



# Addressing avian influenza A(H7N9)

## Qualitative risk assessment update

Issue no. 2



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Following the emergence of the novel influenza A(H7N9) in China in March 2013, FAO released an emergency risk assessment in June 2013 using the data available at that time. To assess the effects of the expected increase in poultry trade and consumption associated with the upcoming lunar New Year festivities of 31 January 2014, this risk assessment was updated based on information available up to 20 January 2014.<sup>1</sup> The increased trade and consumption could affect the spread of the virus and provide increased opportunity for human exposure. The risk assessment update takes into account the increased number of reports of influenza A(H7N9) in humans beginning in December 2013. It is important to note that this update will be revised periodically and as circumstances change.

*The background information used to conduct this risk assessment can be found in the Annex at the end of this document.*

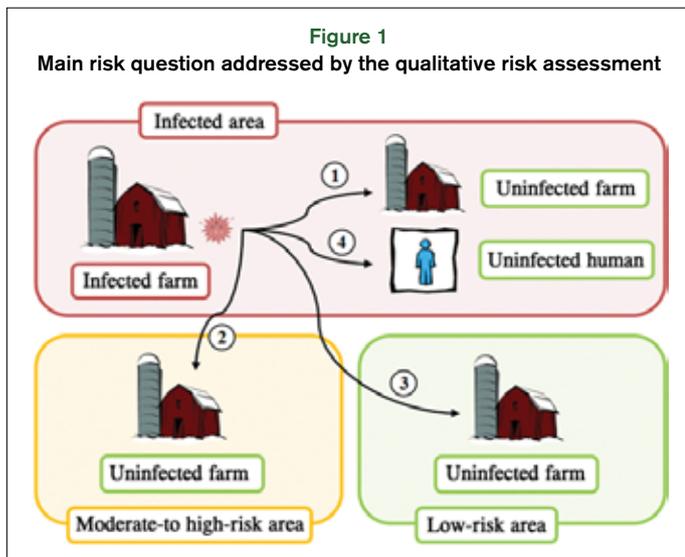
<sup>1</sup> The lunar New Year refers to the beginning of the year in several calendars. It is based on a lunar calendar or a lunisolar calendar. It is known as Chinese New Year in China, or Tet-holiday in Vietnam.

### OUTPUTS

#### The potential spread of the influenza A(H7N9) virus and human exposure

Changes since the previous preliminary risk assessment published in June 2013 are highlighted below:

- 1 there is an **increased likelihood** of the influenza A(H7N9) virus **spreading** for the time considered in this assessment **from an infected farm to an uninfected farm within affected areas of China through Live Bird Markets (LBMs), trade in live birds and trading activities along the market chain, illicit movements of live birds and fomites** (pathway 1 on figure 1);
- 2 there is an **increased likelihood** of the influenza A(H7N9) virus **spreading from a known affected area to a “moderate to high-risk” area through LBMs, live poultry movements and informal/illegal movements of birds** for this period (pathway 2 on figure 1);
- 3 there is an **increased likelihood** of a **human becoming exposed** to the influenza A(H7N9) virus **transmitted from a potentially infected bird within affected areas of China during the next two weeks but a decreased likelihood after the lunar New Year** (pathway 4 on figure 1). There will be a delay in human case reports corresponding to the time gap between exposure and presentation for treatment.



## 1. MAIN RISK QUESTIONS ADDRESSED

What is the expected effect of increased poultry trade and consumption related to the lunar New Year festivities (and the expected concurrent seasonal increase in circulation of influenza viruses) on:

- the likelihood of the influenza A(H7N9) virus spreading from an infected farm to an uninfected farm within affected areas of China?
- the likelihood of the influenza A(H7N9) virus spreading from a known affected area to a “moderate to high-risk” area as defined in the previous preliminary emergency risk assessment (see <http://www.fao.org/docrep/018/i3598e/i3598e.pdf>)<sup>2</sup>?
- the likelihood of the influenza A(H7N9) virus spreading from a known affected area to a “low risk” area as defined in previous preliminary emergency risk assessment<sup>3</sup>?
- the likelihood of a human becoming exposed to the influenza A(H7N9) virus through a potentially infected bird within affected areas of China?

