Issue No. 28

SUMMARY

During the reporting period, 356 domestic poultry outbreaks were reported from 6 countries /territories (Bangladesh, Egypt, Indonesia, Republic of Korea and, Viet Nam), 13 confirmed reports of human cases in three countries (Cambodia, Indonesia and Egypt) and two confirmed wild bird events in two countries (The West Bank and Gaza Strip and Mongolia).

The period April to June generally signals the end of the H5N1 HPAI season when reports of outbreaks decrease globally. As expected, during the second quarter of 2011, there were reductions in the number of countries reporting outbreaks (from 12 to 6 ; see Figure 3a) as well as the number of outbreaks/cases reported globally (Figure 2a). Compared to the same period in 2009 and 2010, there was an increase in outbreaks numbers primarily from Asia and Egypt. There were no newly affected countries reported during this period.

The number of outbreaks of H5N1 HPAI reported globally has increased since July 2008, with these increases taking place in Asia. This increase represent a departure from the general decreasing trend in outbreak numbers which may be attributable to improved surveillance and the emergence of new variants of clade 2.3.2.1 in a number of countries in Asia in which vaccines used regularly are not providing protection against these new isolates resulting in increased disease incidence.

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 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 increase in human case numbers (Figure 4) from 2010 to 2011 provides some support for this. Thus there is an urgent need to identify the drivers or factors responsible for the changes in the H5N1 HPAI situation globally and newly emerging disease dynamics in endemic settings such as China, Vietnam, Egypt and Indonesia.

H5N1 HPAI continues to be a global threat for poultry and also humans therefore surveillance needs to be maintained by governments in poultry and wild birds species in endemic countries and countries at risk worldwide.

WORLDWIDE SITUATION: A CHANGE IN TREND

During the last three months (April to June 2011), 356 H5N1 HPAI outbreaks in poultry were reported officially from the following countries: Bangladesh, Egypt, Indonesia, Republic of Korea and, Viet Nam. Two wild bird cases were reported during the same period in Mongolia and the area of West Bank. See Figure 1. Analysis of HPAI data (as presented in this report) obtained through official reports is limited as the data on outbreaks in many endemic countries is incomplete. In addition, some endemic countries are currently implementing surveillance for H5N1 HPAI with assistance from FAO, the outputs of which are considered essential to understand the dynamics of H5N1 outbreaks in endemic areas and consequent risks to poultry and human.

Figure 2 presents the total number of H5N1 HPAI outbreaks/cases reported globally since December 2003, stratified by continent, and Figure 3 displays the number of countries reporting outbreaks during the same period. The number of outbreaks reported globally has increased since July 2008, with countries in Asia contributing significantly to these numbers. This increase in outbreak numbers represent a departure from the general reduction in outbreaks prior to July 2008.

FIGURE 1

Map showing the location of H5N1 HPAI outbreaks/cases in poultry, H5 and H5N1 infection in wild birds and H5N1 infection in humans reported between April to June 2011. *Insert shows a Bar chart of H5N1 HPAI outbreaks/cases in poultry and H5 and H5N1 infection in wild birds reported between April to June 2011.*

(Source: FAO EMPRES-i)

