

Influenza at the human-animal interface

Summary and assessment, 25 July 2017 to 27 September 2017

- **New infections¹:** Since the previous update, new human infections with influenza A(H5N1), A(H7N9), A(H9N2), A(H1N2)v and A(H3N2) variant² viruses were reported.
- **Risk assessment:** The overall public health risk from currently known influenza viruses at the human-animal interface has not changed, and the likelihood of sustained human-to-human transmission of these viruses remains low. Further human infections with viruses of animal origin are expected.
- **Risk management:** Selection of new candidate vaccine viruses (CVVs) for zoonotic influenza for influenza pandemic preparedness purposes was done during a recent WHO consultation.³
- **IHR compliance:** All human infections caused by a new influenza subtype are required to be reported under the International Health Regulations (IHR, 2005).⁴ This includes any animal and non-circulating seasonal influenza viruses. Information from these notifications is critical to inform risk assessments for influenza at the human-animal interface.

Avian Influenza Viruses

Current situation:

Avian influenza A(H5) viruses

Since the last update on 25 July 2017, one new laboratory-confirmed human case of influenza A(H5N1) virus infection was reported to WHO from Indonesia.

The patient was a child who had illness onset on 1 September 2017. He was hospitalized on 5 September and on 10 September, a sample collected from the patient tested positive for A(H5N1) virus. The patient passed away on 10 September. Prior to illness onset, he reportedly had exposure to poultry at his house. A joint investigation between the human health and animal health sector confirmed A(H5N1) infected birds in the area and samples collected from all human contacts of the patient tested negative for A(H5N1) virus infection.

¹ For epidemiological and virological features of human infections with animal influenza viruses not reported in this assessment, see the yearly report on human cases of influenza at the human-animal interface published in the Weekly Epidemiological Record. Available at: www.who.int/wer/en/

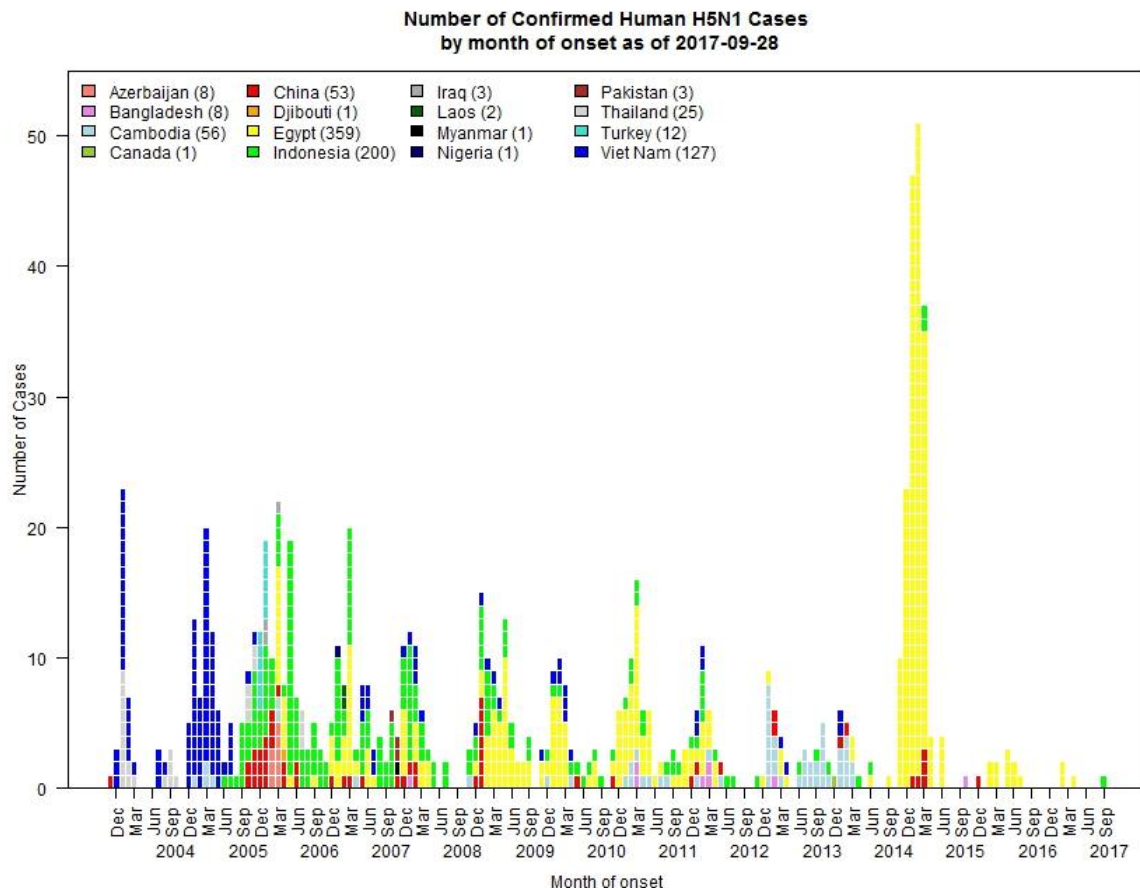
² World Health Organization. Standardization of terminology for the influenza virus variants infecting humans: Update. Available at: www.who.int/influenza/gisrs_laboratory/terminology_variant/en/

