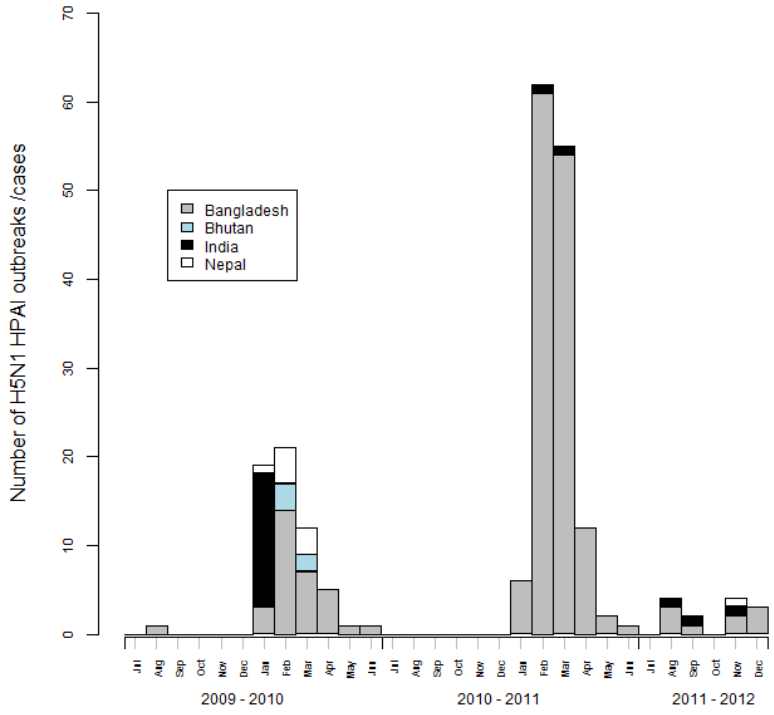


Figure 5
H5N1 HPAI outbreaks/cases reported in poultry, H5 and H5N1 infection in wild birds in South Asia, by country, between July 2009 and December 2011
(Source: FAO EMPRES-i; 2009 – 2010 refers to the period 1 July 2009 to 30 June 2010)*



In India, there were no official reports of H5N1 HPAI events during the period October to December 2011 however there are unofficial reports of die-offs in wild birds associated with H5N1 during November 2011. Previous outbreaks were reported during the period July to September 2011 in poultry in the States of Assam and West Bengal, bordering Bangladesh. The virus clade in these outbreaks is currently unknown. These two outbreaks of H5N1 HPAI differ from the two earlier outbreaks in India that occurred in February and March 2011 as they were in commercial farms (one a duck breeding farm) and in a different State – Tripura. However, all three affected States – Assam, West Bengal and Tripura – border Bangladesh. The virus clade implicated in this last outbreak was 2.3.2.1.

Sero-surveillance activities conducted at HSADL are periodically reported by the government on http://www.dahd.nic.in/, including the number of samples received and tested per state.

The Ministry of Environment and Forests of the Government of India and the Department of Wildlife and Forests of Uttar Pradesh are continuously funding the sampling of wild water birds. Laboratory results are pending.

FAO facilitated a migratory waterfowl satellite tracking project in January 2010 and the flight paths can be found at (http://www.werc.usgs.gov/Project.aspx?ProjectID=60).

Nepal reported one outbreak of H5N1 HPAI in poultry in November, two years after the last confirmed report. The clade of the virus involved in this outbreak is 2.3.2.1. Phylogenetic analyses of virus isolates from previous outbreaks have identified the involvement of clades 2.2 and 2.3.2.

South East and East Asia

One HPAI H5N1 outbreak in poultry was reported in **Cambodia** during this reporting period. The outbreak occurred in a broiler chicken farm in Battambang Province (northwest Cambodia, bordering Thailand) in October 2011. Four thousand, one hundred and fifty-six (4,156) birds, including chickens, ducks and geese, were culled. In this period, no human cases were reported. H5N1 HPAI-related events in humans and poultry were previously reported during the first three quarters of 2011. The virus clade involved in these recent events is clade 1 (source: Institut Pasteur Cambodia, IPC). All available human and animal isolates since 2004, including all those from 2010 and the first two quarters of 2011, are Clade 1.1 and are most closely related to Clade 1 viruses previously circulating in Cambodia. This is also the same virus clade which circulates predominantly in southern Viet Nam, which could be explained by transboundary movement of animals and animal products between these two countries.

