

Influenza at the human-animal interface

Summary and risk assessment, from 27 January to 3 March 2023¹

- **New infections²:** From 27 January to 3 March 2023, three human cases of infection with influenza A(H5N1) viruses, one human case of infection with an influenza A(H5N6) virus and two human cases of infection with influenza A(H9N2) viruses were reported officially. Additionally, two human cases of infection with influenza A(H9N2) viruses and two human cases of infection with influenza A(H1N1) variant viruses were detected.
- **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. Human infections with viruses of animal origin are expected at the human-animal interface wherever these viruses circulate in animals.
- **Risk management:** Selection of new candidate vaccine viruses (CVVs) for zoonotic influenza viruses for 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 influenza A virus that has demonstrated the capacity to infect a human and its haemagglutinin gene (or protein) is not a mutated form of those, i.e. A(H1) or A(H3), circulating widely in the human population. 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 risk assessment on 26 January 2023, three human cases of infection with influenza A(H5N1) viruses were reported to WHO.

On 23 February 2023, Cambodia notified WHO of a confirmed case of human infection with avian influenza A(H5N1) virus. An 11-year-old girl from Prey Veng province developed symptoms on 14 February 2023 and received treatment at a local hospital. On 21 February, she was admitted to the National Pediatric Hospital with severe pneumonia. A sample was collected the same day through

¹ This summary and assessment covers information confirmed during this period and may include information received outside of this period.

² For epidemiological and virological features of human infections with animal influenza viruses not reported in this assessment, see the reports on human cases of influenza at the human-animal interface published in the Weekly Epidemiological Record [here](#).

³ World Health Organization. Genetic and antigenic characteristics of zoonotic influenza A viruses and development of candidate vaccine viruses for pandemic preparedness in the 2023 - 2024 northern hemisphere influenza season. Available at: https://cdn.who.int/media/docs/default-source/influenza/who-influenza-recommendations/vcm-northern-hemisphere-recommendation-2023-2024/20230224_zoonotic_recommendations.pdf?sfvrsn=38c739fa_4

⁴ World Health Organization. Case definitions for the 4 diseases requiring notification to WHO in all circumstances under the International Health Regulations (2005). [Case definitions for the four diseases requiring notification in all circumstances under the International Health Regulations \(2005\)](#).

the severe acute respiratory infection (SARI) sentinel surveillance system. The sample tested positive for an avian influenza A(H5N1) virus by reverse transcriptase-polymerase chain reaction (RT-PCR) at the National Institute of Public Health on the same day. The sample was also sent to Institute Pasteur Cambodia, the National Influenza Center, which confirmed the finding. The patient died on 22 February.

Twelve close contacts (eight asymptomatic close contacts and four symptomatic who met the suspected case definition) of the child were identified and samples were collected and tested. One of the contacts was the child's father, who also developed a mild influenza-like illness on 14 February and tested positive for influenza A(H5N1) on 23 February. The eleven other samples tested negative for A(H5N1) and SARS-CoV-2.

Genetic sequence data of the viruses from both cases was shared through the publicly accessible database GISAID. Virus sequencing showed that the A(H5N1) viruses from the cases belong to the A(H5) genetic clade 2.3.2.1c and are similar to the 2.3.2.1c clade viruses circulating in poultry in southeast Asia since 2014.

Field investigations revealed that both cases had exposure to sick and dead poultry. To date, there is no indication of human-to-human transmission of influenza A(H5N1) virus in this setting. In addition, active case finding has not identified any additional influenza A(H5N1) virus infections.⁵

On 24 February 2023, China reported a case in a 53-year-old woman from Jiangsu province who developed symptoms on 31 January 2023. She was hospitalized on 4 February with severe pneumonia. She had exposure to backyard poultry in Anhui province. No further cases were suspected among family members at the time of reporting. Virus sequencing showed that the A(H5N1) virus from the case belongs to the A(H5) genetic clade 2.3.4.4b.

Since the last risk assessment on 26 January 2023, one human case of infection with an influenza A(H5N6) virus was reported to WHO.

On 2 February 2023, China reported a case in a 49-year-old man from Guangdong province who developed symptoms on 17 December 2022. He was hospitalized on 21 December with severe pneumonia and has since recovered and been discharged. He had exposure to backyard poultry and no further cases were suspected among family members at the time of reporting.

