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WORLDWIDE SITUATION

During the last three months (January to March 2011), 826 H5N1 HPAI outbreaks in poultry were reported from the following countries: Bangladesh, Cambodia, Egypt, China (Hong Kong SAR), India, Indonesia, Israel, Japan, Myanmar, Republic of Korea, Viet Nam and The West Bank and Gaza Strip. Fifty wild bird cases were reported during the same period in Bangladesh, China (Hong Kong SAR), Japan and the Republic of Korea. The number of reported outbreaks/cases by country and their location are illustrated in Table 1 and Figure 1.

Table 1
H5N1 HPAI outbreaks/cases in poultry and H5 and H5N1 infection in wild birds
in January, February and March 2011
(Source: FAO EMPRES-i, OIE WAHIS)

Month	Country	No of outbreaks		
		Domestic poultry	Wild birds	Total
January	Bangladesh	4	1	5
	Cambodia	1	-	1
	Egypt	114	-	114
	Hong Kong	2	1	3
	Indonesia	172	-	172
	Japan	9	10	19
	Myanmar	7	-	7
	Rep of Korea	40	3	43
Total		349	15	364
February	Bangladesh	56	-	56
	Egypt	32	-	32
	India	1	-	1
	Indonesia	211	-	211
	Japan	13	36	49
	Myanmar	1	-	1
	Rep of Korea	6	-	6
	Viet Nam	5	-	5
	West Bank	1	-	1
Total		326	36	362
March	Bangladesh	87	-	87
	Egypt	44	-	44
	Hong Kong	-	1	1
	India	1	-	1
	Indonesia	NA	-	0
	Israel	1	-	1
	Japan	3	1	4
	Myanmar	1	-	1
	Rep of Korea	5	-	5
	Viet Nam	9	-	9
Total		151	2	153

FIGURE 1
H5N1 HPAI outbreaks/cases in poultry, H5 and H5N1 infection in wild birds and H5N1 infection in humans reported between January to March 2011
(Source: FAO EMPRES-i OIE WAHIS)



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 WAHIS. The original data have been collected and aggregated at the most detailed administrative level and for the units available for each country.

Figure 2 shows the number of confirmed cases of H5N1 infections in humans reported to the World Health Organization (WHO) per country from January to March 2011. During the three month reporting period there were 24 confirmed cases of H5N1 in humans reported from Bangladesh (2), Cambodia (3), Egypt (14), and Indonesia (3), 13 of whom died. These new human cases increased the number of confirmed human cases of H5N1 reported between November 2003 and March 2011 to 539 in 16 countries with a case fatality rate (CFR) of 58.9% (318 out of 539). Among the countries with more than ten reported cases, Indonesia had the highest CFR of 82.4% (145 out of 176).

Table 2 shows the number of confirmed human cases and deaths due to H5N1 reported to WHO between January 2009 and March 2011 (a subset of the data presented in Figure 2). There was an increase in case numbers from 2009 to 2010 whilst the number of cases during the first quarter of 2011 represents half of all the cases reported in 2010. This was associated with a consistent decrease in deaths attributable to the disease across the three year period. Thus far in 2011, (as of 16 March 2011) 18 human cases were reported worldwide and 10 have died resulting in a CFR of 55.6%.

FIGURE 2
Cases of H5N1 AI infections reported in humans by country and month of onset from November 2003 to March 2011
(Source: World Health Organization - WHO)

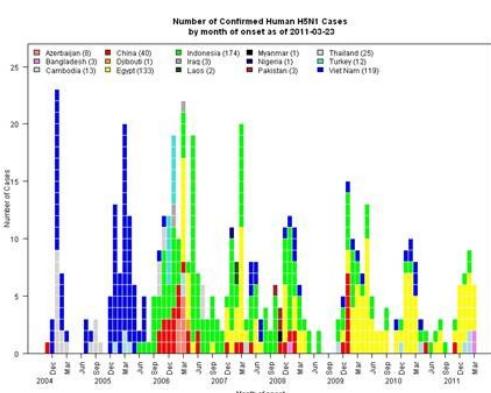


TABLE 2

The number of confirmed human cases of avian influenza A/H5N1 reported to WHO between January 2009 and March 2011

(Source: World Health Organization - WHO)