Cambodia routinely reports results obtained from surveillance activities through two hotlines (supported by FAO until February 2010) at the National Veterinary Research Institute (NaVRI). Joint FAO, NaVRI and IPC environmental surveillance was implemented in four markets during the Khmer New Year period. Eighteen percent (18%) of samples collected during the study period tested positive for H5N1 by PCR. Though only two percent (2%) of environmental samples tested resulted in the isolation of infectious viral particles, these provided sufficient virus for the full sequencing and identification of a number of virus strains/groups. Phylogenetic analysis of the viruses isolated from study markets provide additional insights into virus circulation. The results show evidence of co-circulation of viruses originating from different flocks within markets. In addition, there was evidence that some viruses circulated for a long period of time (6 weeks) and that at least one of the virus groups isolated from markets was similar to virus isolates which caused the death of two children in 2011. Interestingly, all the strains detected in markets during the study period belonged to the Cambodian endemic lineage, which suggests that the viruses detected were most probably originating from poultry that were raised in Cambodia.

In **mainland China**, an outbreak of HPAI H5N1 was reported in poultry in Lhasa, Tibet, in December. This outbreak resulted in the death of 290 birds and the subsequent destruction of 1,575 birds. In **Hong Kong SAR**, three wild bird positive cases and one positive chicken carcass was reported in December. A Black-headed Gull and an Oriental Magpie Robin found dead in two separate locations tested positive for H5N1 HPAI virus. A chicken carcass sampled at the Cheung Sha Wan Temporary Wholesale Poultry Market as part of ongoing active surveillance tested positive for HPAI H5N1. This lead to the immediate culling of 19,451 poultry, including 15,569 chickens, 810 pigeons, 1,950 pheasants and 1,122 silky fowls.

Though there were no outbreak reports during the first three quarters of 2011, ongoing active surveillance in live bird markets at national and provincial levels during June and July have resulted in virus-positive birds, implying that H5N1 viruses are still circulating in many provinces in domestic poultry and disease outbreaks go unnoticed by the authorities. Based on the Official Veterinary Bulletin published during the current reporting period, a total of 52,627 samples were collected and tested during July and September. This resulted in one confirmed H5N1 positive duck sample from a duck farm in Liaoning province in July. This adds to the list of virus positive provinces indentified during June, which includes Chongqing, Guangdong, Guangxi, Hubei, Hunan, Fujian and Zhejiang provinces.

China first identified HPAI viruses of the H5N1 subtype in 1996 in geese in Guangdong Province and these viruses have continued to circulate and evolve over time. Almost 200 H5N1 HPAI outbreaks have been reported in poultry and H5N1 and H5 infection in wild birds in 29 provinces since 2004, and over 35 million poultry have been culled to control the spread of the disease. Since 2004, there has been a marked decrease in the number of reported outbreaks in domestic poultry. Despite this decrease, official ongoing active surveillance activities conducted nationally have repeatedly found H5N1 positive samples, providing evidence that H5N1 viruses are still circulating in many provinces in domestic poultry.

Mass vaccination against H5N1 AI has been implemented since November 2005. Though data is not available for the current reporting period, post-vaccination sero-surveillance during the period July to September 2011 showed that out of 931,817 post-vaccination samples, 839,491 (90.1%) were sero-positive. Avian influenza vaccines are produced nationally by ten manufacturers. Vaccines are provided to commercial poultry farms and backyard poultry breeders by the government at no cost. The government is developing a new vaccine antigen because immunity produced by existing antigens against existing Clade 2.3.2.1 does not provide optimal protection.