In the most recent risk assessment of 26 January 2023, a human case of infection with an avian influenza A(H5) virus reported by Ecuador was included. Further laboratory information confirms the N-type of the virus as N1. Thus, the case is considered as a human case of infection with an influenza A(H5N1) virus.⁶

In the risk assessment of 11 November 2022, a human case of infection with an avian influenza A(H5) virus reported by Viet Nam was included. Further laboratory information confirms the N-type of the virus as N1. Thus, the case is considered as a human case of infection with an influenza A(H5N1) virus. The A(H5) genetic clade that this virus belongs to is not known.⁷

⁵ World Health Organization. Avian influenza A(H5N1) – Cambodia. <https://www.who.int/emergencies/disease-outbreak-news/item/2023-DON445>

⁶ World Health Organization. Influenza at the human-animal interface summary and assessment, 26 January 2023. <https://www.who.int/publications/m/item/influenza-at-the-human-animal-interface-summary-and-assessment-26-jan-2023>

⁷ World Health Organization. Influenza at the human-animal interface summary and assessment, 11 November 2022. <https://www.who.int/publications/m/item/influenza-at-the-human-animal-interface-summary-and-assessment-11-nov-2022>

According to reports received by the World Organisation for Animal Health (WOAH), various influenza A(H5) subtypes continue to be detected in wild and domestic birds in Africa, Asia, Europe and the Americas. Infections in mammals are also reported.

Risk Assessment:

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

The overall risk assessment is unchanged. Most human cases were sporadic infections 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 related 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, including those involving health care workers, current epidemiological and virological evidence suggests that influenza 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(H9N2) viruses

Since the last risk assessment on 26 January 2023, two human cases of infection with influenza A(H9N2) viruses were reported from China (see Table 1 below). No epidemiological links or clusters of cases were reported associated with these cases. All cases have recovered. The cases were detected in influenza-like illness surveillance. Additionally, two human cases of infection with influenza A(H9N2) viruses were detected in China according to information received during the WHO Consultation and Information Meeting on the Composition of Influenza Virus Vaccines for Use in the 2023-2024 Northern Hemisphere Influenza Season held in February 2023.⁸

Table 1. Human cases of influenza A(H9N2) reported to WHO from China from 27 January to 3 March 2023.

Onset date	Reporting province	Gender	Age	Severity	Poultry exposure
23.10.2022	Sichuan	F	6 years	Mild	Backyard poultry
15.11.2022	Hunan	F	9 months	Mild	Live poultry market

*NA=not available

Avian influenza A(H9N2) viruses are enzootic in poultry in Asia and increasingly reported in poultry in Africa.

⁸ World Health Organization. Genetic and antigenic characteristics of zoonotic influenza A viruses and development of candidate vaccine viruses for pandemic preparedness in the 2023 - 2024 northern hemisphere influenza season. Available at: https://cdn.who.int/media/docs/default-source/influenza/who-influenza-recommendations/vcm-northern-hemisphere-recommendation-2023-2024/20230224_zoonotic_recommendations.pdf?sfvrsn=38c739fa_4

Risk Assessment:

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

Most human cases follow exposure to the A(H9N2) virus through contact with infected poultry or contaminated environments. Human infection tends to result in mild clinical illness in most cases. 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 epidemiologic and virologic evidence suggests that influenza A(H9N2) viruses assessed by GISRS have not acquired the ability of sustained transmission among humans, thus the likelihood is low.

3. What is the likelihood 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 the A(H9N2) virus subtype has not been confirmed to have acquired the ability to transmit easily among humans.

Swine Influenza Viruses

Current situation:

Influenza A(H1N1) variant viruses [A(H1N1)v]

Since the last risk assessment on 26 January 2023, two human cases of infection with influenza A(H1N1)v viruses were detected in China according to information received during the WHO Consultation and Information Meeting on the Composition of Influenza Virus Vaccines for Use in the 2023-2024 Northern Hemisphere Influenza Season held in February 2023.⁹

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 animals or contaminated environments. Human infection tends to result in mild clinical illness in most cases. 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?

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 likelihood of international spread of swine influenza viruses by travelers?

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.

⁹ World Health Organization. Genetic and antigenic characteristics of zoonotic influenza A viruses and development of candidate vaccine viruses for pandemic preparedness in the 2023 - 2024 northern hemisphere influenza season. Available at: https://cdn.who.int/media/docs/default-source/influenza/who-influenza-recommendations/vcm-northern-hemisphere-recommendation-2023-2024/20230224_zoonotic_recommendations.pdf?sfvrsn=38c739fa_4

For more information on A(H5), A(H9N2), A(H1)v and A(H3N2)v viruses, see the report from the WHO Consultation and Information Meeting on the Composition of Influenza Virus Vaccines for Use in the 2023-2024 Northern Hemisphere Influenza Season held in February 2023 at the following link: [Genetic and antigenic characteristics of zoonotic influenza A viruses and development of candidate vaccine viruses for pandemic preparedness in the 2023-2024 northern hemisphere influenza season](#).

