



China HPAI Situation - Update

CHINA



ECTAD-CHINA

HPAI Outbreak Situation Update (2010 - June 2012)

HPAI Surveillance Situation Update (2010 - 2011)

HPAI H5N1 Virus Monitoring and New Vaccine Development

PANIS



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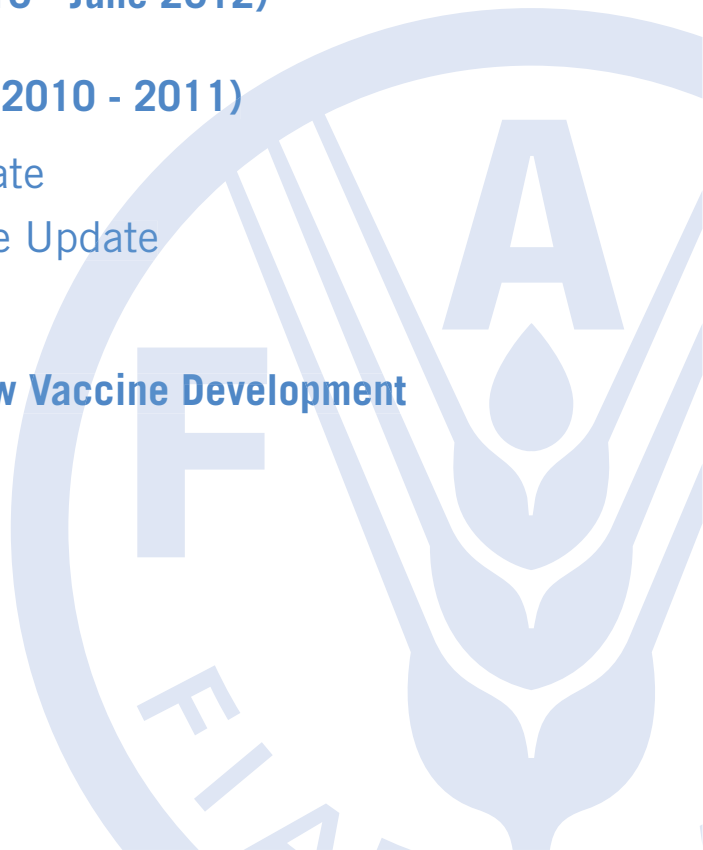
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INTRODUCTION

The “China HPAI Situation Update” is a publication of the FAO ECTAD office in China, which provides up to date information about HPAI H5N1 surveillance to assist the government of China to contain the disease and thus to reduce the risk of human infection. This document contains an important summary including human health data in order to use a “One Health” approach. To do this, FAO (Food and Agriculture Organization) and WHO (World Health Organization) exchanged data and integrated them together in a single paper.

This publication comprises interpretations of surveillance results that are reported by the Chinese government. It contains studies of outbreaks including animal and human cases and of virological and post-vaccination surveillance. At the end, there is a virological update including some changes in the circulation of clades.

This sixth update describes the situation of HPAI in China from 2010 to June 2012. The information used for this analysis comes from surveillance and outbreak data published in the Official Veterinary Bulletin. In the last 2 years there have been relatively few outbreaks and cases and these include 4 human cases and 5 poultry outbreaks. The poultry outbreaks were concentrated in the last six months.

This information paper also provides information on surveillance in pigs, virological changes of clades and provides an update on vaccination.



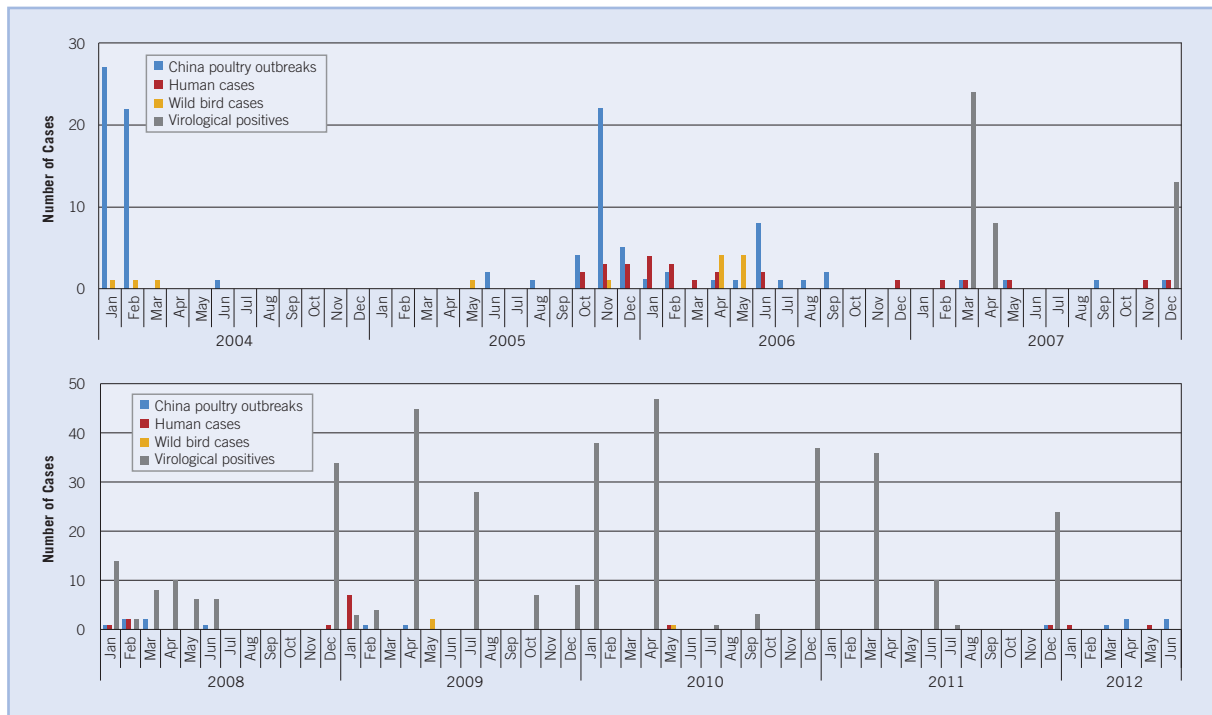
HPAI OUTBREAK SITUATION UPDATE (2010 - JUNE 2012)

In 2012, there were four reported HPAI H5N1 outbreaks in domestic poultry in mainland China. Two of them were observed in June, the last one was observed on 20th June by the Xinjiang Production and Construction Corps. In this case, 5500 broiler chickens showed suspected avian flu symptoms, 1600 chickens died, and 156 439 chickens were culled, 116 327 chickens received emergency immunization. Another case in June occurred in China's north western Gansu province, where more than 6200 chickens on a farm in a village in Luyang, Jingtai County, showed signs of suspected avian influenza on 1st June, and 260 of them died.