Note: in red the figures that have changed since the last Global overview

Country	2009		2010		2011	
	cases	deaths	cases	deaths	cases	deaths
Bangladesh	0	0	0	0	2	-
Cambodia	1	0	1	1	3	3
China	7	4	2	1	-	-
Egypt	39	4	29	13	14	5
Indonesia	21	19	9	7	5	5
Viet Nam	5	5	7	2	-	-
Total	73	32	48	24	24	13

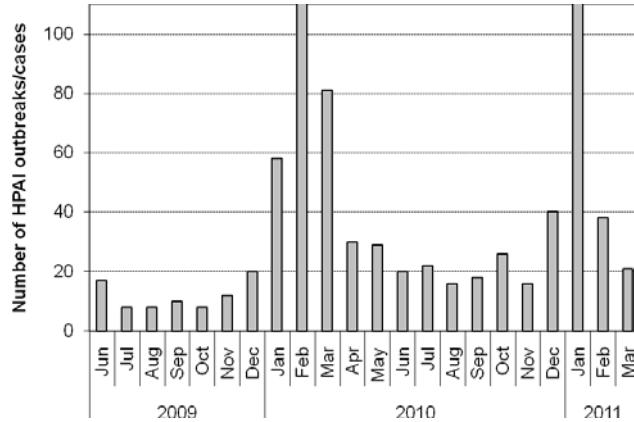
SITUATION BY CONTINENT/REGION

Africa

FIGURE 4

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

(Source: FAO EMPRES-i)



Egypt reported 190 H5 HPAI outbreaks in poultry from 18 governorates, primarily in the household sector (151 of 190 outbreaks) during January, February and March 2011. Affected governorates include Fayoum (33), Minufiyah (30), Gharbia (20), Dakahlia (19), Qalubia (18), Kafr el-Shiekh (14), Minya (14), Sharkia (12), Sixth of October (9), Beni-Suef (6), Behaira (5), Aswan (2), Helwan (2), Qena (2), Damietta (1), Giza (1), Luxor (1), and Souhage (1). Out of 190 outbreaks, 27 (14%) occurred in vaccinated flocks and 55 (29%) in non-vaccinated flocks, and 108 outbreaks (57%) in flocks of unknown vaccination status. During the reporting months, the Community Animal Health Outreach (CAHO) teams visited 450 villages in 15 governorates and detected 17% (33) of the 190 reported outbreaks. CAHO teams operate in high-risk governorates and collect samples only from suspected HPAI cases.

Out of 4 080 samples tested, as part of regular pre-movement testing during the reporting period, seven tested positive for influenza A/H5N1. Poultry farms in Egypt are required to test birds prior to movement as part of an HPAI certification programme (HPAI infection negative status). Compliance with certification for poultry transportation is generally sub-optimal and only registered commercial poultry farms (<20% of all farms) seek such services.

As part of the ongoing active surveillance programme, 183 commercial poultry farms located in nine governorates were tested and six were confirmed positive for H5 HPAI infection. Active surveillance in household poultry was also carried out in 650 villages where 108 samples in 13 governorates were found positive for H5 HPAI.

All of the 26 suspected HPAI notifications received from commercial poultry farms were confirmed positive for H5 HPAI. In addition, 42 of the 240 suspected outbreak notifications received from the household poultry sector from 12 governorates were confirmed positive for H5 HPAI. Only one sample was collected at road check points and tested negative for H5 HPAI. Conversely, one sample was collected from a poultry slaughterhouse and was confirmed positive for H5 HPAI.

The current government policy is to allow commercial poultry farms to vaccinate their flocks with registered vaccines of their choice. Although there are no official data, it is assumed that vaccines are widely used in the commercial poultry sector. All AI vaccines used in Egypt (at least 21) are inactivated (mostly H5N2) and imported. For three years, until July 2009, the government provided vaccination to household/village poultry free of charge; then vaccination was suspended after an assessment indicated that the programme had limited or no impact on H5N1 HPAI incidence.

In January, February and March 2011, there were 14 human avian influenza (AI) type A H5N1 cases with five fatalities. Since 2006, 133 human laboratory-confirmed infections were reported in Egypt, of these, 45 (34%) 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%). The increase in reported H5N1 HPAI outbreaks in poultry (460 outbreaks reported from January to December 2010, compared with 177 in the same period in 2009) is most likely the result of improved surveillance through the CAHO program.