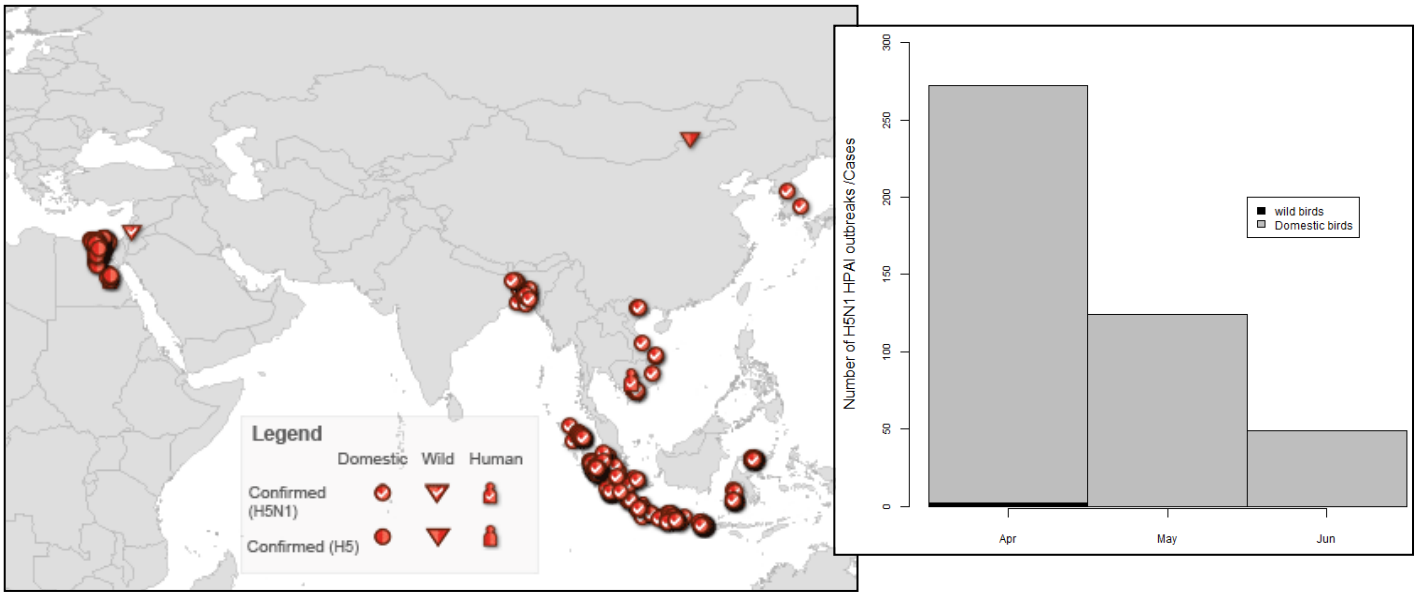
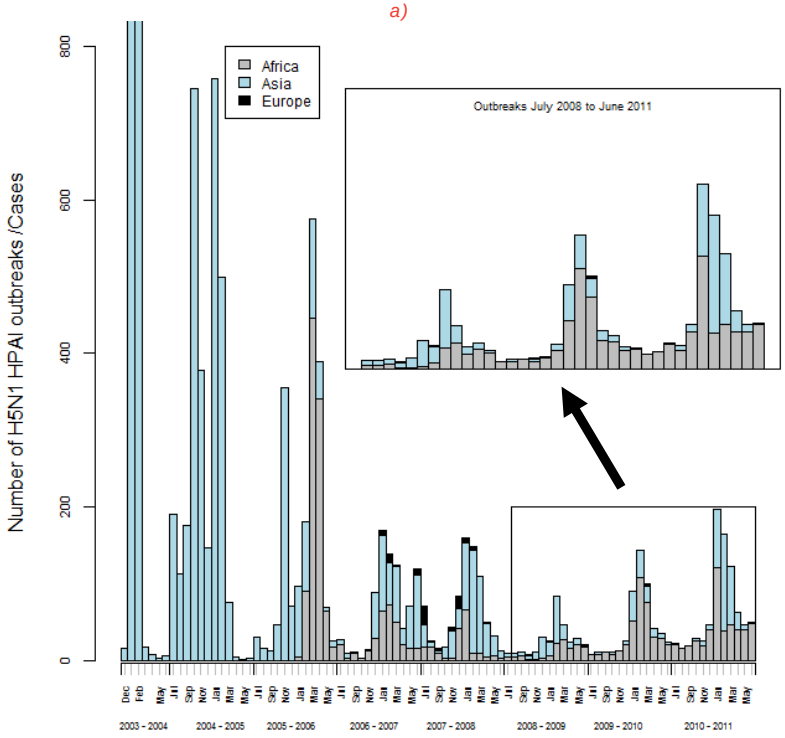


Figure 2

Epidemic curve showing: (a) the monthly and, (b) annual number of H5N1 HPAI outbreaks/cases reported between December 2003 and June 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 that 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)