³ World Health Organization. Antigenic and genetic characteristics of zoonotic influenza viruses and candidate vaccine viruses developed for potential use in human vaccines. Available at: www.who.int/influenza/vaccines/virus/characteristics_virus_vaccines/en/

⁴ World Health Organization. Case definitions for the four diseases requiring notification in all circumstances under the International Health Regulations (2005). Available at: www.who.int/ihr/Case_Definitions.pdf

Since 2003, a total of 860 laboratory-confirmed cases of human infection with avian influenza A(H5N1) virus, including 454 deaths, have been reported to WHO from 16 countries.⁵ The last human cases of A(H5N1) virus infection reported from Indonesia occurred in 2015.

Figure 1: Epidemiological curve of avian influenza A(H5N1) cases in humans by week of onset, 2003-2017



Influenza A(H5) subtype viruses have the potential to cause disease in humans and thus far, no human cases, other than those with influenza A(H5N1) and A(H5N6) viruses, have been reported to WHO. According to reports received by the World Organisation for Animal Health (OIE), various influenza A(H5) subtypes continue to be detected in birds in Africa, Europe and Asia.

Risk Assessment:

1. What is the likelihood that additional human cases of infection with avian influenza A(H5) viruses will occur?

Most human cases were exposed to A(H5) viruses through contact with infected poultry or contaminated environments, including live poultry markets. Since the viruses continue to be detected in animals and environments, further human cases can be expected.

2. What is the likelihood of human-to-human transmission of avian influenza A(H5) viruses?

Even though small clusters of A(H5) virus infections have been reported previously including those involving healthcare workers, current epidemiological and virological evidence suggests that this and

⁵ WHO Cumulative number of confirmed human cases of avian influenza A(H5N1) reported to WHO tables. Available at: www.who.int/influenza/human_animal_interface/H5N1_cumulative_table_archives/en/

other A(H5) viruses have not acquired the ability of sustained transmission among humans, thus the likelihood is low.

3. What is the risk of international spread of avian influenza A(H5) viruses by travellers?

Should infected individuals from affected areas travel internationally, their infection may be detected in another country during travel or after arrival. If this were to occur, further community level spread is considered unlikely as evidence suggests these viruses have not acquired the ability to transmit easily among humans.

Avian influenza A(H7N9) viruses

During this reporting period, 7 laboratory-confirmed human cases of influenza A(H7N9) virus infection were reported to WHO from China. Case details are presented in the table in the Annex of this document. For additional details on these cases, public health interventions and avian influenza A(H7N9) viruses, see the [Disease Outbreak News](#).

As of 27 September 2017, a total of 1564 laboratory-confirmed cases of human infection with avian influenza A(H7N9) viruses, including at least 612 deaths⁶, have been reported to WHO (Figure 1). The number of human infections with avian influenza A(H7N9) viruses and the geographical distribution of human cases in the fifth epidemic wave (i.e. onset since 1 October 2016) have been greater than in any earlier wave. This suggests that the virus has spread, and emphasizes that further intensive surveillance and control measures in both the human and animal health sectors are crucial. A decrease in cases occurred during the past few months. However, if the incidence of human cases follows the trends seen in previous years, the number of reported human cases may rise over the coming months. Further sporadic cases of human infection with avian influenza A(H7N9) virus are therefore expected in affected and possibly neighbouring areas.