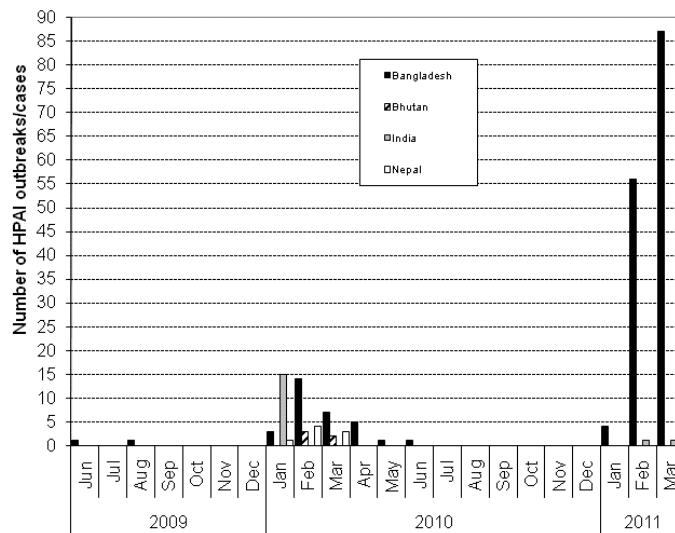
The first report of an outbreak in poultry of H5N1 HPAI in Egypt was in February 2006. Despite a vigorous initial response to the disease, including the culling of over 40 million birds, Egypt is considered as an endemic country where outbreaks are regularly reported from different governorates. Circulating 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 after 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).

All the human cases in 2010 are caused by viruses genetically similar to those isolated in 2009. Data are not available on the antigenic properties of the recent poultry viruses in Egypt, but the human isolates characterized are antigenically similar to sub group I described above.

South Asia

FIGURE 5

H5N1 HPAI outbreaks/cases reported in poultry, H5 and H5N1 infection in wild birds in South Asia, by country, between June 2009 and March 2011
 (Source: FAO EMPRES-i)



In January, February and March 2011, **Bangladesh** experienced 147 outbreaks of H5N1 HPAI. The virus clade involved in these outbreaks is currently unknown. The virus isolates from the 2010 outbreaks belonged to Clade 2.2. In particular, these isolates grouped in 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.

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.

As of 31 March 2011, a total of 505 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, 448 were on commercial poultry farms, and only 57 in backyard poultry. Over 2.3 million birds have been culled since 2007. Poultry vaccination against H5N1 HPAI is prohibited by the government. 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 computer) as a reporting tool. Daily, in each upazila, three 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 January, February and March, 29 554, 26 555 and 28 905 SMS messages were received, respectively, including 425 suspected HPAI events in backyard poultry and 1 617 suspected events on commercial poultry farms. The veterinary investigations that followed excluded 2 042 of these suspect cases and on 425 occasions, diagnostic specimens were collected. Of all specimens collected and reported through the SMS gateway system, 143 tested positive for H5N1 HPAI.

Eight of 23 migratory waterfowl trapped in Bangladesh in February 2010, as part of an FAO-facilitated satellite tracking project, are still delivering data that will allow further clarification of the role of migratory birds in the spread of H5N1 HPAI. The current location of the birds can be found at <http://www.werc.usgs.gov/Project.aspx?ProjectID=159>. An article on this project was published in Science (<http://www.sciencemag.org/content/vol328/issue5978/r-samples.dtl>). Four of these birds were observed to have returned to Bangladesh in November 2010. The virus isolated from the first human case belongs to clade 2.2.

In **Bhutan**, no new outbreaks have been reported since February and March 2010. These outbreaks were caused by viruses belonging to Clade 2.2, similar to those detected in India and Bangladesh.

In **India**, two outbreaks of H5N1 HPAI occurred in February and March 2011. The first outbreak occurred on a Government exotic duck breeding farm where high mortality rates amongst ducklings and adult ducks were the first signs observed. The second outbreak occurred at a state-owned hatchery, where high mortality was seen in a chicken parent flock. Samples taken from the two affected farms tested by the High Security Animal Disease Laboratory, Bhopal (HSADL), confirmed the presence of H5N1 HPAI infection. Both farms are located in Agartala, Tripura, a border town with Bangladesh. Stamping out was conducted on the two affected farms and within a three kilometre radius area around the farms. Further pending diagnostics will identify the Clade of the current isolates.

Sero-surveillance activities conducted at HSADL, are periodically reported at <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 however laboratory results are pending.