On 30 December 2011, a 39-year-old man from the Bao'an district of Shenzhen, Guangdong province (bordering Hong Kong SAR) was confirmed as H5N1 positive, and died of multiple organ failure on 31 December 2011. The strain of virus was identified as 2.3.2.1 subtype by the Shenzhen Disease Control Center. Up to present, China has reported 41

human cases, of which 27 (66%) were fatal since the beginning of the epidemic.

All the clades of Asian-lineage H5N1 HPAI virus found globally have been detected in China. Of particular interest is the recent expansion of Clade 2.3.2, which was originally detected from a dead Chinese pond heron in Hong Kong SAR in 2004 and has now expanded its geographic range to include Mongolia, the Russian Federation, Nepal, Romania and Bulgaria. In Hong Kong SAR, viruses from Clade 2.3.4 were also detected in wild birds and poultry in 2009. The recent positive events in wild birds and poultry carcass is associated with clade 2.3.2.1. The study by Kou et al. (2001) provides some information on virus clades isolated from wild birds in China between April 2004 and August 2007 which can be found at:
http://www.plosone.org/article/info:doi%2F10.1371%2Fjournal.pone.0006926

Indonesia continues to report a high proportion of H5N1 HPAI outbreaks in poultry compared to the rest of the world (Figure 7), as it has for the past three years. H5N1 HPAI Clade 2.1 is confirmed to be endemic on the islands of Java, Sumatra and Sulawesi, and probably Bali, with sporadic outbreaks reported elsewhere. H5N1 HPAI prevalence by village varies widely. Only one of Indonesia's 33 provinces has never reported the occurrence of H5N1 HPAI. The high number of reports each month is partially explained by the implementation of the Participatory Disease Surveillance and Response (PDSR) programme that targets village poultry production systems (mainly backyard) and reports evidence of virus circulation in village poultry. The programme is supported by FAO with USAID and AusAID financial support and is operating in 385 of 496 (77%) districts through 33 Local Disease Control Centres (LDCCs) in 29 (88%) of 33 provinces in Java, Sumatra, Bali, Sulawesi and Kalimantan, including all known endemic areas; however, the quality and intensity of surveillance is not the same in all districts. Larger and less densely-populated provinces report HPAI outbreaks less often than more densely populated provinces.

During October PDSR officers visited 1,431 villages, of which 100 (7.0%) were infected. Of these, 89 were new infections. In November 2011, PDSR officers visited 1,048 villages, of which 47 (4.5%) were infected. Of these, 42 were new infections. During the previous 12 months (November 2010 to November 2011), 17 488 (24.2% of 72,162 villages were visited in the 385 PDSR surveillance districts. Since August 2008, PDSR officers have visited approximately 58.3% of villages under coverage. Approximately 9.0 % of villages visited during the previous 12 months were classified as newly infected. Cases over the past 12 months were concentrated in Sumatra, Java, Bali and Sulawesi.

The Indonesian Government introduced vaccination in small flocks in mid-2004. Vaccines containing either an Indonesian H5N1 antigen (e.g. A/chicken/Legok/2003) or H5N2 viral antigen have been used in government programmes and there are now approximately 20 different licensed vaccines. Vaccination programmes by the central government in the backyard poultry sector were implemented until 2008, when they stopped as a result of concern over the efficacy of registered vaccines. In the commercial sectors, vaccination is not coordinated by government, thus vaccination practices are based on risk as perceived by the farmer. Today, preventive vaccination is practiced in all breeder facilities and on nearly all layer farms nationwide. Vaccination of broilers is rarely practiced. Ducks are usually not vaccinated against H5N1 AI in Indonesia as current circulating strains of the virus are of very low pathogenicity for ducks. While ducks may act as a reservoir for the disease by being asymptomatic carriers, the prevalence of infection is generally very low.

In **Mongolia**, no H5N1 HPAI events were reported during the July to September 2011 period. One wild bird AI event was previously reported in April 2011 in Whooper swans (*Cygnus cygnus*) at Zegst lake. The clade information of this event in wild birds is unknown. Phylogenetic analyses of the 2010 wild bird isolates placed them in the 2.3.2 Clade.