Another two cases were in April. One of them was in Liaoning Province on 24th April, where 5 ornamental chickens raised by a kindergarten were found dead and confirmed to be H5N1 positive by the National Avian Influenza Reference Laboratory. Another one was reported in Ningxia Hui Autonomous Region on 13th April and 23,880 layer chickens showed clinical symptoms and a total of 95,000 birds were destroyed.

The previous outbreak was reported in poultry in Lhasa, Tibet on 12th December in 2011. It was the first outbreak communicated for the previous 31 consecutive months, since May 2009.

Figure 1: Timeline of HPAI H5N1 events in Mainland China from 2004 to June 2012



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The last reported HPAI H5N1 outbreak in wild birds was observed in Tibet Autonomous Region in May 2010, until November 2011 there were no more outbreaks reported.

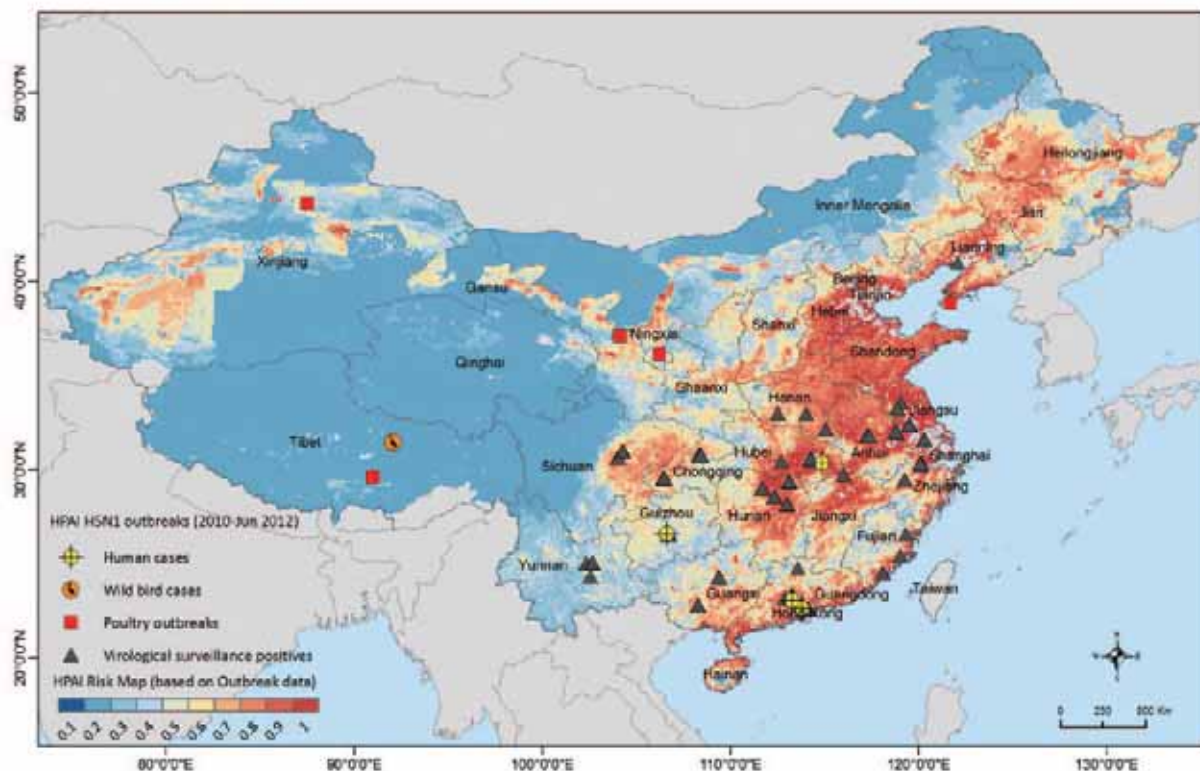
Human episodes still appeared occasionally in the country. Four new human cases were reported in China since the beginning of 2010 and these were: in May 2010 in Hubei, in December 2011 in Guangdong, in January 2012 in Guizhou and in May 2012 in Guangdong. In May 2010, the patient was a 22-year-old pregnant woman and she did not recover from the disease. The source of transmission was thought to be contact with dead poultry. In December 2011, a 39 year-old sick man developed symptoms; he was already in a critical condition and he died a few days later. In January 2012, the patient was a 39 year-old male and unfortunately the disease was fatal. People in the vicinity of these human cases did not show any flu symptoms and did not develop the disease. In May 2012, a 2-year-old boy was diagnosed with H5N1 influenza. He had visited a live poultry market in Guangzhou where the H5N1 virus has since been detected.

Map 1 shows the HPAI H5N1 risk map and HPAI outbreaks in poultry, wild birds, and human and virological surveillance results from 2010 to June 2012.

This analysis shows that the HPAI H5N1 viruses are still circulating in the country.

It is difficult to draw conclusions about the apparent increase in frequency of outbreaks because there are relatively few outbreaks across several provinces and there is very limited epidemiological information available. Possible reasons include variable and incomplete reporting, variable vaccine quality and coverage in some areas and changes in the nature of the disease, including an increase in clades with poor matching with existing vaccines. Outbreaks need careful epidemiological investigation to find the reasons for these outbreaks.

Map 1: HPAI H5N1 risk map* and HPAI outbreaks in China (2010 - June 2012).



*HPAI H5N1 Risk map is from Martin V, et al., doi:10.1371/journal.ppat.1001308



HPAI SURVEILLANCE SITUATION UPDATE (2010 - 2011)

During 2010, a total of 4,668,433 samples were collected, among that 92.6% were from post-vaccination testing and 7.4% were for virological tests. Also 5,228,280 samples were collected in 2011, 93.9% for post-vaccination tests and 6.1% for virological tests. Of these, 126 samples were HPAI H5N1 positive in 2010 and 71 were positive in 2011 in poultry. (Table 1) Data are up to December 2011 because no more recent data is available.