## 2. MAIN ASSESSMENT

**QUESTION 1. What is the likelihood of the influenza A(H7N9) virus spreading from an infected farm to an uninfected farm within affected areas of China during this specific time?**

Considering that:

- The highest likelihood of spread within already affected areas is associated with the risk pathways that involve LBMs, trade in live birds, illicit movements of live birds, and fomites as defined in the previous preliminary emergency risk assessment (see <http://www.fao.org/docrep/018/i3598e/i3598e.pdf>).

<sup>2</sup> Moderate-risk areas or countries are unaffected areas or countries that import live birds or bird products from areas or countries that import such products from at least one infected area or country and/or that have seasonal migration stopover sites of wild bird species known to be the main natural reservoir of low pathogenic influenza (LPAI) viruses. The cross-border trade of live birds and bird products may include historical or existing, formal or informal trading activities. High-risk areas or countries are unaffected areas or countries that share a land border with at least one infected area or country or that have formal or informal imports of live birds or bird products including historical trading activities with at least one infected area or country.

<sup>3</sup> Low-risk areas or countries are unaffected areas or countries that are not classified as high-risk or moderate-risk.

- Increased trading activities of poultry in southern China around the lunar New Year festivities have been associated with higher H5N1 avian influenza (AI) virus infection risk in humans and poultry (Soares Magalhaes *et al.*, 2012).
- The virus can be present on an unknown number of poultry farms at an unknown prevalence (i.e. sub-clinical infection). Therefore the presence of the influenza A(H7N9) virus in poultry will remain unnoticed along the market chain and will not disrupt trade activities, unless sufficiently effective surveillance in healthy-looking birds is performed and mitigation measures taken whenever the virus is detected.
- Limited data on infection on farms means that the likelihood of influenza A(H7N9) spreading to other farms and markets remains unknown.
- Changes in rules including bans of live birds movement and trade over provincial boundaries may have increased the likelihood for influenza A(H7N9) spreading through alternative commercial activities, especially if testing is not done prior to movement to assess infection status.
- The birds detected in LBMs and linked to human infection are meat chickens of the yellow chicken/broiler type, most commonly found in eastern and southern parts of China.
- Many of these farms are involved in integrated systems of production for meat chickens where movement of young chickens, people and feed represent the most likely source of infection between farms.
- Chickens sent for sale in LBMs are destined for human consumption and while they represent a major source of infection for humans, they pose a lower danger for spread between and among farms. There is, however, a danger of spreading the virus back to farms through transport vehicles whenever biosecurity measures are not applied.
- There is an **increased likelihood** of the influenza A(H7N9) virus spreading during the winter season from an infected farm within affected areas of China through the risk pathways identified in the previous preliminary risk assessment (see <http://www.fao.org/docrep/018/i3598e/i3598e.pdf>).
- There is so far no evidence of spread to the white chicken, which is more prevalent in northern areas of China, and layer hen industry sectors. This lack of evidence will have to be considered as it might affect the likelihood assessment.

**QUESTION 2. What is the likelihood of the influenza A(H7N9) virus spreading from a known affected area to a “moderate to high-risk” area during this specific time?**

Considering that:

- The highest likelihood of the influenza A(H7N9) virus spreading to poultry within these regions is associated with live poultry movements, trade through LBMs and informal or illegal movements of birds.
- “Moderate to high-risk” areas where lunar New Year festivities result in increased poultry consumption and trade through possible illegal poultry movements to meet increased demands for live poultry are most likely to be affected (e.g. Tet-holiday in Viet Nam, Hong Kong Special Administrative Region (HKSAR)).
- More reliable surveillance data are needed to better assess the likely increase in transmission of influenza A(H7N9) at this time of the year.

The likelihood of the influenza A(H7N9) virus spreading from a known affected area to a “moderate to high-risk” area through these risk pathways is considered to **increase** on the occasion of lunar New Year festivities according to the previous preliminary risk assessment.

For some “moderate to high-risk” areas (e.g. HKSAR), live birds moving from Chinese provinces (e.g. Guangdong) will be subjected to serological testing on host farms and at border points. This should provide additional reassurance that the farms supplying poultry were not infected with the influenza A(H7N9) virus at least up to several weeks prior to dispatch of poultry. This should also lower the likelihood of the virus spreading, as previously assessed.