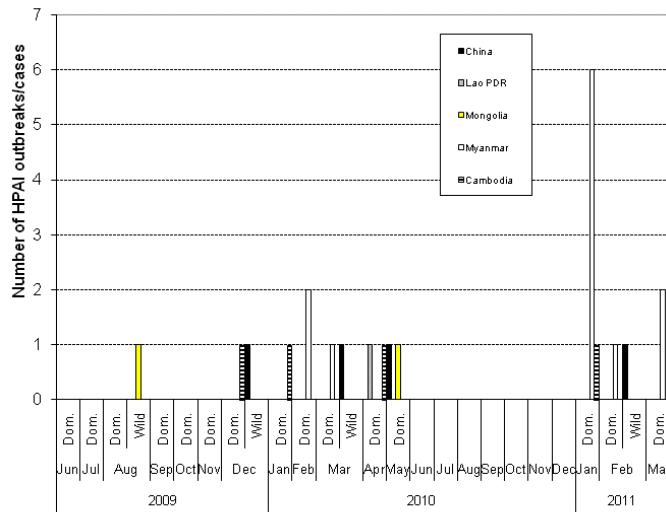
FAO facilitated a migratory waterfowl satellite tracking project in January 2010 and the flight paths can be found at (<http://www.werc.usgs.gov/Project.aspx?ProjectID=60>).

In **Nepal**, no new H5N1 HPAI outbreaks have been reported since March 2010. Phylogenetic analyses of virus isolates from these last outbreaks identified H5N1 Clade 2.2 (samples taken from the Kaski District outbreaks) and H5N1 Clade 2.3.2 (from all outbreaks). Clade 2.2 had been previously isolated in 2009 in Nepal's eastern region, but this was the first detection of Clade 2.3.2 in the South Asia region. Clade 2.3.2 viruses were most related to viruses isolated in wild birds in 2009 from the Russian Federation and Mongolia. More distant Clade 2.3.2 viruses were also isolated in wild birds in China (Hong Kong SAR) and in poultry in Viet Nam.

South East and East Asia

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 March 2011
 (Source: FAO EMPRES-i)



In **Cambodia**, one poultry outbreak and three human cases were reported between January and March 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 clade that 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 (LBM) in five provinces and sentinel duck flock surveillance in six provinces. Both duck surveillance efforts are conducted by NaVRI (and supported by FAO). 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**, no outbreaks were reported in poultry between January and March 2011. In China (Hong Kong SAR), there were seven H5N1 related events officially reported for the period in wild birds and wild bird/poultry carcasses. These involved detection of H5N1 virus in a wild bird and two wild bird carcasses collected through the ongoing surveillance programme. Five poultry carcasses of unknown origin collected from the shores of Tai O, Sham Shek Tsuen were also diagnosed as H5N1 virus positive. The latest official veterinary bulletin released by the Ministry of Agriculture for surveillance conducted in domestic poultry between August and November 2010 did not result in positive findings.

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.

Between 2004 and 2009 there has been a marked decrease in the number of reported outbreaks in domestic poultry. Despite this decrease in outbreak numbers, official ongoing surveillance activities conducted at national and provincial levels provide evidence that H5N1 viruses are still circulating in many provinces in domestic poultry. According to the results from the national surveillance system released during the period January to March 2011 by the Ministry of Agriculture, H5N1 positive samples were isolated from Jiangsu and Guangdong provinces. It must be noted that the surveillance activities were conducted between August and November 2010. Out of 106 319 virological samples collected and tested during those three months, three (0.28 per 10 000) were positive. All positive samples came from ducks. Sixty-eight percent of samples were collected from chickens, 21.93% from ducks, 5.45% from geese, 1.63% from wild birds and the remaining 2.99% from pigs and other species.

A study by Kou *et al.* (2010) describes the H5N1 virus prevalence in apparently healthy wild birds surveyed between April 2004 and August 2007. Of 14,472 wild birds sampled, covering 56 species of 10 orders in 14 provinces of China tested with RT-PCR using H5 primers, 17 viral strains out of 149 positive samples were isolated. Of the six bird orders affected, Anseriformes had the highest prevalence (2.70%), while Passeriformes had the lowest (0.36%). Among the 24 positive species, mallards (*Anas platyrhynchos*) had the highest prevalence (4.37%). Of the provinces included in the sampling, Qinghai Province had the highest prevalence (3.88%), particularly in pintails (*Anas acuta*), mallards (*Anas platyrhynchos*) and tufted ducks (*Aythya fuligula*).

An intensive surveillance programme is ongoing in Hong Kong SAR which includes sampling of dead wild birds, wholesale and retail market birds found dead, as well as faecal swabs and pre-sale antibody checks from healthy birds. Results from this programme are not available.