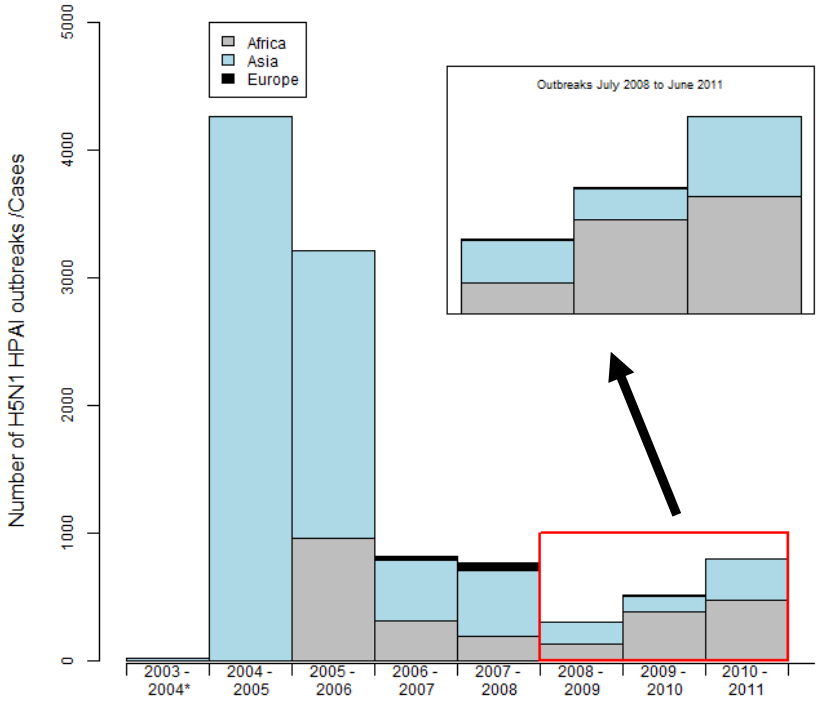


FIGURE 3

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 June 2011*

(Source: FAO EMPRES-i)

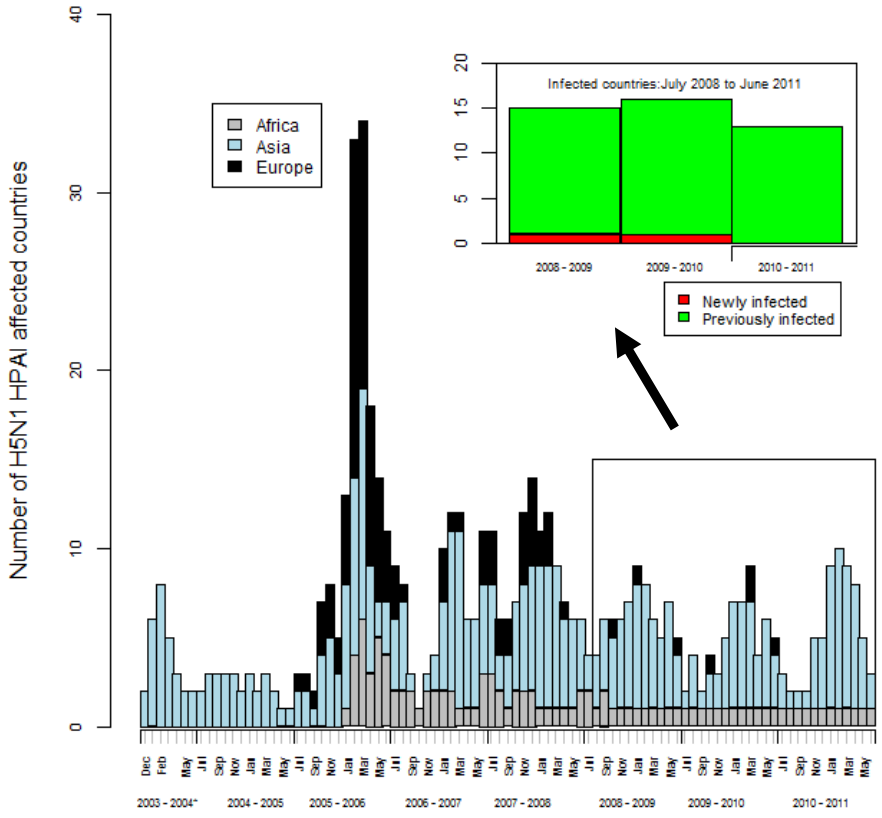
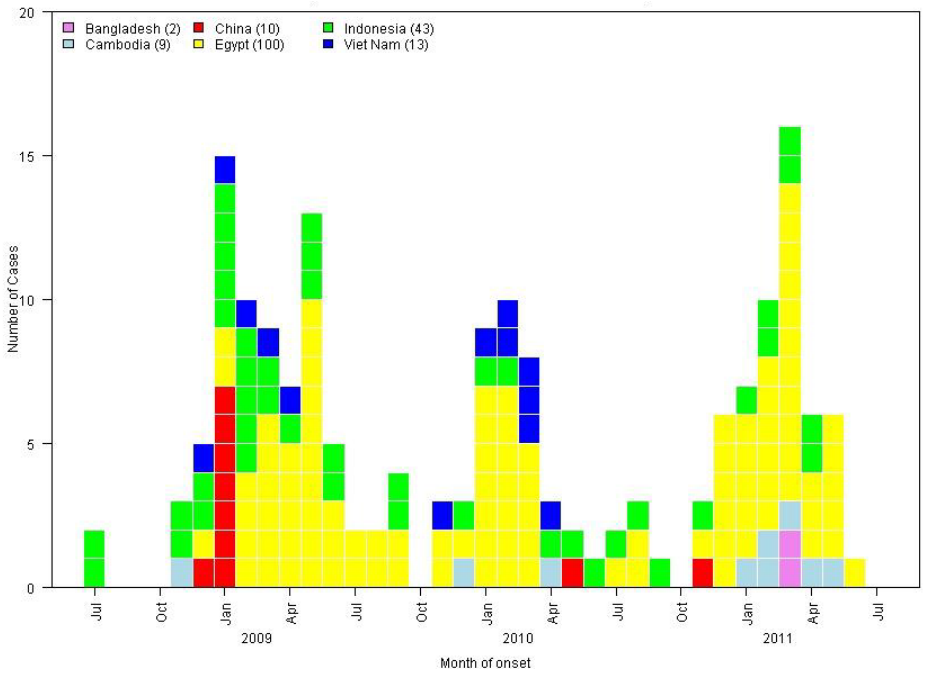