HKSAR has successfully managed risk mitigation through a combination of approved farms using testing for H7N9 and H5N1 viruses, increased biosecurity during transport and strict enforcement of biosecurity in LBMs with enforced rapid clearance of markets.

Market closures in some major cities that will follow the lunar New Year festivities could potentially result in traders seeking alternative destinations for poultry, leading to increased smuggling of poultry.

**QUESTION 3. What is the likelihood of the influenza A(H7N9) virus spreading from a known affected area to a “low risk” area during the specific time?**

Considering that:

- By definition, a low risk uninfected country or area does not trade directly with affected or high-risk unaffected countries or areas.

The likelihood of the influenza A(H7N9) virus spreading from a known affected area to a “low risk” area through trade is considered **unchanged** by the upcoming festivities from the previous preliminary emergency risk assessment.

The likelihood of the virus spreading through trade remains highly dependent on the regulatory frameworks applied in low risk countries and the level of illegal trade, if any.

**QUESTION 4. What is the likelihood of a human becoming exposed to the influenza A(H7N9) virus spreading from a potentially infected bird within affected areas of China during the specific time?**

Considering that:

- Increased trading activities of poultry in eastern and southeastern areas of Southern China around the lunar

New Year have been associated with higher H5N1

- influenza virus infection risk in humans and poultry.
- Increased poultry product consumption during lunar New Year festivities will occur, although the extent of the increase may be tempered as a result of consumer concerns. Increased poultry consumption may be associated with home slaughtering resulting in potential close contact with live poultry and high risk practices.
- Infection in poultry still remains unnoticed due to lack of clinical signs.
- Epidemiological investigations indicate that human exposure appears to be associated with direct or indirect contact with live bird species, especially in a LBM or poultry transport, handling and/or slaughtering activities.
- The number of reported human cases of influenza A(H7N9) has already increased since December 2013 in line with earlier predictions.
- There has been increased attention to improved biosecurity in LBMs in the previously most affected provinces (e.g. Anhui, Jiangsu and Shanghai). This appears to have reduced the number of new human cases in the last few months. However, biosecurity and prevention measures in other areas appear to be variable and in some places very limited.
- The effects of temporary market closures in places where the virus is found, and in particular measures that will be taken in markets after lunar New Year, might reduce the number of new cases reported in the second half of February 2014.

There is an **increased** likelihood of a human becoming exposed to the influenza A(H7N9) virus transmitted from a potentially infected bird within affected areas of China during the next two weeks, after which it is expected to decrease for a period of time determined by the duration of market closures and the quality of measures taken to minimize infection in LBMs.





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- » Implement regular market rest days with appropriate cleaning and disinfection and monitor these for effectiveness using regular consistent monitoring for virus, with environmental samples collected just before and just after rest days. Rest days are only effective if an entirely new batch of poultry is introduced rather than just removing birds temporarily and returning them subsequently.
- » Implement regular market cleaning with detergent and water (see the FAO Guide on Risk Management Along the Market Chain: <http://www.fao.org/docrep/018/i3609e/i3609e.pdf>). Cleaning should be done by trained staff wearing appropriate personal protective equipment (PPE) and should be conducted when the market is closed and no customers are present.
- » Strict controls should be placed on cross-border movements of poultry.
- Keep different types of birds and other species of domestic animals apart. Screens, fencing or nets can be used to separate species from each other and help prevent possible transmission.
- Limit access of wild birds to poultry or other domestic animals. Even though there is no current evidence to implicate wild birds in the spread of influenza A(H7N9), this is still considered good practice.
- Report sick or dead animals to the local veterinary or public health authorities. If this is not possible, inform community leaders. Even though influenza A(H7N9) does not currently cause illness in poultry, H5N1 does and it remains important that all signs of illness or sudden and unexplained deaths in poultry, farmed birds, wild birds or other animals are reported to the authorities and appropriately investigated and handled.
- Do not feed sick or dead animals to other animals.

### 3. MITIGATION MEASURES AVAILABLE

The risk management measures applied by the Chinese authorities since the beginning of the event mitigate the risk of human exposure to the influenza A(H7N9) virus in LBMs and the spread of this virus through trading activities, but do not eliminate it. Thorough investigations need to continue in order to identify whether and where virus is circulating in places other than LBMs and to understand why human infections with the virus are still occurring despite the measures taken already in markets to reduce this risk. Increased surveillance at commercial farm level will be necessary to ensure that poultry going to markets are not coming from infected farms.