Mass vaccination against H5N1 HPAI has been implemented since November 2005. Vaccination combined with other measures has resulted in improved disease control. Between August 2010 and November 2010, out of 1,706,029 post-vaccination samples, 1 575 370 (90.58%) were sero-positive. AI vaccines are provided free of charge by the government to both commercial poultry farms and backyard poultry breeders. China produces its own AI vaccines with ten manufacturers nationwide. Most birds receive the killed "Re-5" vaccine regardless of species. Most poultry should receive at least two doses of vaccine (primary + booster), except for meat ducks and chickens, which have a very short production cycle.

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) also provides some information on virus clades in wild birds sampled in China between April 2004 and August 2007. Additional information can be found at

<http://www.plosone.org/article/info:doi%2F10.1371%2Fjournal.pone.0006926>.

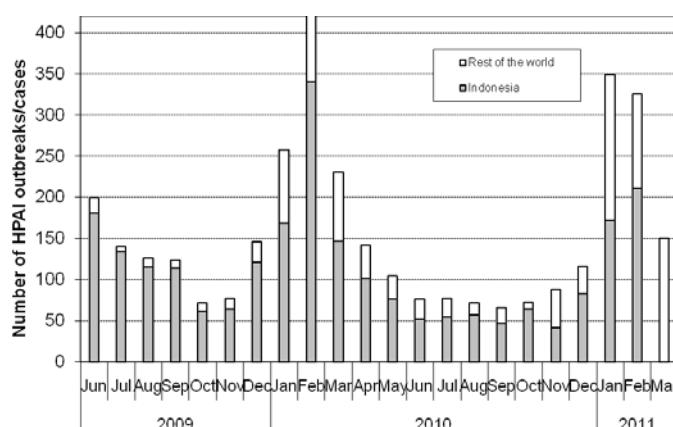
Indonesia continues to report a high proportion of H5N1 HPAI outbreaks in poultry worldwide (Figure 7), as it has for the past three years. H5N1 HPAI Clade 2.1 is confirmed to be endemic on the islands of Java, Sumatra and Sulawesi, and probably Bali, with sporadic outbreaks reported elsewhere.

H5N1 HPAI prevalence by village varies widely. Only two of Indonesia's 33 provinces have 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, AusAID and World Bank-implemented Avian and Human Influenza Facility Policy and Human Resources Development Fund (AHIF-PHRD) financial support and is operating in 349 of 496 (70%) districts through 31 Local Disease Control Centres (LDCCs) in 27 (82%) of 33 provinces in Java, Sumatra, Bali, Sulawesi and Kalimantan, including all known endemic areas. Larger and less densely-populated provinces report HPAI outbreaks less often than more densely populated provinces.

FIGURE 7

H5N1 HPAI outbreaks in poultry in Indonesia (compared to the rest of the world) between June 2009 and March 2011

(Source: GoI/ECTAD Indonesia and EMPRES-i)



During January 2011, PDSR officers visited 2 127 villages, of which 172 (8.1%) were infected. Of these, 166 were new infections. In February 2011, PDSR officers visited 2,011 villages, of which 211 (10.5%) were infected. Of these, 202 were new infections. During the previous 12 months (February 2010 to February 2011), 20 100 (28.1% of 71,653) villages were visited in the 384 PDSR surveillance districts. Since May 2008, the PDSR officers have visited approximately 55.8% of villages under coverage. Approximately 7.0 % 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. Vaccination of ducks is not

widely practiced and the epidemiologic role of ducks in Indonesia remains poorly understood.

Japan has reported 25 outbreaks in poultry and 47 cases in wild birds during the period between January to March 2011. The clade of virus isolates involved in these outbreaks are currently unknown but in October 2010, an H5N1 HPAI virus belonging to subclade 2.3.2. was isolated from wild bird faecal material.

Lao People's Democratic Republic has reported no outbreaks since April and May 2010 in Vientiane, the capital, when the country experienced its first HPAI outbreaks since February 2009. Samples sent to the Australian Animal Health Laboratory (AAHL) in Geelong were identified as Clade 2.3.4, clustering together with viruses seen in Lao PDR previously.