FIGURE 4

Cases of H5N1 AI infections reported in humans by country and month of onset from July 2008 to June 2011.

(Source: World Health Organization - WHO)



SITUATION BY CONTINENT/REGION

Africa

Egypt reported 128 outbreaks in poultry from 17 governorates, mostly from the household sector (114 out of 128). See Figure 4. These occurred mostly in flocks of unknown vaccination status 56% (72 of 128) and non-vaccinated flocks 34% (44 out of 128). Twelve of the 128 outbreaks were detected during visits to 430 villages by The Community Animal Health Outreach (CAHO) teams. CAHO teams operate in high-risk governorates and collect samples only from suspected HPAI cases. Five out of 3 501 samples tested, as part of a regular pre-movement on farm testing

were positive and three out of 289 commercial poultry farms tested as part of the ongoing active surveillance were positive for H5 HPAI infection Active surveillance in household poultry was also carried out in 2 377 villages where 85 samples in 20 governorates were found positive for H5 HPAI. Three out of 16 suspected outbreak notifications from commercial farms were confirmed positive for H5 HPAI whilst 29 of the 871 suspected outbreak notifications from the household poultry sector were confirmed positive for H5 HPAI. Out of fifty-three samples collected at road check points, three tested positive for H5 HPAI.

There were nine human avian influenza (AI) type A H5N1 cases with six fatalities during the three months period. This increases the human confirmed cases in Egypt since 2006 to 150, 52 (35%) have been fatal. While most cases in 2009 were in children under four years of age, in 2010, 78% of human infections have been reported in patients above that age. The CFR in 2010 is higher than in 2009 (43% vs 10%), but similar to the CFR reported in 2008 (50%).

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 vaccination was introduced, Egypt is considered as 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 depicts that currently there are two major groups of A/H5N1 viruses: i) The classical group: which is closely related to the originally introduced viruses and is circulating mainly in household poultry flocks; and ii) the variant group that has emerged in late 2007 and that 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).

South Asia

In April, May and June 2011, **Bangladesh** experienced 15 outbreaks of H5N1 HPAI. The virus clade (s) involved in these outbreaks is currently unknown. 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 was confirmed for the first time in Bangladesh in crows and chickens in January and February 2011.

As of 24 June 2011, a total of 520 outbreaks had been recorded in 51 out of 64 districts, including 31 outbreaks in 2010, 32 in 2009, 226 in 2008 and 69 in 2007. Out of these outbreaks, 463 were on commercial poultry farms, and 57 in backyard poultry.

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 prohibited by the government. Over 2.4 million birds have been culled 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 April, May and June (up to 24), 27 687, 28 271 and 21 236 SMS messages were received, respectively, including 154 suspected HPAI events in backyard poultry and 628 suspected events on commercial poultry farms. The veterinary investigations that followed excluded 782 of these suspect cases and on 87 occasions, diagnostic specimens were collected. Of all specimens collected and reported through the SMS gateway system, 15 tested positive for H5N1 HPAI.