Risk Assessment:

1. What is the likelihood that additional human cases of infection with avian influenza A(H7N9) viruses will occur?

Most human cases are exposed to the A(H7N9) virus through contact with infected poultry or contaminated environments, including live poultry markets. Since the virus continues to be detected in animals and environments, further human cases can be expected. Additional sporadic human cases of influenza A(H7N9) in other provinces in China that have not yet reported human cases are also expected.

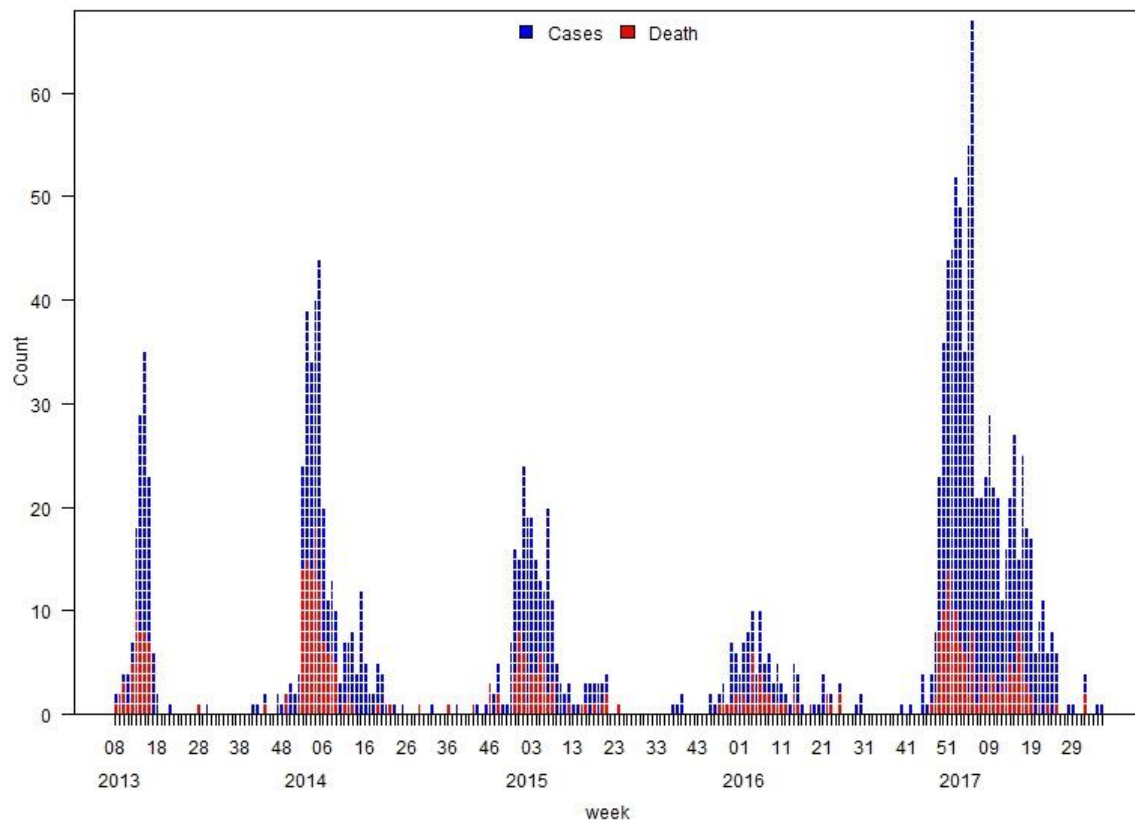
2. What is the likelihood of human-to-human transmission of avian influenza A(H7N9) viruses?

Even though small clusters of cases have been reported, including those involving healthcare workers, currently available epidemiological and virological evidence suggests that this virus has not acquired the ability of sustained transmission among humans, thus the likelihood is low.

3. What is the risk of international spread of avian influenza A(H7N9) virus by travellers? Should infected individuals from affected areas travel internationally, their infection may be detected in another country during travel or after arrival. If this were to occur, further community level spread is considered unlikely as this virus has not acquired the ability to transmit easily among humans.

⁶ Total number of fatal cases is published on a monthly basis by China National Health and Family Planning Commission.

Figure 1: Epidemiological curve of avian influenza A(H7N9) cases in humans by week of onset, 2013-2017.