	2007	2008	2009	2010	2011
Virological Samples Collected	295,550	561,552	642,184	346,661	320,468
Positive Virological Samples	45	80	96	126	71
Vaccination Samples Collected	3,614,393	4,795,371	4,299,372	4,321,772	4,907,812
Positive Vaccination Samples	3,232,671	4,321,498	3,832,333	3,923,123	4,451,845
Vaccination Coverage (%)	89.44	90.12	89.14	90.78	90.71

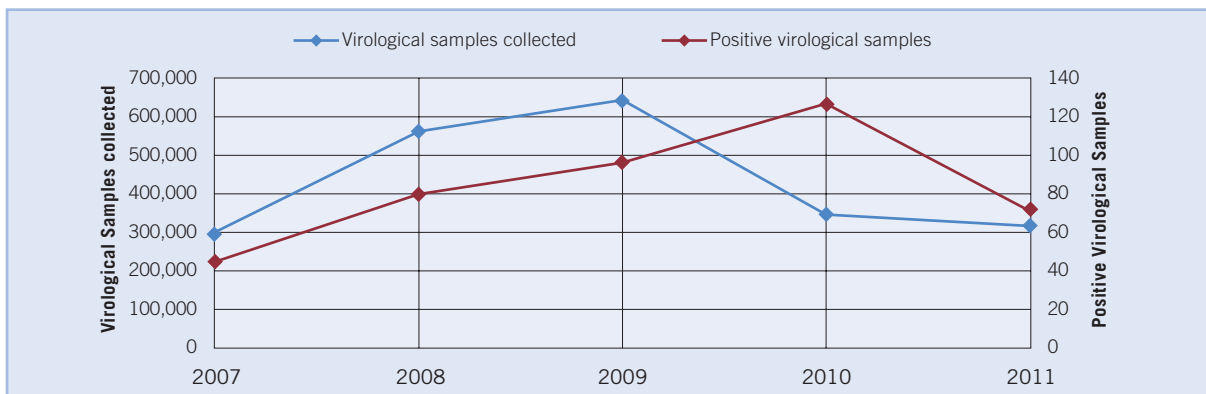
Table 1: Number of virological surveillance samples and post-vaccination surveillance samples collected from 2007 to 2011.

HPAI Virological Surveillance Update

The results of the National HPAI Surveillance Program implemented by MoA (Ministry of Agriculture, PRC), showed that there were a total of 197 HPAI H5N1 viruses isolated in 15 provinces during 2010 and 2011. From May 2009 to November 2011, while there were no reported H5N1 poultry outbreaks, 241 H5N1 viruses were isolated in 11 months in 15 provinces. In 2012, only one positive result was found and this was in Yunnan province in March 2012 and this involved chickens.

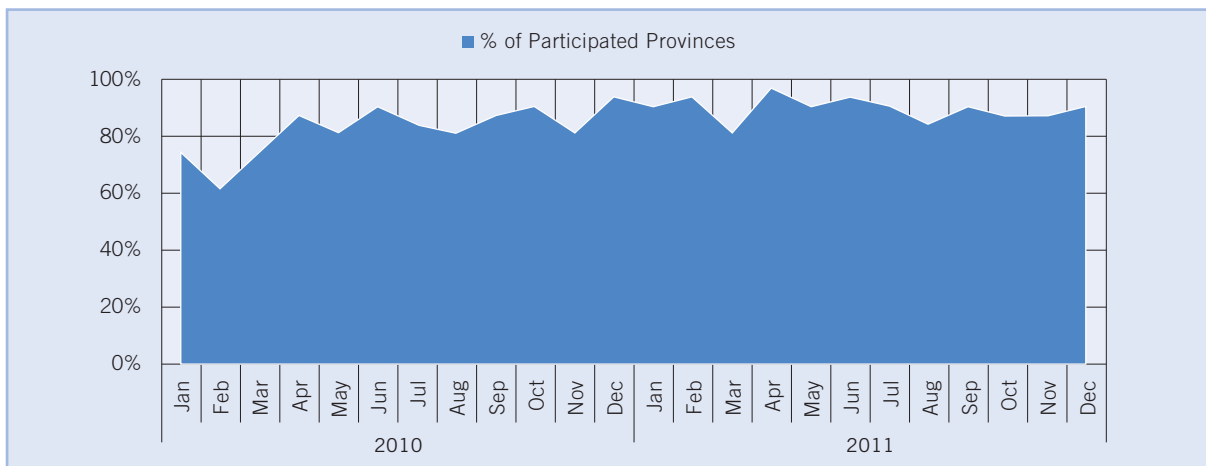
As Figure 2 shows, the number of virological samples collected, after an increase for 3 years, decreased in 2010 and in 2011. However, during 2010, even if the number of collected samples decreased, the positive samples were marked by the highest incidence for the previous 4 years. In 2011, slightly less virological samples were detected positive.

Figure 2: Virological samples and positives samples trend from 2007 to 2011



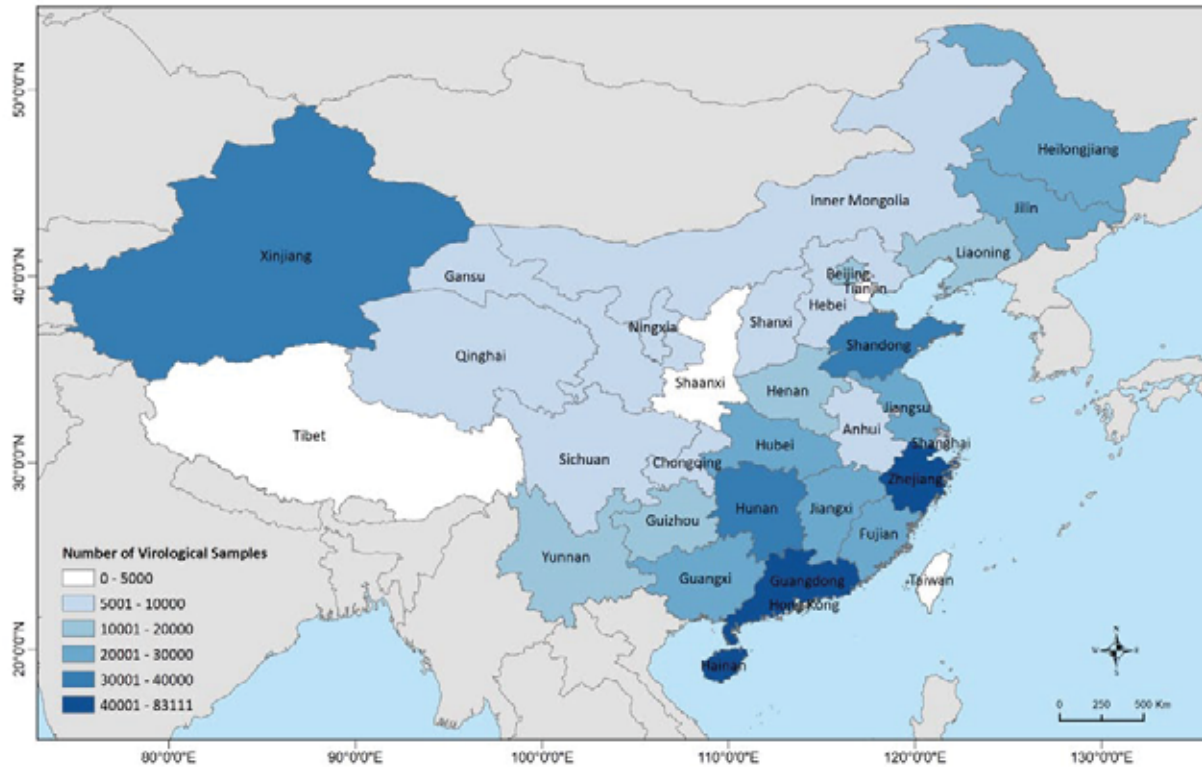
Most of the provinces took part in the virological surveillance program every month (Figure 3). On average about 27 provinces (85.7%) took part in the program every month. In April 2011, 30 provinces (96.8%) joined the program. Tibet wasn't involved (Figure 3).