FIGURE 5

H5N1 HPAI outbreaks in poultry in Egypt between June 2009 and June 2011

(Source: FAO EMPRES-i; 2009 – 2010 refers to the period 1 July 2009 to 30 June 2010)*

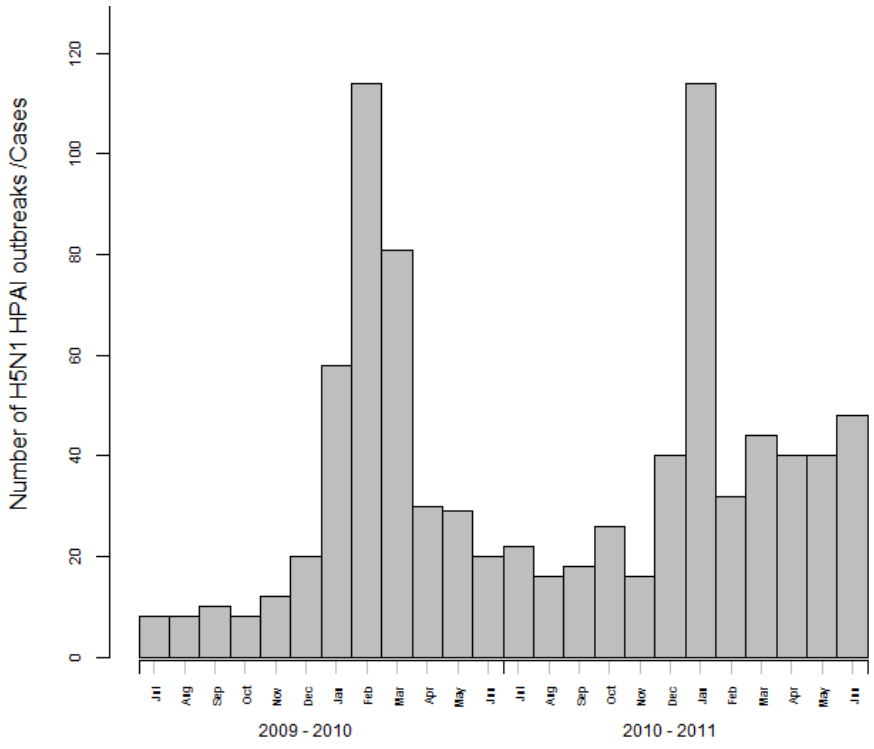
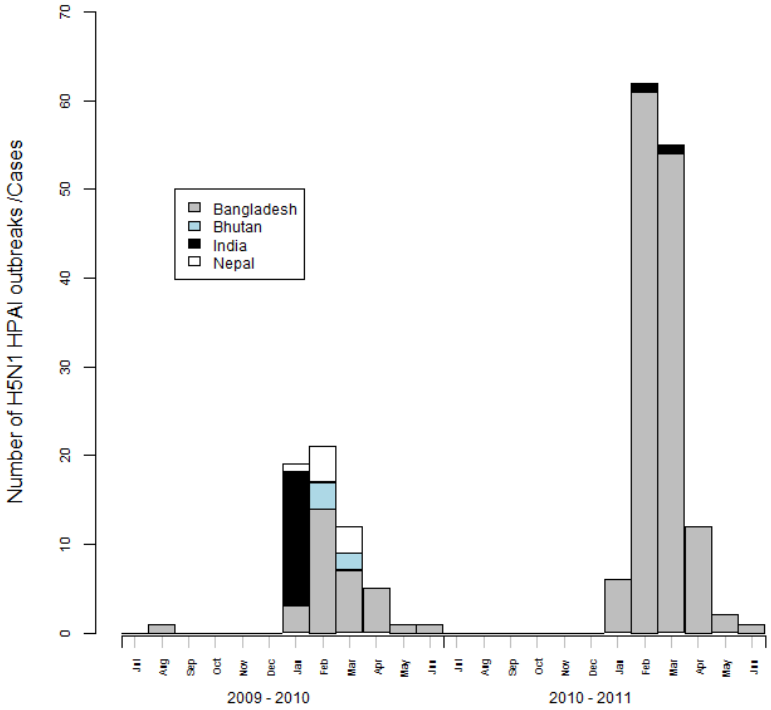


Figure 6

H5N1 HPAI outbreaks/cases reported in poultry, H5 and H5N1 infection in wild birds in South Asia, by country, between July 2009 and June 2011

(Source: FAO EMPRES-i; 2009 – 2010 refers to the period 1 July 2009 to 30 June 2010)*