Overall Risk Management Recommendations:

- WHO does not advise special traveller screening at points of entry or restrictions with regards to the current situation of influenza viruses at the human-animal interface. For recommendations on safe trade in animals and related products from countries affected by these influenza viruses, refer to WOA guidance.
- Given the observed extent and frequency of avian influenza cases in wild birds, WHO advises the public to avoid contact with sick or dead birds, including wild birds, and to report dead wild birds or request their removal by contacting local wildlife or veterinary authorities.
- 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 excreta. Travelers should also wash their hands often with soap and water. All individuals should follow good food safety and hygiene practices.
- Due to the constantly evolving nature of influenza viruses, WHO continues to stress the importance of global surveillance to detect virologic, epidemiologic 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. Collaboration between the animal and human health sectors is essential. As the extent of influenza viruses circulation in animals is not clear, epidemiologic and virologic surveillance and the follow-up of suspected human cases should continue systematically. Guidance on investigation of non-seasonal influenza and other emerging acute respiratory diseases has been published on the WHO website here: <https://www.who.int/publications/i/item/WHO-WHE-IHM-GIP-2018.2>.
- In the current COVID-19 pandemic, vigilance for the emergence of novel influenza viruses of pandemic potential should be maintained. WHO has developed practical guidance for integrated surveillance in the context of the cocirculation of SARS-CoV-2 and influenza viruses. The guidance is available here: <https://www.who.int/publications/i/item/WHO-2019-nCoV-Integrated-sentinel-surveillance-2022.1>
- All human infections caused by a new subtype of influenza virus are notifiable under the International Health Regulations (IHR, 2005).¹⁰ State Parties to the IHR (2005) are required to immediately notify WHO of any laboratory-confirmed¹¹ case of a recent human infection caused by an influenza A virus with the potential to cause a pandemic¹². Evidence of illness is not required for this report.
- It is critical that these influenza viruses from animals or from people are fully characterized in appropriate animal or human health influenza reference laboratories. Under WHO's Pandemic Influenza Preparedness (PIP) Framework, Member States are expected to share influenza viruses

¹⁰ World Health Organization. [Case definitions for the four diseases requiring notification in all circumstances under the International Health Regulations \(2005\)](#).

¹¹ World Health Organization. Manual for the laboratory diagnosis and virological surveillance of influenza (2011). Available at: <https://apps.who.int/iris/handle/10665/44518>

¹² World Health Organization. Pandemic influenza preparedness framework for the sharing of influenza viruses and access to vaccines and other benefits. Available at: <https://apps.who.int/iris/handle/10665/44796>

with pandemic potential on a regular and **timely basis**¹³ 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

<https://www.who.int/teams/global-influenza-programme/avian-influenza>

WHO Influenza (Avian and other zoonotic) fact sheet

[https://www.who.int/news-room/fact-sheets/detail/influenza-\(avian-and-other-zoonotic\)](https://www.who.int/news-room/fact-sheets/detail/influenza-(avian-and-other-zoonotic))

WHO Protocol to investigate non-seasonal influenza and other emerging acute respiratory diseases

<https://www.who.int/publications/i/item/WHO-WHE-IHM-GIP-2018.2>

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

<https://www.who.int/teams/global-influenza-programme/avian-influenza>

Avian Influenza A(H7N9) Information

[https://www.who.int/teams/global-influenza-programme/avian-influenza/avian-influenza-a-\(h7n9\)-virus](https://www.who.int/teams/global-influenza-programme/avian-influenza/avian-influenza-a-(h7n9)-virus)

World Organisation of Animal Health (WOAH) web page: Avian Influenza

<https://www.woah.org/en/home/>

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

<https://www.fao.org/animal-health/avian-flu-qa/en/>

OFFLU

<http://www.offlu.org/>

¹³ World Health Organization. Operational guidance on sharing influenza viruses with human pandemic potential (IVPP) under the Pandemic Influenza Preparedness (PIP) Framework (2017). Available at: <https://apps.who.int/iris/handle/10665/25940>