According to reports received by the Food and Agriculture Organization (FAO) on surveillance activities for avian influenza A(H7N9) viruses in China, positives among virological samples continue to be detected in poultry from live bird markets, commercial and backyard farms. The agricultural authorities in China have also announced that vaccination of domestic poultry against infection with avian influenza A(H7) viruses has commenced, in addition to the ongoing poultry vaccination program against avian influenza A(H5) viruses.

Avian influenza A(H9N2) viruses

Since the last update, one laboratory-confirmed human cases of A(H9N2) virus infection was reported to WHO from China. The patient is a child who had mild illness onset of 18 September, received outpatient care and had no apparent exposure history to live poultry.

Risk Assessment:

1. What is the likelihood that additional human cases of infection with avian influenza A(H9N2) viruses will occur?

Most human cases are exposed to the A(H9N2) virus through contact with infected poultry or contaminated environments. Human infection tends to result in mild clinical illness. Since the virus continues to be detected in poultry populations, further human cases can be expected.

2. What is the likelihood of human-to-human transmission of avian influenza A(H9N2) viruses?

No case clusters have been reported. Current epidemiological and virological evidence suggests that this virus has not acquired the ability of sustained transmission among humans, thus the likelihood is low.

3. What is the risk of international spread of avian influenza A(H9N2) virus by travellers?

Should infected individuals from affected areas travel internationally, their infection may be detected in another country during travel or after arrival. If this were to occur, further community level spread is considered unlikely as this virus has not acquired the ability to transmit easily among humans.

Swine Influenza Viruses

Current situation:

Influenza A(H1N2)v viruses

Two human infections with influenza A(H1N2)v viruses were detected in the state of Ohio in the United States (U.S). Both cases occurred in children who reported contact with swine at an agricultural event prior to illness. The cases were not hospitalized and have fully recovered from their illnesses. No human-to-human transmission was identified. Characterization of the viruses from the cases indicates they are similar to A(H1N2) viruses currently circulating in swine in the USA. Given that the viruses reacted poorly with current candidate vaccine viruses, new CVVS for pandemic preparedness have been proposed.⁷

Since 2005, 11 cases of A(H1N2)v influenza virus infection have been reported to the U.S. Centers for Disease Control and Prevention (CDC).⁸ Most cases are associated with mild illness and two have been hospitalized.

Influenza A(H3N2)v viruses

Since 25 July 2017, 19 human infections with influenza A(H3N2)v viruses were detected in the U.S. in several states.⁹ All cases reported exposure to swine at an agricultural fair before illness onset. Two cases were hospitalized. No human-to-human transmission was identified. Characterization of the viruses from the cases indicates they are similar to A(H3N2) viruses currently circulating in swine in the USA. Given that the viruses reacted poorly with current candidate vaccine viruses, a new CVV for pandemic preparedness has been proposed.¹⁰

Since reporting of novel influenza A viruses became nationally notifiable in 2005, 403 human infections with influenza A(H3N2)v viruses have been reported to the U.S. CDC and 31 of these occurred in 2017.⁶

⁷ World Health Organization. Antigenic and genetic characteristics of zoonotic influenza viruses and development of candidate vaccine viruses for pandemic preparedness September 2017. Available at:

www.who.int/influenza/vaccines/virus/201709_zoonotic_vaccinevirusupdate.pdf?ua=1

⁸ Centers for Disease Control and Prevention, USA. Reported Infections with Variant Influenza Viruses in the United States since 2005. Available at: <https://www.cdc.gov/flu/swineflu/variant-cases-us.htm>.

⁹ Centers for Disease Control and Prevention, USA. Weekly U.S. Influenza Surveillance Report. Available at: www.cdc.gov/flu/weekly/index.htm

¹⁰ World Health Organization. Antigenic and genetic characteristics of zoonotic influenza viruses and development of candidate vaccine viruses for pandemic preparedness September 2017. Available at: www.who.int/influenza/vaccines/virus/201709_zoonotic_vaccinevirusupdate.pdf?ua=1

Risk Assessment:

1. What is the likelihood that additional human cases of infection with swine influenza viruses will occur? Swine influenza viruses circulate in swine populations in many regions of the world. Depending on geographic location, the genetic characteristics of these viruses differ. Most human cases are exposed to swine influenza viruses through contact with infected swine or contaminated environments. Human infection tends to result in mild clinical illness. Since these viruses continue to be detected in swine populations, further human cases can be expected.