South East and East Asia

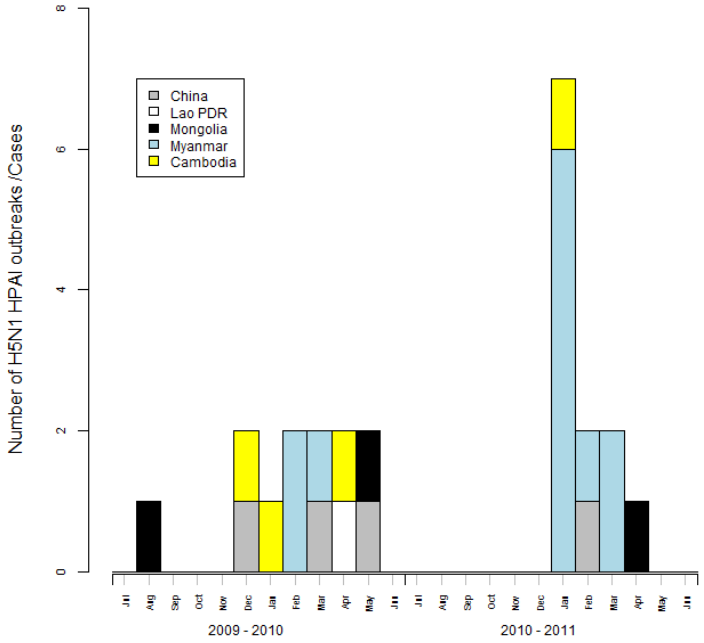
Though no poultry outbreaks were reported in **Cambodia** during this reporting period, there were three human cases of H5N1 infections reported. This follows reports of one poultry outbreak and two human cases during the first three months of 2011. The virus clade involved in these events is currently unknown. All available human and animal isolates since 2004, including all those from 2010, are Clade 1 (genotype Z) 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.

Cambodia routinely reports results obtained from surveillance activities through two hotlines (supported by FAO until February 2010) at the National Veterinary Research Institute (NaVRI). There is also ongoing duck market surveillance at eight live bird markets (LBMs) in five provinces and sentinel duck flock surveillance in six provinces. Both duck surveillance efforts are conducted by NaVRI (and supported by FAO).

Figure 7

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 June 2011.

(Source: FAO EMPRES-i; 2009 – 2010 refers to the period 1 July 2009 to 30 June 2010)*



As none of the samples previously collected from 12 markets over two years have tested positive for H5N1 HPAI, the number of markets was reduced to eight and 12 sentinel duck flocks have been introduced into the surveillance programme.

In **mainland China**, there were no reports of outbreaks/cases of H5N1 HPAI in poultry or wild birds or human infections between April and June 2011. Though there were no outbreak reports during the previous three months of 2011, ongoing active surveillance in live bird markets in 13 provinces resulted in 36 virus positive birds during March, implying that H5N1 viruses are still circulating in many provinces in domestic poultry and disease outbreaks are unnoticed by the authorities. Positive samples came from eight provinces (Chongqing, Guizhou, Henan, Sichuan, Yunnan, Zhejiang, Jiangxi, Jiangsu, Hunan, Guangxi. Guangdong, Fujian and Anhui) and four species (chickens, ducks, geese and pigeon). The last reported outbreak was observed in wild birds in Tibet in May 2010. There was no new reports or detections HPAI H5N1 virus in wild birds or poultry since the last reported case in March 2011 in **Hong Kong (SAR).**

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. A study by Kou *et al.* (2010) provides evidence of the presence of H5N1 virus circulation in apparently healthy wild birds surveyed between April 2004 and August 2007 in a number of provinces.

Mass vaccination against H5N1 HPAI has been implemented since November 2005. Though data is not available for the current reporting period, post-vaccination sero-surveillance during the January to March 2011 provide evidence of vaccination coverage ranging between 89% and 91%. 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.
No human cases were reported between January and March 2011. China has reported 40 human cases, of which 26 (65%) 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 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 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. Following the reporting of HPAI in Gorontalo Province in February 2011, 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 April 2011, PDSR officers visited 2 131 villages, of which 231 (10.8%) were infected. Of these, 202 were new infections. In May 2011, PDSR officers visited 1,825 villages, of which 110 (6.0%) were infected. Of these, 77 were new infections. During the previous 12 months (May 2010 to May 2011), 19 513 (27.2% of 71,815 villages were visited in the 385 PDSR surveillance districts. Since May 2008, the PDSR officers have visited approximately 57.3% of villages under coverage. Approximately 6.2 % of villages visited during the previous 12 months were classified as newly infected. Cases over the past 12 months were concentrated in Sumatera and Java.
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. Single dose vaccination of broilers with inactivated vaccine is practiced sporadically during the wet season on Java. Ducks are usually not vaccinated against HPAI H5N1 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**, one wild bird HPAI event was reported in Whooper swans (Cygnus cygnus) at Zegst lake during April 2011, approximately one year since the last wild bird HPAI event was reported in May 2010. Phylogenetic analyses of the 2010 wild bird isolates placed them in the 2.3.2 Clade. The clade information of the current wild bird event is unknown.
The **Republic of Korea** reported one outbreak in domestic poultry during this period. This follows the detection of domestic and wild bird events from November 2010 and March 2011. Viruses involved in the 2010 outbreaks were clade 2.3.2.