Figure 3: Participation of provinces by month in virological surveillance



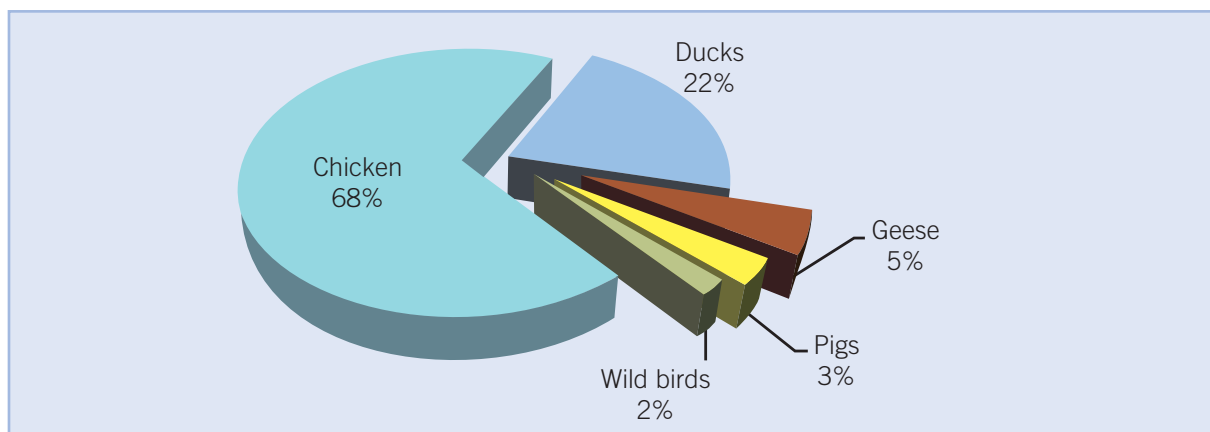
However, the level of participation varied between the provinces and Guangdong, Zhejiang and Hainan collected the most samples (Map 2).

Map 2: Virological samples by province in China (2010-2011)



Chicken samples represented between 60 to 80% of all the samples collected each month. Ducks, geese, swine and wild birds were less frequently represented. Chickens, ducks and geese correspond to more than 90% of the samples every month (Figure 4).

Figure 4: Species origins (in average) of surveillance samples (2010-2011)



The sampling, especially with chickens, is not regular and there appears to be 2 peaks during the year: June and December. This variation is less evident with ducks and geese because of the lower number of samples (Figure 5).

Figure 5: Numbers of samples by months and by species

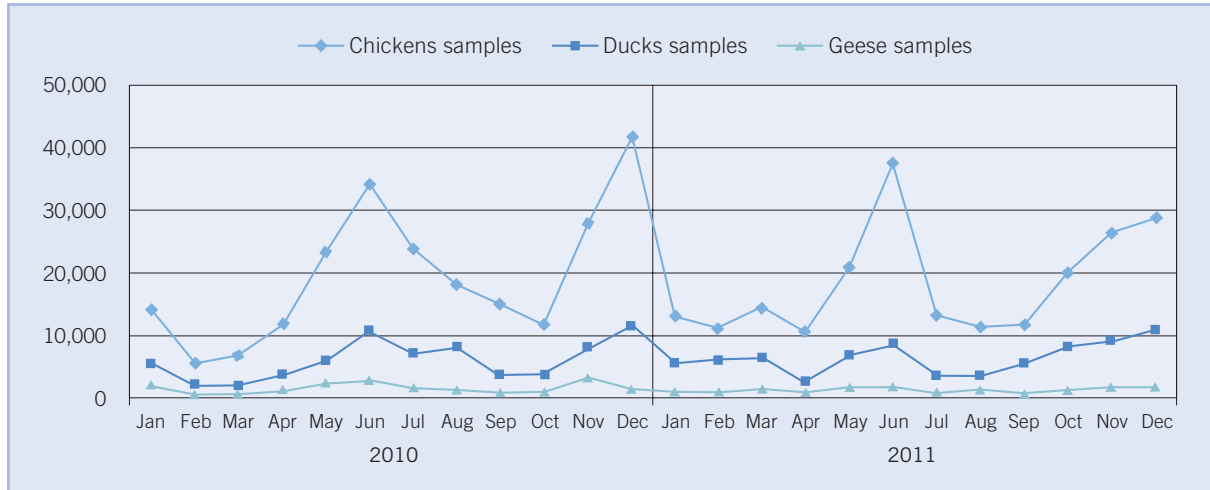
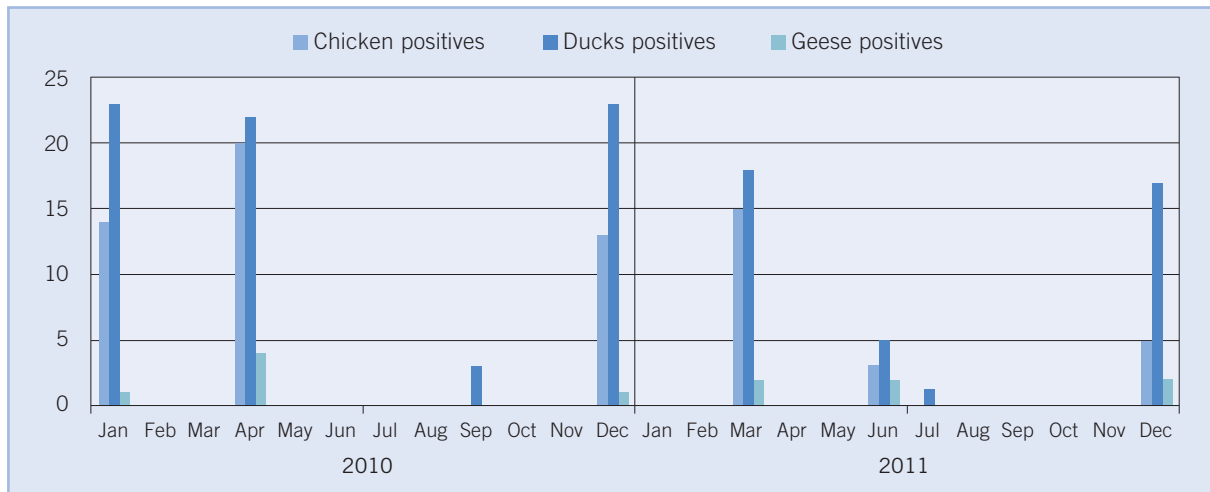