The **Republic of Korea** reported no outbreaks or events in domestic poultry or wild birds during this period. Previous detection of domestic and wild bird AI events occurred in November 2010 and March 2011. Viruses involved in the 2010 and 2011 poultry outbreaks and wild bird events were clade 2.3.2.

In **Viet Nam**, during the three months reporting period, the Department of Animal Health officially reported 1(one) HPAI outbreak in the central (Nghe An Province) of Viet Nam. See Figure 8. There were no human cases during this period. In Viet Nam, H5N1 was first identified in poultry in 2003 and in humans in 2004.

Disease control measures include stamping out on infected farms, movement restrictions for 21 days and compensation. Viet Nam has temporarily halted government-sponsored vaccination in north and central Viet Nam in response to the emergence of a new clade of H5N1 virus, when the vaccine in use was found to be ineffective. However, some vaccination occurs in the south and emergency stock of vaccine for ring vaccination is maintained for use in south Viet Nam.

Surveillance and molecular genetics have indicated the presence of four circulating virus clades in Viet Nam since 2003. These are: (1) Clade 1 (predominant in southern Viet Nam from 2004 to 2011; (2) Clade 2.3.4 (predominant in northern Viet Nam from 2007 to the first half of 2010); (3) Clade 7 (detected in poultry seized at the Chinese border and at markets near Hanoi in 2008); and (4) Clade 2.3.2 (detected in 2005 for the first time and reappeared in late 2009). Virus clade 2.3.2.1 has become predominant in Viet Nam since late 2010. It was also detected in the south-central area of Vietnam in 2010. In a vaccine efficacy trial, it was observed that the current vaccines in use in Viet Nam provided poor protection against one particular virus strain within virus clade 2.3.2.1, detected for the first time in early 2011 from mostly North Viet Nam but also in central Viet Nam. Within this clade 2.3.2 (subsequently designated as 2.3.2.1), a particular variant virus cluster has been detected. This virus strain forms a distinct cluster from most of the other virus strains of clade 2.3.2.1. in the HA gene phylogeny. This particular variant strain of H5N1 virus has been detected in five (5) northern provinces of Viet Nam in 2011.

The FAO/USAID-funded Gathering Evidence for a Transitional Strategy for Highly Pathogenic Avian Influenza (HPAI) H5N1 Vaccination in Vietnam (GETS) Project has provided crucial epidemiological evidence of H5N1 HPAI through a longitudinal sentinel study, two market surveys and a modified post-vaccination monitoring programme carried out in five provinces of Viet Nam. The sentinel study, which monitored 244 flocks during a period of over one year, detected H5N1 infection rate of 1.1%. This study also showed differences inH5N1 detections between the Red River area and the the Mekong provinces; H5N1 infections in the Red River were only detected at the start of the project (December 2009 – January 2010), whereas in the Mekong provinces infection was detected all year round. In most cases, infection occurred without concomitant clinical signs, which limits a farmer's ability to detect possible H5N1 HPAI based on clinical surveillance. Results from the market surveys carried out in January and May 2011 testing pools of 5 ducks (oro-pharyngeal and cloacal swabs combined) (1,248 pools on each survey) resulted in an overall H5N1 pool prevalence of

4.5% (January) and 2.1% (May). No evidence of H5N1 was detected in the two Red River Delta provinces surveyed, but in the Mekong provinces the pool prevalence was 9.0% and 4.3% in the surveys.

Middle East

In **Israel**, no new outbreaks of H5N1 HPAI were reported during the period July to September 2011. The last H5N1 HPAI outbreaks occurred in March 2011 in poultry and was associated with clade 2.2.1 virus isolates. The last positive H5N1 HPAI finding prior to this was in April 2010, when two emus at a mini-zoo of a Kibbutz in Hadarom tested positive. Sequence data available within Genbank for a virus isolated from an earlier outbreak in breeder pullets in Haifa in January 2010 indicated that the virus was closely related to viruses of clade 2.2 from Egypt. This could indicate informal trade across borders of live poultry and products is an important means of HPAI incursion in Israel.