The following risk mitigation measures are available to poultry producers, marketers and consumers.

#### **Mitigation measures reducing the likelihood of influenza A(H7N9) virus spreading from an infected farm/unit to an uninfected farm/unit within affected areas of China and from a known affected area to a “moderate to high-risk” area**

- Apply strict biosecurity measures in LBMs including:
  - » Ensure that the sources of poultry for live poultry markets are free from virus and appropriate tracing systems and certification systems are in place. In many areas this is not possible at present.
  - » Reduce transit times of poultry in markets below the incubation period of the virus in order to limit any likelihood of viral excretion and further human exposure by sub-clinical infection.

#### **Mitigation measures reducing the likelihood of a human infection with the influenza A(H7N9) and other influenza viruses transmitted from a potentially infected bird within affected area**

- Close contact with infected animals can put people at risk. Since influenza A(H7N9) causes no signs in infected poultry, it is crucial to have separate living areas for animals and humans and avoid slaughtering of animals in non-dedicated professional areas (e.g. at home). Seek immediate medical advice if signs of fever appear within a few days after contact with poultry, farmed birds, wild birds or other animals.
- Wash your hands often and always after handling birds or other animals, before and after preparing food and before eating.
- Observe good hygiene practices including: (i) keeping raw meat separate from cooked or ready-to-eat foods to avoid cross-contamination; (ii) using separate utensils to prepare raw meats and other foods (e.g. chopping boards and other surfaces, knives, and plates, for instance); and (iii) washing and disinfecting all surfaces and utensils that have been in contact with raw meat.
- Eat only well-cooked meat products (food reaches 70°C or more in all parts). Influenza and other viruses or bacteria are not transmitted through consumption of well-cooked food. As a general food safety rule, the consumption of raw meat and uncooked blood-based dishes is a high-risk practice.
- Do not eat sick or dead animals and do not give or sell them to others.



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- This particular strain of virus, subsequently named influenza A(H7N9), had never been identified in humans or poultry prior to this event.
- From 31 March 2013 to 20 January 2014, a total of 209 laboratory confirmed human cases and one asymptomatic human case found via active surveillance, were reported by Chinese health authorities; 55 of these were fatal. The cases were reported from 15 provinces or municipalities, including Anhui, Beijing, Fujian, Guangdong, Guizhou, Hebei, Henan, HKSAR, Hunan, Jiangsu, Jiangxi, Shandong, Shanghai, Taiwan Province and Zhejiang. Most of the patients were reported to have had contact with poultry, either during market visits, slaughter (at home) or transportation activities, prior to the onset of their illness.
  - As of 20 January 2014 no disease outbreaks involving the influenza A(H7N9) virus have been reported in poultry or other susceptible species (i.e. wild birds or pigs) in affected provinces or municipalities of China. Infection of poultry does not produce any clinical disease. Various challenge-studies provided information on relative susceptibility and levels of shedding by various avian species (Miller *et al.*, 2013). A recent paper also suggested that the A(H7N9) virus spread at a low level between chickens (Kang *et al.*, 2014).
  - The number of reported human cases of this new influenza over time has increased during the winter of 2013 - 2014 with more than 65 cases reported since December 2013 in eastern and southern China. The majority of them have a history of contact with poultry prior to falling ill.
  - An increase in the number of human cases of influenza A(H7N9) in the winter was expected after the summer of 2013 based on the following:
    - » the influenza A(H7N9) virus had not been eradicated;
    - » markets closed temporarily following the influenza A(H7N9) outbreak in the spring of 2013 and were reopened albeit with some measures in place to reduce the risk of virus circulation;
    - » the increase in cases of seasonal influenza is usually seen during the winter; and
    - » the seasonal pattern of human cases of influenza A(H5N1).
  - Human cases in the second wave have been reported from Fujian, Guangdong, Jiangsu, Shanghai and Zhejiang, with the vast majority from Guangdong and Zhejiang.

## ANNEX

### BACKGROUND ON INFLUENZA A(H7N9) ON 20 JANUARY 2014

- On 31 March 2013, Chinese authorities reported the identification of a new strain of influenza in three persons displaying flu-like symptoms in Shanghai municipality and Anhui province. All three patients died from the infections.