Figure 6: Number of positive results for chicken, ducks and geese by month in China- 2010-2011



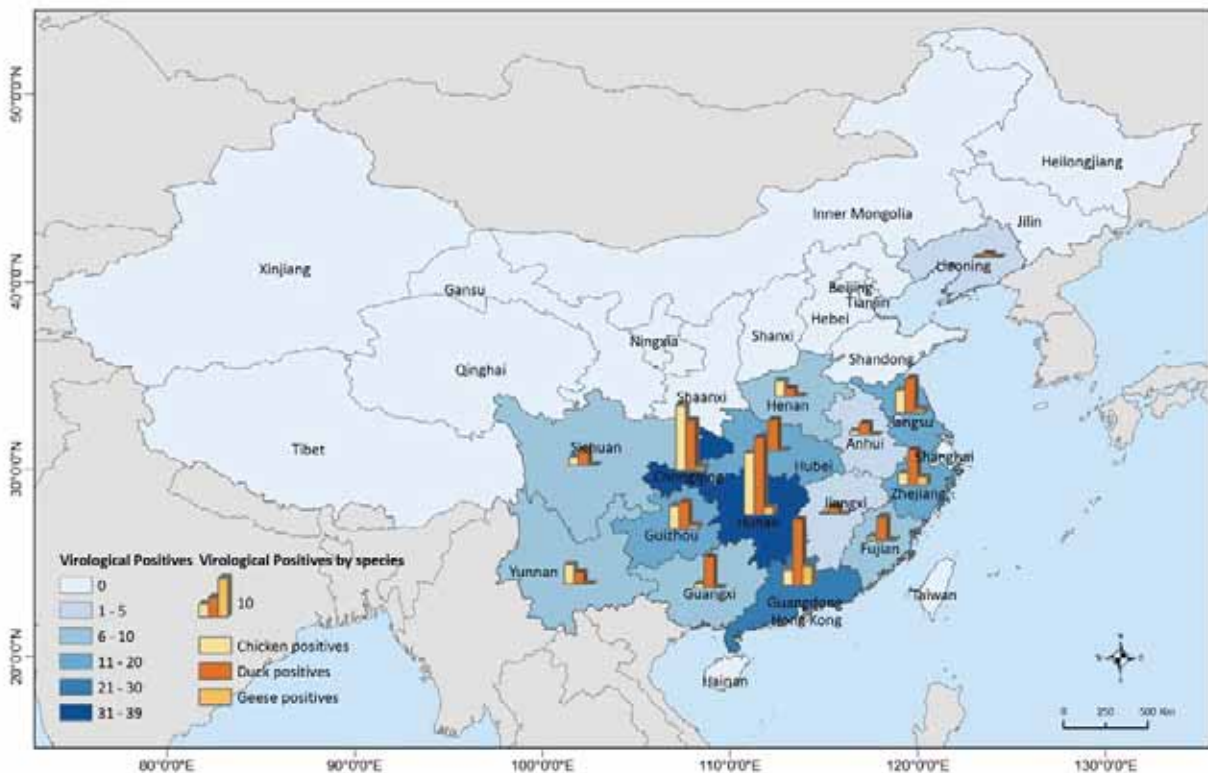
During 2010, 346,661 virological samples were collected and 126 samples returned a positive result. There were 38 in January, 47 in April, 1 in July (in wild bird), 3 in September and 37 in December. No virus was revealed during the other 7 months of the year.

Map 3 shows that 14 provinces out of 31 have had positive results and these are: Anhui (3 samples), Chongqing (21), Fujian (5), Guangdong (15), Guangxi (5), Guizhou (12), Henan (6), Hubei (7), Hunan (22), Jiangsu (10), Jiangxi (2), Sichuan (5), Yunnan (4) and Zhejiang (9). This depicts an important variation between provinces: Hunan, Chongqing and Guangdong had the highest number of reports.

During 2011, 320,468 virological samples were collected and 70 samples returned positive virological results: 35 in March, 10 in June, 1 in July and 24 in December. 13 provinces have reported positive virus isolation: Anhui (1 sample), Chongqing (10), Fujian (2), Guangdong (11), Guangxi (4), Guizhou (2), Hubei (5), Hunan (17), Jiangsu (7), Liaoning (1), Sichuan (1), Yunnan (4) and Zhejiang (5).

All samples from all species that were positive appeared in the similar months: January, April, July, September and December 2010 and March, June, July and December 2011. The ratio of positive results is quite different among the 3 species and ducks had the highest rate (Figure 6). Map 4 also shows a similar variation in positive results.