The 2010 active surveillance programme is carried out in the nine highest-risk provinces in Lao PDR, based on the location of historical HPAI outbreaks. The surveillance is focused on ducks in live bird markets and, high duck concentrated villages and farms. A total of 30 markets, 35 villages and 28 farms have been visited. Three samplings of active surveillance (March, June and September 2010) have been completed. A total of 3 695, 3 227 and 3 148 swab samples and 1 899, 2 064 and 1 943 serum samples were collected from the first, second and third rounds respectively. From all the three samplings, 565 (5.61%) swab samples tested positive to avian influenza type A H5N1 RT-PCR, but all were negative to AIV H5. While 302 (5.11%) of sera tested positive to AIV type A by ELISA, but all were negative to the HI test. Laboratory results from the fourth sampling conducted in December 2010 are pending.

In **Mongolia**, no HPAI event has been reported since the wild bird outbreak reported in May 2010, affecting whooper swans (*Cygnus cygnus*) and greylag geese (*Anser anser*) in Ganga Lake, on the south-eastern border with China. Phylogenetic analyses placed them in the 2.3.2 Clade.

Myanmar reported nine outbreaks during the three months period in domestic poultry; the majority of those were detected in January. Previous reports occurred in February and March 2010 associated with virus clade 2.3.4. The country is currently compiling a national database of commercial poultry farms with population and geo-location data to support disease control programmes. Myanmar is implementing an expanded surveillance programme in 78 townships (out of a total of 334). The programme is based on surveillance by community animal health workers (CAHW), suspect outbreak investigations by veterinary staff and longitudinal studies of 100 poultry flocks. In the longitudinal studies, sera are collected monthly from ducks and backyard chickens in contact with ducks.

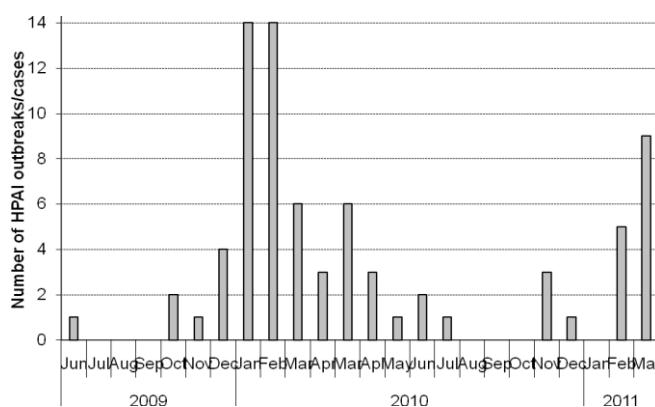
The **Republic of Korea** reported 53 outbreaks of H5N1 HPAI in domestic poultry and three wild bird events between January and March 2011 inclusive. This follows detection of domestic and poultry events in the previous two months (November and December 2010). Viruses involved in the 2010 outbreaks were clade 2.3.2.

In **Thailand**, a country that has not experienced any outbreak since 2008, a recent study by Amosin *et al.* (available at <http://www.virologyj.com/content/pdf/1743-422x-7-233.pdf>) reported on the genetic characterization of the viruses isolated from the 2008 and earlier outbreaks reported in four provinces. Eight influenza A H5N1 viruses, recovered and characterised, displayed genetic drift characteristics (less than 3% genetic differences).

* In the event that more than one bird dies suddenly in a flock, with or without clinical signs, Participatory Disease Surveillance and Response (PDSR) teams carry out an influenza type A rapid test. A mortality event consistent with clinical HPAI and a positive rapid test in affected poultry is considered a confirmed detection of HPAI in areas where HPAI has previously been confirmed by laboratory testing.

FIGURE 8

H5N1 HPAI outbreaks in poultry in Viet Nam, between June 2009 and March 2011
 (Source: FAO EMPRES-i)



In **Viet Nam**, between January and March 2011, the Department of Animal Health officially reported 14 HPAI outbreaks in the north (seven provinces) and central (five provinces) of Viet Nam. These outbreaks follow poultry outbreaks in 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. The Government of Viet Nam announced in February 2011 a new vaccination strategy for the 2011-2012 period with compulsory age-based vaccination for poultry flocks of more than 50 birds. Vaccination of flocks below 2 000 head/flock will be financially supported by the Government. Vaccination campaigns are now organised on a monthly basis (instead of twice-a-year massive national campaigns previously implemented since end of 2005) in 25 provinces in which vaccination is compulsory and in 15 provinces in which vaccination is recommended in high-risk area only. The vaccination is optional and not compulsory in 23 provinces and cities. The objective is to reach vaccination coverage of 80% among the susceptible population in risk areas.

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); 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.