No new outbreaks of H5N1 HPAI were reported in **West Bank and Gaza Strip** in the July to September 2011 period. Previous HPAI events occurred in poultry and wild birds in March and April 2011 respectively. The previous outbreak in domestic poultry was associated with virus clade 2.2.1.

Iran, one outbreak of H5N1 HPAI was reported in poultry during October 2011 in the province of Bobol, identified as a result of Iranian passive surveillance. This follows the confirmation of outbreaks in free ranging duck flocks in the northernmost province of Iran (facing the Caspian sea) during September, associated with virus clade 2.3.2.1. A stamping out policy was applied to control the outbreaks. The virus associated with the outbreak in October is currently unknown. Vaccination against H5N1 AI is prohibited in Iran.

Eastern Europe

The last wild bird event in Europe was reported in the **Russian Federation** in June 2010, when 367 wild birds were found dead in Ubsu-Nur Lake, in Tyva Republic. Genetic analysis at the All-Russian Research Institute for Animal Health (ARRIAH) in Vladimir determined that the isolate belonged to Clade 2.3.2 of the Asian linage A/Guandong/1/96 and is 99% similar to the 2009-2010 H5N1 isolates from wild birds in Mongolia, Tyva and Qinghai.

Prior to this, H5N1 activity was reported on the Black Sea coast, with two outbreaks in backyard poultry in **Romania** and one positive case in a common buzzard in **Bulgaria**. Isolates from both countries grouped in the 2010 virus Clade 2.3.2.1 and were 99.3% identical and 99.3% similar to viruses isolated recently from poultry in Nepal. Prior to April 2010, the last H5N1 HPAI event in poultry had been detected in October 2008 on a mixed poultry farm in Germany.

Figure 6
H5N1 HPAI outbreaks/cases in poultry, H5 and H5N1 infection in wild birds in East and South East Asia, by country (excluding Indonesia and Viet Nam), between June 2009 and December 2011.
*(Source: FAO EMPRES-i; * 2009 – 2010 refers to the period 1 July 2009 to 30 June 2010)*

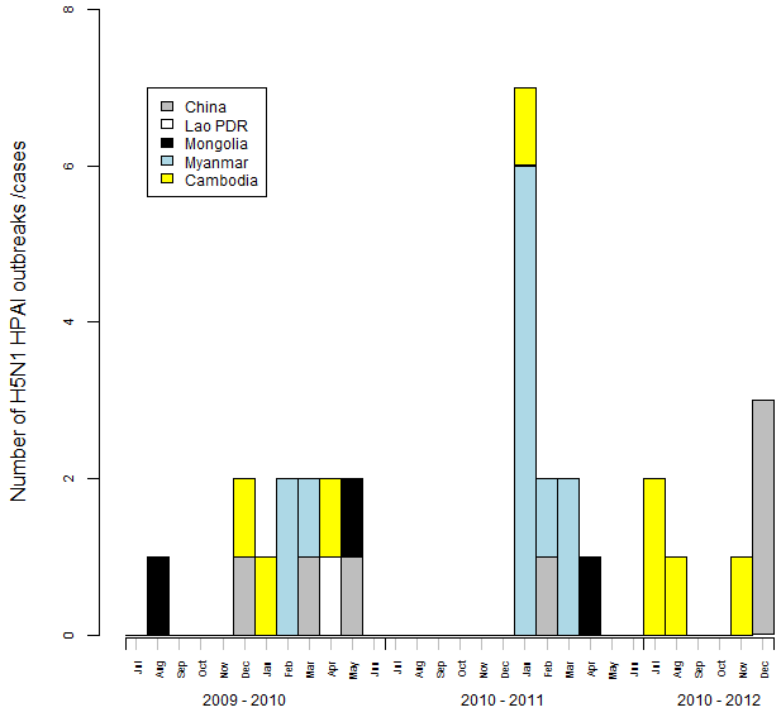


Figure 7
H5N1 HPAI outbreaks in poultry in Indonesia (compared to the rest of the world) Between July 2009 and December 2011.
*(Source: GoI/ECTAD Indonesia and EMPRES-i; * 2009 – 2010 refers to the period 1 July 2009 to 30 June 2010)*