**Map 3: Number of positive results by province in China (2010-2011)
By species: chicken, ducks and geese**

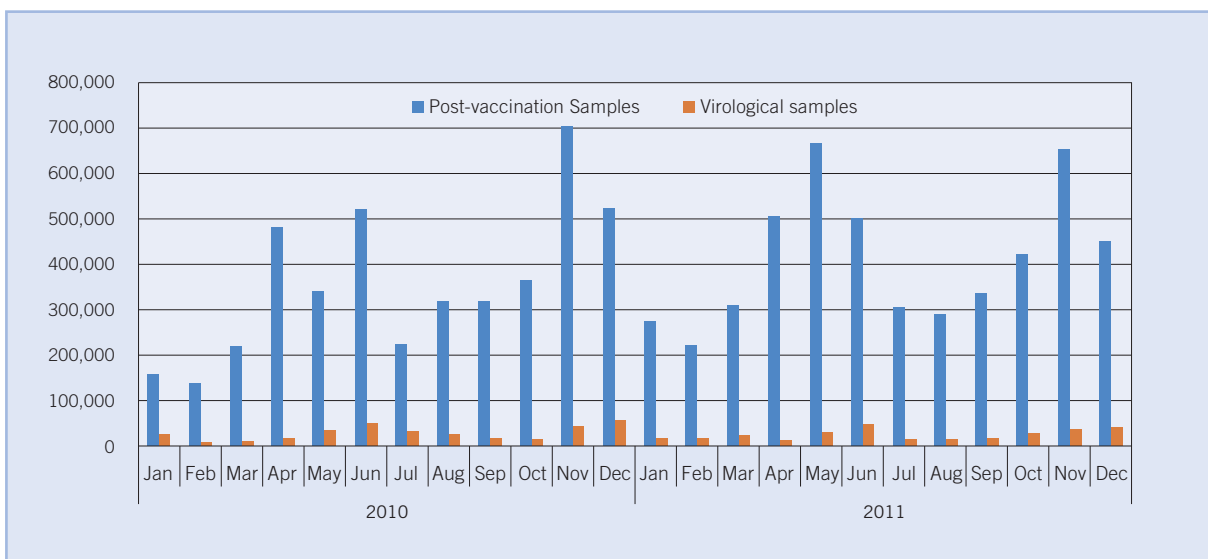




HPAI Post-vaccination Surveillance Update

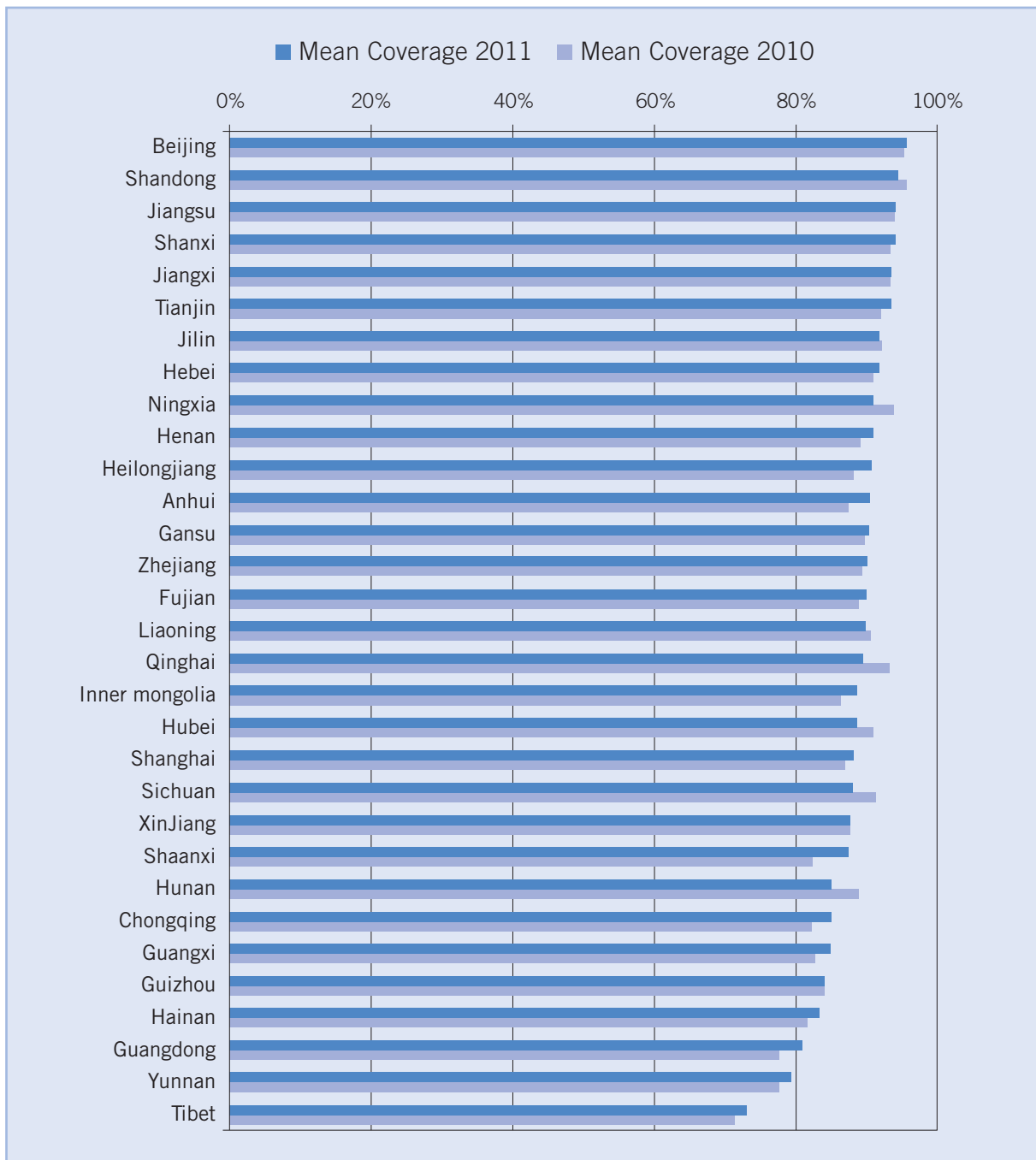
The number of collected samples for vaccination monitoring greatly exceeds the number of samples for virological surveillance (Figure 7).

Figure 7: Comparison of the number of samples by month and reason for collection



There was a high level of vaccination coverage and the mean coverage in each province in every year was over 70%. Only 3 provinces did not reach 80% coverage but Beijing, Shandong, Jiangsu, Shanxi, Jiangxi, Tianjin, Jilin, Hebei and Ningxia were over 90% coverage every year.