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- The epidemic curve in the affected areas is not as steep as it was in March-April 2013. However, the number of new cases reported each day is now approaching the levels of 2013. This suggests that the cases are following the predicted seasonal increase but the increase is not uniform across the country.
  - Cases are not evenly distributed in affected provinces. For example, only 6 of 20 prefectures in Guangdong province (Dongguan, Foshan, Guangzhou, Huizhou, Shenzhen and Yangjiang) have reported human cases, with all but Yangjiang forming part of the densely populated urban conglomerate extending along the Pearl River, from HKSAR to Guangzhou.
  - The increase in case reports may also partially result from surveillance for influenza-like respiratory infections (ILI) or severe acute respiratory infections (SARI) in humans and increased specific testing for influenza A(H7N9) undertaken by the Chinese authorities, although the majority of cases presented critical conditions which probably increased the chance of testing for influenza A(H7N9). Surveillance of ILI and SARI in humans conducted in China allowed detection of one human infection with another influenza virus (H10N8) in December 2013.
  - Since March 2013, the Chinese authorities have detected the influenza virus A(H7N9) in surveillance samples mostly from chickens, ducks, pigeons (captive-bred and feral) and market environments, mainly at LBMs linked to human cases. Reports indicate that none of the birds testing positive showed clinical signs of illness. The influenza A(H7N9) virus was detected in LBMs in Guangdong where human cases had not been detected (e.g. Shantou). Measures, including temporary market closures, culling of birds, cleaning and disinfection, were taken at LBMs following virus detection.
  - Surveillance activities are continuing, including environmental and poultry sampling in LBMs (identified as a major exposure site in reported human infections) and wild bird and poultry sampling at the farm level.
- Although surveillance results published by the Ministry of Agriculture to date do not suggest a particular high viral circulation within affected areas, uncertainties regarding the representativeness of these results remain. Targeted surveillance is needed to better assess the actual levels of viral circulation in susceptible animal species.
- A distinct reservoir for the influenza virus A(H7N9) has not yet been identified. Temporary closure of live poultry markets resulted in a marked reduction in new human cases suggesting that live poultry were an important source of infection for humans (Cowling *et al.*, 2013). Case control studies suggest that contact with live poultry in the two weeks before clinical onset was a significant risk factor. When testing has been conducted in LBMs linked to human cases, the virus has been detected (Cui *et al.*, 2014). Cases have occurred in patients transporting and handling live poultry and slaughtering poultry at home.
  - So far, no sustained human-to-human transmission has been reported by the World Health Organization (WHO).
  - Significant changes have been implemented in LBMs varying within and between provinces. Measures include short-term closure of markets for regular poultry-free rest days, enhanced cleaning and disinfection and temporary closures and depopulation if the influenza virus A(H7N9) is detected. The effects of these measures need to be considered in the assessment of likely effects of the seasonal increases in trade in poultry. In places such as Guangdong, where market rest days have been implemented, human cases are still occurring, whereas in other places, like Shanghai and Jiangsu, few cases have occurred yet.
  - Trade in poultry increases during the winter with very high volumes around the lunar New Year festivities. Immediately following the festivities, markets are usually closed for one or more days. This year, markets will be emptied and in some places closed for an extended period. The extent of the increase in demand of live poultry might also be affected due to consumer concerns about influenza A(H7N9) increased cases in the past few weeks.





## CONTACT ))

The Emergency Prevention System (EMPRES) is an FAO programme, founded in 1994, with the goal of enhancing world food security, fighting transboundary animal and plant pests and diseases and reducing the adverse impact of food safety threats. EMPRES-Animal Health is the component dealing with the prevention and control of transboundary animal diseases (TADs).

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EMPRES-Animal Health can assist countries in the shipment of samples for TAD diagnostic testing at a FAO reference laboratory and reference centre. Please contact **Empres-Shipping-Service@fao.org** for information prior to sampling or shipment. Please note that sending samples out of a country requires an export permit from the Chief Veterinarian's Office of the country and an import permit from the receiving country.



**This summary of the preliminary risk assessment is based on the information available to date** and will be reviewed as new findings emerge from field investigations, laboratory testing and epidemiological studies at both the animal and human levels.

### Recommended citation

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