Though no human cases have been reported since April 2010, Viet Nam remains one of the countries with the highest number of human cases - 119 - of which 59 (50%) have been fatal.

Middle East

In **Israel**, one poultry outbreak was reported in March 2011. The virus isolates from this outbreak belong to clade 2.2.1. 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.

One domestic poultry outbreak was reported in the **West Bank and Gaza Strip** in March 2011. This 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 lineage 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 Clade 2.3.2 and were 99.3% equal to each other 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.

CONCLUSIONS

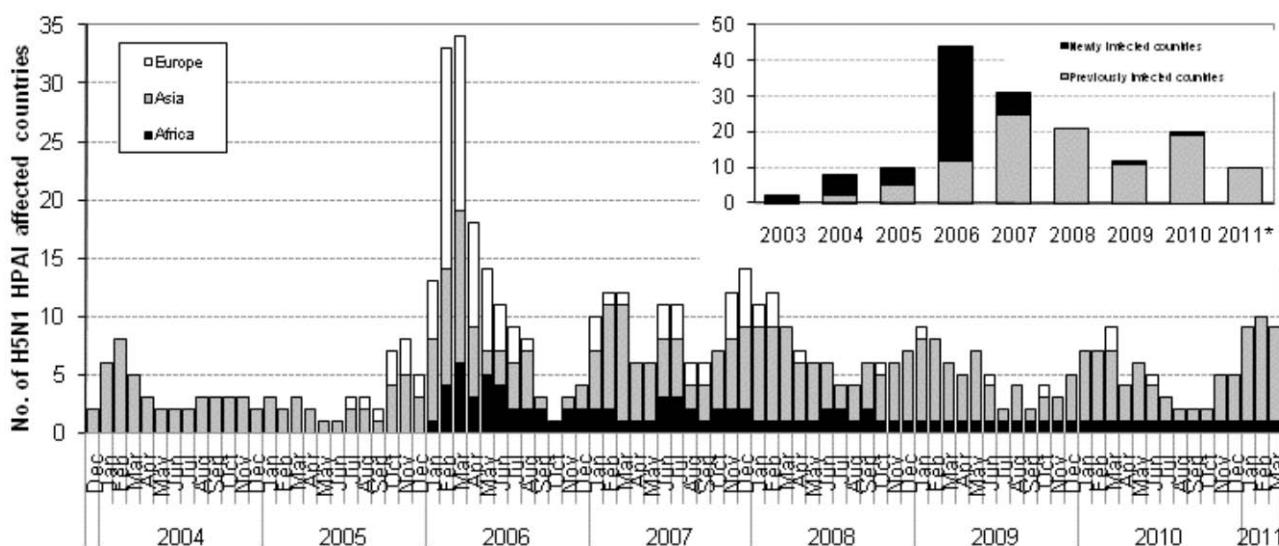
During the reporting period, 826 domestic poultry outbreaks were reported in 12 countries /territories (Bangladesh, Cambodia, Egypt, China (Hong Kong SAR), India, Indonesia, Israel, Japan, Myanmar, Republic of Korea, Viet Nam and, The West Bank and Gaza Strip), 24 confirmed reports of human cases in four countries (Bangladesh, Cambodia, Indonesia and Egypt) and 53 confirmed wild bird events were reported in three countries (Bangladesh, China (Hong Kong SAR), and Japan).

The first three months of 2011 presented unusual increases in the number of countries reporting outbreaks (Figure 9) and the number of outbreaks (Figure 10) reported globally. This was mainly caused by increases in outbreaks reported by Japan and the Republic of Korea and the reoccurrence in countries that had not reported outbreaks for some time. Viet Nam and China unexpectedly did not follow this trend of increased outbreak reports, which may suggest some level of underreporting. This is supported in part by isolations of H5N1 viruses (of clade 2.3.4) from floating poultry carcasses in China (Hong Kong SAR) during the three month reporting period, which gives an indication of virus circulation in the broader southern China area.