Figure 8: Mean vaccination coverage by provinces (2010- 2011)

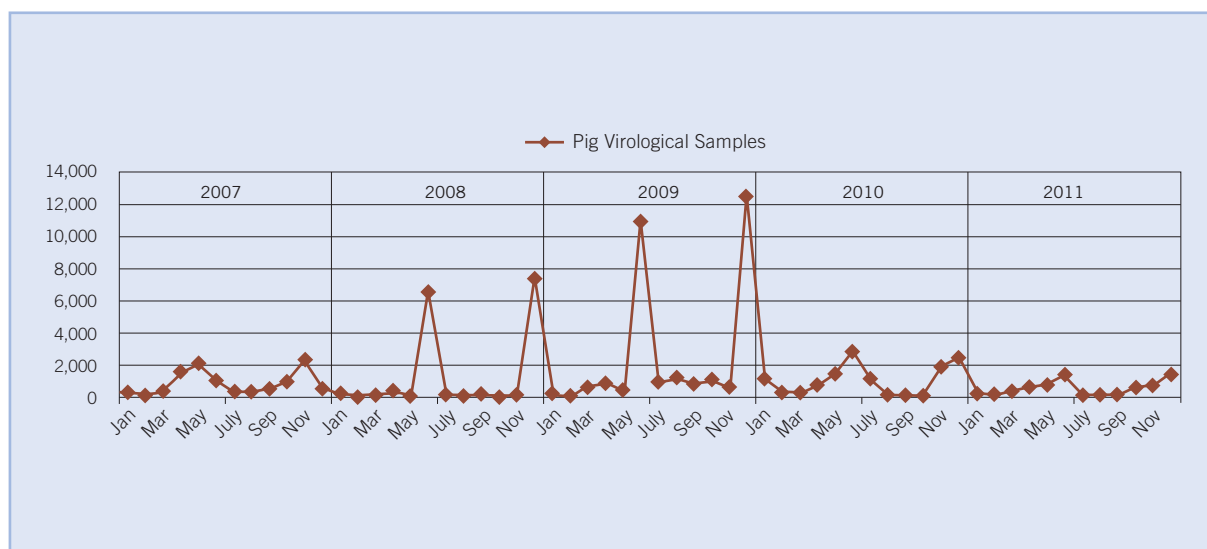


Highlights for Pig Surveillance

Pig surveillance is of increased interest and in China this consists principally of virological surveillance. The number of samples collected was constant in recent years but sometimes peaked in June and December (Figure 9).

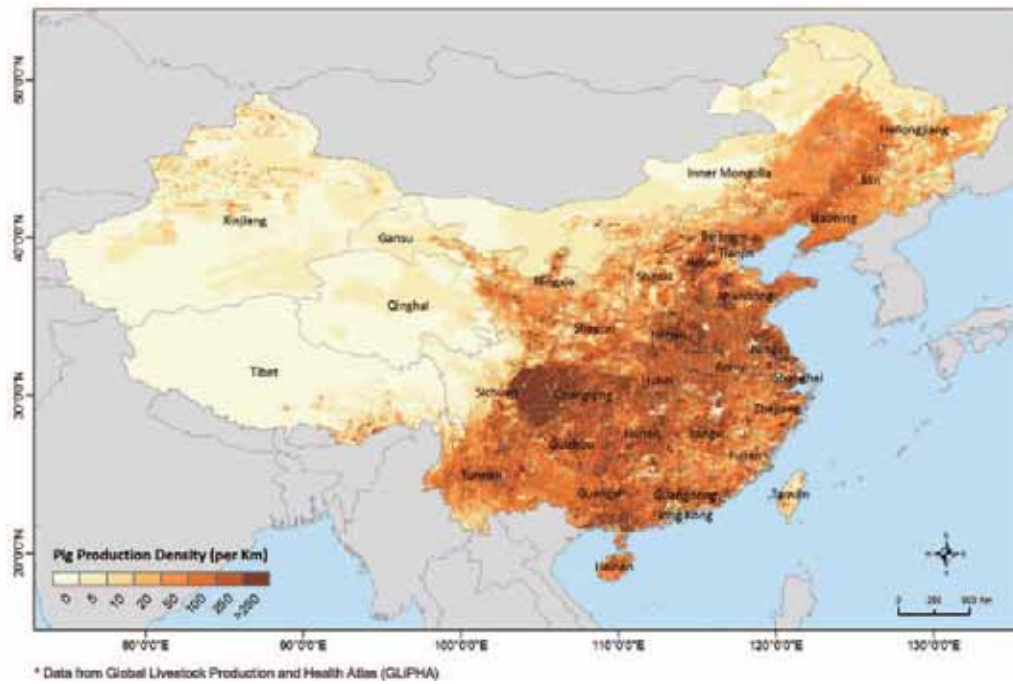
No virological samples have ever been shown positive.

Figure 9: Variation of the number of samples by month in China (2007-2011)

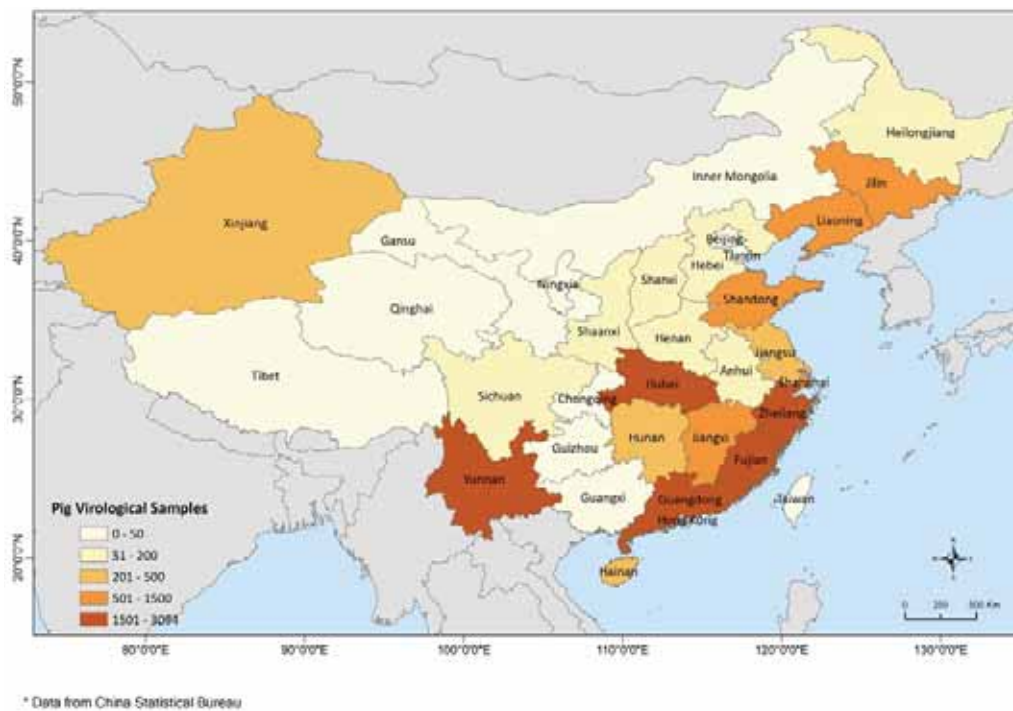


Map 4 shows that pig production is mainly concentrated in the eastern and southern parts of mainland China. Sichuan and Hunan are the traditional pig production provinces. Hunan, Shandong and Hubei present big potential for growth and Guangdong is the largest pork consuming province in China, with 40% pork imported from neighboring provinces. Map 5 shows that virological surveillance samples were taken in each province, and that more samples were collected in Yunnan, Guangdong, Hubei, Fujian and Zhejiang provinces.