In **Viet Nam**, during the three months reporting period, the Department of Animal Health officially reported 14 HPAI outbreaks in the north (seven provinces) and central (five provinces) of Viet Nam. See Figure 9. These outbreaks follow poultry outbreaks during the first three months of 2011 and the last two months of 2010. No human cases were officially declared during the reporting 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, compensation and vaccination.

Figure 8

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

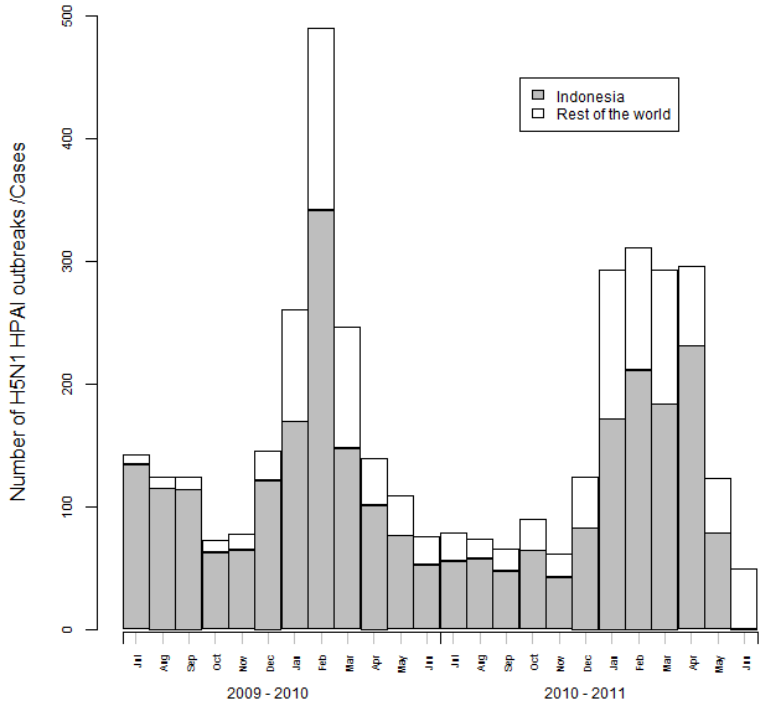
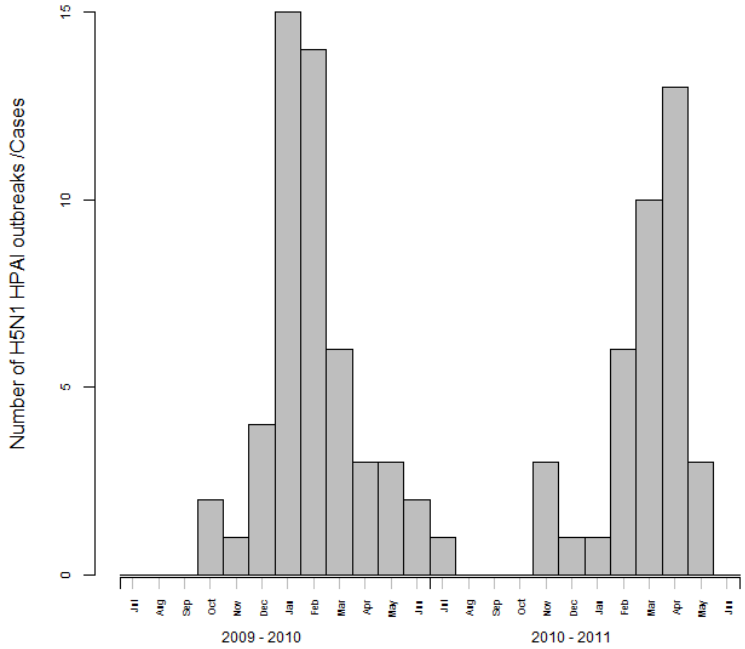