2. What is the likelihood of human-to-human transmission of swine influenza viruses? No case clusters have been reported. Current evidence suggests that these viruses have not acquired the ability of sustained transmission among humans, thus the likelihood is low.

3. What is the risk of international spread of swine influenza viruses by travellers? Should infected individuals from affected areas travel internationally, their infection may be detected in another country during travel or after arrival. If this were to occur, further community level spread is considered unlikely as these viruses have not acquired the ability to transmit easily among humans.

Overall Risk Management Recommendations:

- WHO does not advise special traveller screening at points of entry or restrictions with regard to the current situation of influenza viruses at the human-animal interface. For recommendations on safe trade in animals from countries affected by these influenza viruses, refer to OIE guidance.
- WHO advises that travellers to countries with known outbreaks of animal influenza should avoid farms, contact with animals in live animal markets, entering areas where animals may be slaughtered, or contact with any surfaces that appear to be contaminated with animal faeces. Travellers should also wash their hands often with soap and water. Travellers should follow good food safety and good food hygiene practices.
- Due to the constantly evolving nature of influenza viruses, WHO continues to stress the importance of global surveillance to detect virological, epidemiological and clinical changes associated with circulating influenza viruses that may affect human (or animal) health. Continued vigilance is needed within affected and neighbouring areas to detect infections in animals and humans. As the extent of virus circulation in animals is not clear, epidemiological and virological surveillance and the follow-up of suspected human cases should remain high.
- All human infections caused by a new influenza subtype are notifiable under the International Health Regulations (IHR, 2005).¹¹ State Parties to the IHR (2005) are required to immediately notify WHO of any laboratory-confirmed¹² case of a recent human infection caused by an influenza A virus with the potential to cause a pandemic.⁶ Evidence of illness is not required for this report.
- It is critical that influenza viruses from animals and people are fully characterized in appropriate animal or human health influenza reference laboratories and reported according to international standards. Under WHO's Pandemic Influenza Preparedness (PIP) Framework, Member States are

¹¹ World Health Organization. Case definitions for the four diseases requiring notification in all circumstances under the International Health Regulations (2005). Available at: www.who.int/ihr/Case_Definitions.pdf

¹² World Health Organization. Manual for the laboratory diagnosis and virological surveillance of influenza (2011). Available at: www.who.int/influenza/gisrs_laboratory/manual_diagnosis_surveillance_influenza/en/

expected to share their influenza viruses with pandemic potential on a regular and timely basis with the Global Influenza Surveillance and Response System (GISRS), a WHO-coordinated network of public health laboratories. The viruses are used by the public health laboratories to assess the risk of pandemic influenza and to develop candidate vaccine viruses.

Links:

WHO Human-Animal Interface web page

http://www.who.int/influenza/human_animal_interface/en/

Cumulative Number of Confirmed Human Cases of Avian Influenza A(H5N1) Reported to WHO

http://www.who.int/influenza/human_animal_interface/H5N1_cumulative_table_archives/en/

Avian Influenza A(H7N9) Information

http://who.int/influenza/human_animal_interface/influenza_h7n9/en/index.html

WHO Avian Influenza Food Safety Issues

http://www.who.int/foodsafety/areas_work/zoonose/avian/en/

World Organisation of Animal Health (OIE) web page: Web portal on Avian Influenza

<http://www.oie.int/animal-health-in-the-world/web-portal-on-avian-influenza/>

Food and Agriculture Organization of the UN (FAO) webpage: Avian Influenza

<http://www.fao.org/avianflu/en/index.html>

OFFLU

<http://www.offlu.net/index.html>

Annex:

Table 1: Laboratory-confirmed human cases of avian influenza A(H7N9) virus infection (reported 25 July to 27 September 2017)

Province or region reporting (province of assumed exposure, if different from reporting province or region)	Age	Sex	Case condition at time of reporting	Date of onset (dd/mm/yyyy)	Exposure history (at time of reporting)
Fujian	58	M	Severe	19/7/2017	Live poultry market
Hunan	47	M	Severe	9/8/2017	Live poultry market
Xinjiang	73	M	Severe	7/8/2017	Live poultry market
Xinjiang	74	M	Fatal	7/8/2017	No known exposure
Jiangsu	58	M	Fatal	9/8/2017	Live poultry market
Hunan	67	M	Severe	27/8/2017	Live poultry vendor
Liaoning	54	M	Severe	3/9/2017	Live poultry farming