Map 4: Pig production density in China. (Data source from FAO GeoNetwork data repository, downloaded through Global Livestock Production and Health Atlas (GLiPHA) web application.)



Map 5: Number of virological samples been taken from each province of China



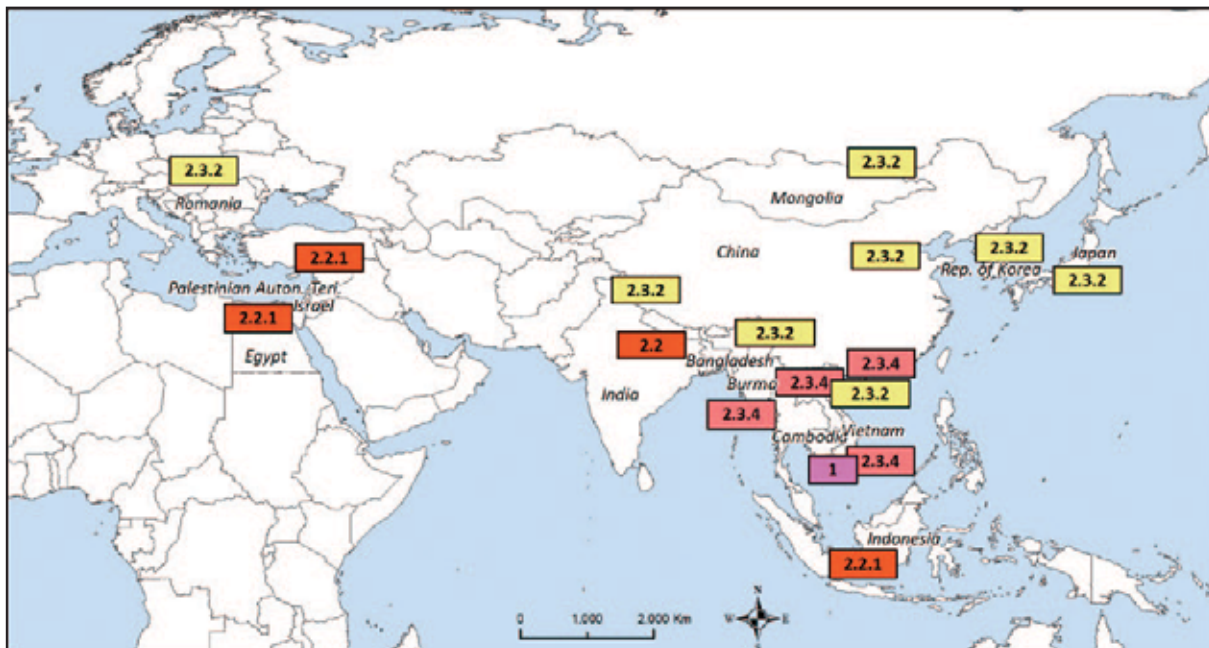
HPAI H5N1 VIRUS MONITORING AND NEW VACCINE DEVELOPMENT

Clades in Circulation

The way to name the different strains of virus changed in recent years, and, clades and sub-clades are now in use and these more easily identify the movement of viruses between countries. In this way it has been shown that the cause of epidemics in Vietnam and Indonesia did not come from the same province in China. Also, the clades at the origin of the epidemic in April 2005 in Africa and Europe, were directly linked to a clade in wild birds in Qinghai Lake of China.

The clades co-circulating in China have been identified as 2.3.4, 2.3.2 and 7. However, clade 2.3.2 has been the most representative clade in China since 2010. It was first isolated from a dead Chinese heron in 2004 and is now circulating in the wild population. This clade is responsible for the cross-continental spread and epidemics from Asia to Europe, including Romania. The dissemination of this clade is directly linked to wild birds and long distance spread.

**Map 6: Distribution of HPAI H5N1 clades of samples identified in 2011 (Data source: EMPRES-i).
Each clade in the figure is represented by its code (e.g. 2.3.1) and a colour (yellow for 2.3.2)**



After isolation of the virus in 3 human cases, the clades found were: 2.3.2.1 for Hubei and Guangdong and 2.3.4.2 for Guizhou. This shows that both clades 2.3.2 and 2.3.4 are still circulating and still provide risk for the population.

Modification of the Vaccines

Following the evolution in circulating clades, there was concern the some vaccines may not be effective against the clade 2.3.2.1. China then reacted and developed new vaccines to contain this virus clade. The new vaccines have been prepared and have passed all the steps for acceptance. The development was finished at the end of 2010, and then the vaccine passed the efficiency tests and received an approval in China after a scientific review. Now the country is waiting for the final approval and release on the vaccine market.

For ducks the situation is different. Live vaccines are being developed for clade 2.3.2 and these are combined with duck enteritis virus vaccine. Because the enteritis vaccine is already widely used in flocks, this association will increase the vaccination coverage of HPAI in the duck population.

CONCLUSION

The fight against HPAI is going on and has involved considerable effort by governments at all levels. For the last few years the situation appeared to have stabilized. However, after a period with few poultry outbreaks there has been an apparent increase in outbreaks since late 2011 and most of these have been in several provinces across the north and outside the highest risk areas in the southern and eastern parts of China (Map 1). There have been occasional human deaths from HPAI. Further in depth investigation is required to understand the reasons for recent outbreaks.

It has shown that despite a high level of vaccination, there is evidence that the virus is still present in several parts of the country.

Furthermore, there are variations among circulating clades and these are responsible for outbreaks and causing deaths. Thanks to new classification methods, the spread in other parts of East Asia and to Europe has been reported and better understood. As viruses are always evolving, control and eradication measures need to respond to the changing situation. Surveillance is being enhanced, and further studies are being conducted and vaccines are being developed to deal with evolving clades of HPAI.



China HPAI Situation - Update

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