Figure 9

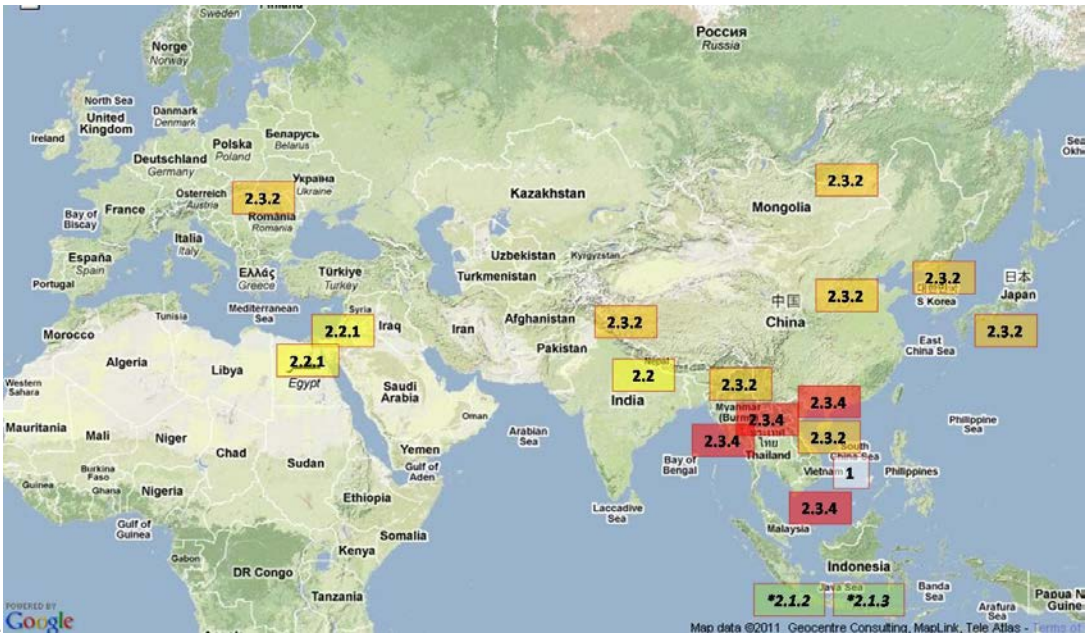
H5N1 HPAI outbreaks in poultry in Viet Nam, between June 2009 and March 2011
(Source: FAO EMPRES-i; 2009 – 2010 refers to the period 1 July 2009 to 30 June 2010)*



Molecular genetics surveillance has indicated the presence of four circulating virus clades in Viet Nam since 2003. These are: (1) Clade 1 (predominant in southern Viet Nam since 2004 to 2010; (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 has become predominant in the north Viet Nam since late 2010. It was also detected in the south in 2010. Interestingly, Clade 2.3.2 HA genes were nearly identical to A/Hubei/1/2010, which was recently isolated from a human case in China. Clade 2.3.4 viruses grouped into one of two previously identified subgroups with limited genetic variation compared to Clade 2.3.4 vaccine strains. This clade, though largely prevalent in north and central Viet Nam, was also detected in south Viet Nam in 2010. No Clade 7 isolates have been detected since 2008.

In a vaccine efficacy trial, it was observed that the current vaccines in use in Vietnam could not fully protect one particular virus strain within virus clade 2.3.2, detected from two HPAI outbreaks in poultry in North Vietnam recently. This virus strain also forms a distinct cluster from most of the other virus strains of clade 2.3.2 in the HA gene phylogeny. The Government of Vietnam in June, 2011 announced a temporary halt in their HPAI vaccination campaign owing to this new development.

Figure 10
Geographic distribution of circulating virus clades globally in 2010.



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 HPAI H5N1 through a longitudinal sentinel study, two market surveys and a modified post-vaccination monitoring programme carried out in five provinces of Vietnam. 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 in H5N1 detections between Red River area and 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 farmers ability to report 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 clocal 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 April to June 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 between borders of live poultry and products is an important mean of HPAI incursion in Israel .
One wild bird event was reported in the **West Bank and Gaza Strip** in April 2011. This follows one confirmed outbreak in poultry during March 2011. This previous outbreak in domestic poultry was associated with virus clade 2.2.1.

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 at 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 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.

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 and Response System for Major Animal Diseases including Zoonoses.
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. Information will be treated confidentially if requested.