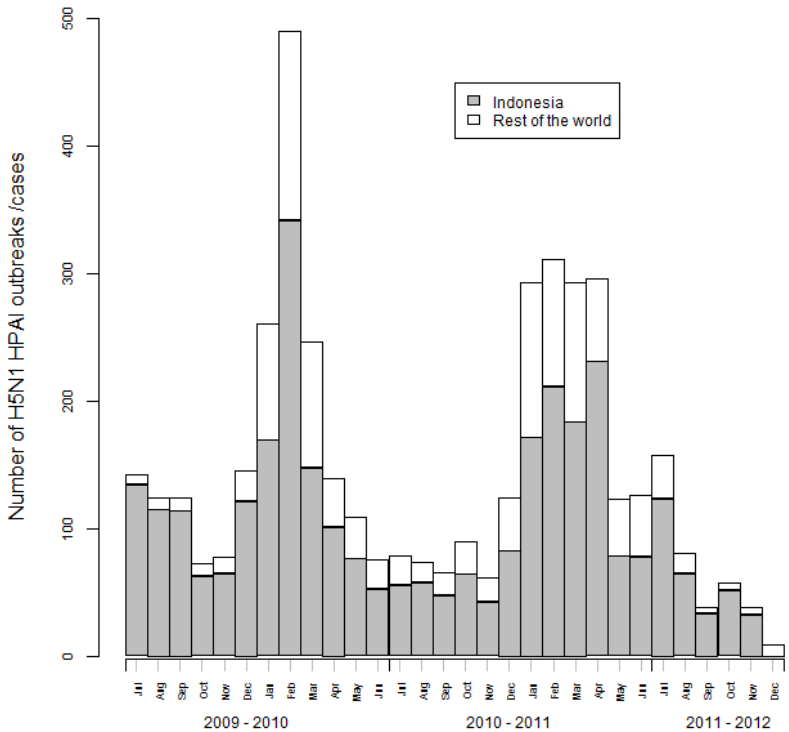


Figure 8
H5N1 HPAI outbreaks in poultry in Viet Nam, between June 2009 and December 2011
(Source: FAO EMPRES-i; 2009 – 2010 refers to the period 1 July 2009 to 30 June 2010)*