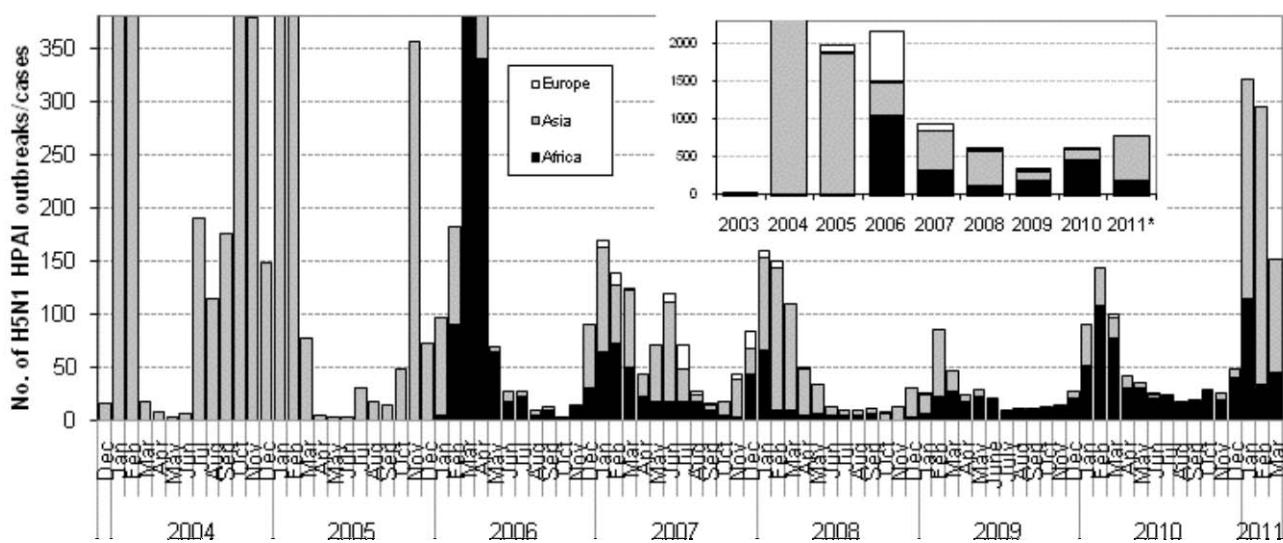
An interesting finding during this period was the lack of human case reports from either mainland China or Viet Nam. As human cases are a crude but independent indicator of infection, this finding suggests that there may be a reduction in the transmission from poultry to humans in this period in these two countries. For China, the results of market surveillance for the first three months of 2011 are not yet available. A recent report comparing the situation of human cases of influenza A H5N1 in southern Viet Nam with those in Cambodia showed that between 2004 and 2011 there were more human cases reported in Cambodia than in southern Viet Nam. This is despite the continuous circulation of Clade 1 viruses, a much larger duck and chicken population, greater human populations and higher human/poultry densities in

FIGURE 9

Number of countries by continent and by month and year that reported H5N1 HPAI outbreaks since December 2003
 (Source: FAO EMPRES-i)

**FIGURE 10**

H5N1 HPAI outbreaks/cases by continent, by month, since December 2003
 (Source: FAO EMPRES-i; Note 1: 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); Note 2: Months with more than 380 outbreaks (Jan 04: 1 311, Feb 04: 1 175 and Oct 04: 741), and years with more than 650 outbreaks (2004: 4 189) have been truncated so that rest of the graph is not distorted)



southern Viet Nam compared to Cambodia. Possible reasons for the observed differences include the differences in vaccination use, controls on live bird markets, differences in production systems and levels of poverty. These factors need further exploration.

In the first three months of 2011, there were no newly affected countries reporting outbreaks. H5N1 HPAI reoccurred in a number of countries where the disease had not been reported for a number of months, including Israel, the West Bank and Gaza Strip and, Cambodia. In south East Asia, it remains unknown whether the new cases resulted from reintroduction of virus or from detection of outbreaks caused by virus that was circulating at low level within the country without reports of disease or positive findings from surveillance studies. The finding of additional virus positive poultry carcasses washed ashore in China (Hong Kong SAR) (Clade 2.3.4) reaffirms the on-going presence of virus in the southern China region together with clade 2.3.2 viruses.

Since 2003, 63 countries/territories have experienced outbreaks of H5N1 HPAI. The last newly infected country was Bhutan in February 2010 (Figure 9 – upper right corner). Effective control measures for outbreaks in poultry have been associated with a reduced incidence of human infections in several countries. However, H5N1 HPAI continues to be present in poultry in parts of Asia and Africa (Egypt) and thus the risk of human infection remains.

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

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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.

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FIGURE 11

Global distribution of HPAI H5N1 virus clades together with cumulative spatial distribution of outbreaks of H5N1 HPAI in poultry and cases in wild birds between 2003 and 2009 (density of outbreaks shaded between yellow (low but >0) and dark blue (high) and isolated outbreaks shown as red dots.