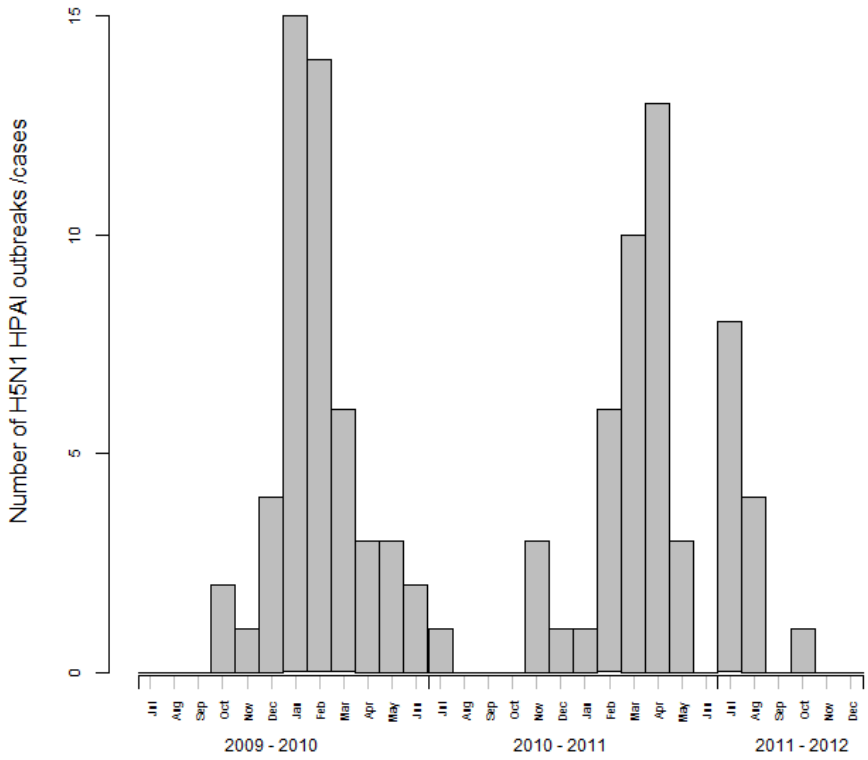
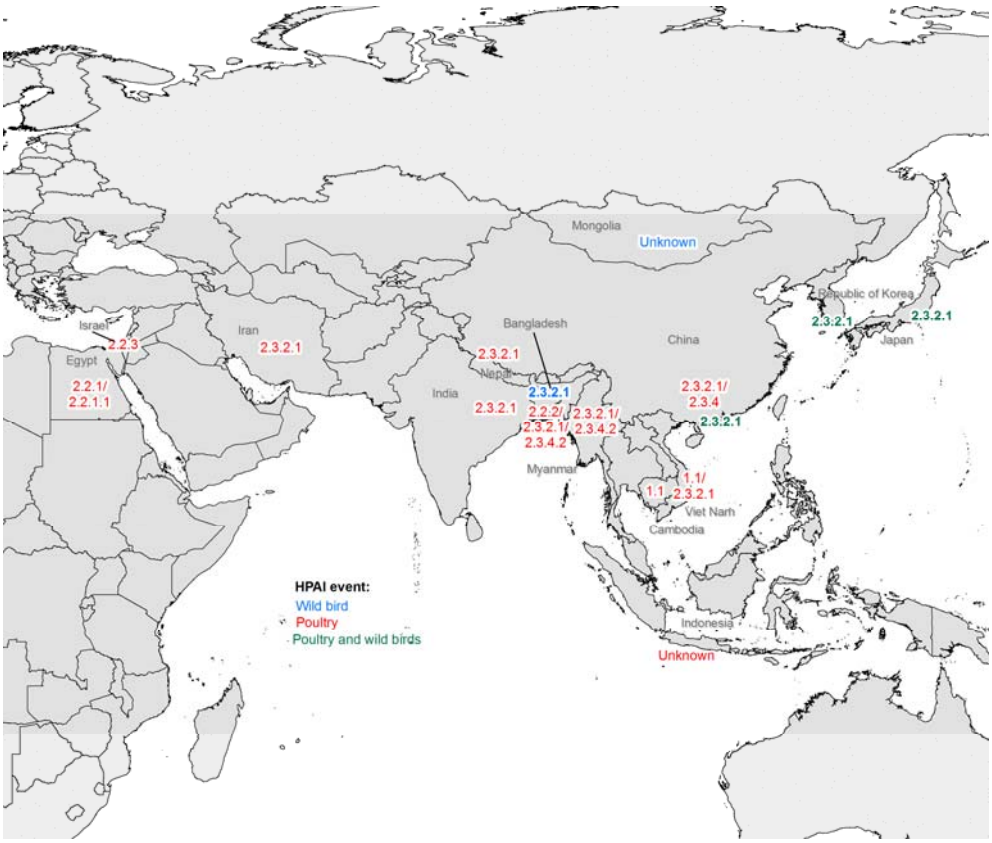


Figure 9
Geographic distribution of circulating virus clades globally in poultry and wild birds reported between February and December 2011
(updated for Nepal and China).



Disclaimer

This overview is produced by the EMPRES/GLEWS team in FAO, which collects and analyses epidemiological data and information on animal disease outbreaks under the framework of the Global Early Warning System for Major Animal Diseases including Zoonoses.

EMPRES/GLEWS 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. Information will be treated confidentially if requested.