

Influenza at the human-animal interface

Summary and risk assessment, from 2 November to 21 December 2023¹

- **New infections²:** From 2 November to 21 December 2023, two human cases of infection with avian influenza A(H5N1) viruses, one human case of infection with an avian influenza A(H5N6) virus, three human cases of infection with avian influenza A(H9N2) viruses, one human case of infection with an A(H1N1) variant virus and one human case of infection with an A(H1N2) variant virus were reported officially.
- **Risk assessment:** The overall public health risk from currently known influenza viruses at the human-animal interface has not changed, and sustained human-to-human transmission of the viruses from these cases is currently considered unlikely. Although human infections with viruses of animal origin are unusual, they are not unexpected at the human-animal interface wherever these viruses circulate in animals.
- **IHR compliance:** All human infections caused by a new influenza subtype are required to be reported under the International Health Regulations (IHR, 2005).³ 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 risk assessment of 1 November 2023, two human cases of infection with avian influenza A(H5N1) viruses were reported from Cambodia. On 24 November 2023, Cambodia notified WHO of an infection in a 21-year-old female in Kampot province who had an onset of illness on 19 November 2023. She was hospitalized on 23 November in intensive care and passed away on 26 November. A sample collected on admission as part of routine severe acute respiratory infection (SARI) surveillance was confirmed positive for A(H5N1) virus. She had exposure to sick and dead chickens before her illness onset. Samples collected from poultry in the village were tested and positive for influenza A(H5N1).⁴

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. Case definitions for the four 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 \(2005\)](#).

⁴ World Organisation for Animal Health (WOAH). <https://wahis.woah.org/#/in-review/5359?reportId=164120&fromPage=event-dashboard-url>

On 25 November, Cambodia notified WHO of an additional case of human infection with influenza A(H5N1) in a four-year-old female from the same village as the first case. The case is a neighbour of the first case and had onset of symptoms on 23 November with respiratory symptoms including fever, cough and rash. The case was detected through active surveillance as part of the response following the detection of the first case on 24 November. She was treated with oseltamivir and referred for treatment and further care at a hospital on 25 November and remained in an isolation room in the respiratory ward of the hospital at the time of reporting. She also had contact with dead backyard chickens raised by the family, and in the past month, there had been sick and dead chickens in the family's backyard.

An epidemiologic investigation did not reveal any close contact between the two cases.

Laboratory investigation shows the viruses, as indicated by phylogenetic analysis, fall within the H5 clade 2.3.2.1c with close similarity to the viruses that have been circulating in Cambodia and South-East Asia since 2013-2014. The sequences cluster most closely with the viruses from the two human cases reported in October 2023.

Additionally, one human case of infection with an influenza A(H5N6) virus was reported from China on 6 December 2023. A 33-year-old-female from Sichuan had an onset of illness on 20 October 2023, was hospitalized on 22 October in severe condition with pneumonia, and passed away on 14 November. She had exposure to a live poultry market. Environmental samples collected from around the case's residence tested positive for avian influenza A(H5) virus. No family members had developed symptoms at the time of reporting.

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 non-human mammals are also reported.

Risk Assessment:

1. What is the risk of additional sporadic human cases of infection with avian influenza A(H5) viruses?

Most human cases so far were sporadic infections in people exposed to A(H5) viruses through contact with infected poultry or contaminated environments, including live poultry markets. While the viruses continue to be detected in animals and related environments, further human cases among exposed individuals are expected but unusual. The impact for public health if additional sporadic cases are detected is minimal. The overall risk is low.

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

No human-to-human transmission was identified associated with the event described above. In the past, small clusters of A(H5) virus infections were reported, including those involving health care workers, but without evidence of sustained human-to-human transmission. Current epidemiological and virological evidence suggests that contemporary influenza A(H5) viruses have not acquired the ability of sustained transmission among humans. Human-to-human transmission is thus currently considered unlikely.

3. What is the likelihood 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 current 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 1 November 2023, three human cases of influenza A(H9N2) virus infections were reported from China. On 7 November 2023, China notified WHO of one laboratory-confirmed A(H9N2) virus infection in a 55-year-old male from Sichuan province. He had onset of illness on 1 October 2023, was hospitalized with severe pneumonia on 5 October and has recovered. He was exposed to a live poultry market and backyard poultry before his onset of illness. Samples collected from his surrounding environment tested negative for influenza viruses. No family members developed symptoms or tested positive for avian influenza A(H9N2) at the time of reporting.

Additionally, on 6 December 2023, China notified WHO of two laboratory-confirmed A(H9N2) virus infections detected in Sichuan province. Both cases are from the same village in Sichuan province and are neighbours. The first case detected is a one-year-old male who had an onset of mild illness on 14 November 2023. A sample collected on 14 November as part of routine influenza-like illness surveillance was confirmed A(H9N2)-positive on 18 November. The second case was identified during the contact tracing efforts following the detection of the first case and is a 74-year-old female who had onset of mild illness on 5 November. A sample collected on 18 November was confirmed A(H9N2)-positive on the same day. Neither case was hospitalized, and both were exposed to backyard poultry at the residence of the second case. Backyard samples collected from the second case's house tested positive for influenza A(H9) viruses. All other close contacts of these two cases tested negative for influenza A(H5), A(H7), and A(H9) viruses. Information received thus far suggests separate spillover events from infected poultry to the two human cases although limited human-to-human transmission cannot be excluded.

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

Risk Assessment:

1. What is the risk of additional sporadic human cases of infection with avian influenza A(H9N2) viruses?

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 but remain unusual. The impact to public health if additional sporadic cases are detected is minimal. The overall risk is low.

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

Prior to the event described above, only sporadic cases have been reported. The last two reported A(H9N2) cases cluster in time and place and could have resulted from separate spillover events. Limited human-to-human transmission cannot be excluded. No sustained human-to-human transmission has been identified associated with the event described above. Current epidemiologic and virologic evidence suggests that contemporary influenza A(H9N2) viruses assessed by GISRS have not acquired the ability of sustained transmission among humans. Human-to-human transmission is thus currently considered unlikely.

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 current evidence suggests the A(H9N2) virus subtype has not acquired the ability to transmit easily among humans.

Swine Influenza Viruses

Current situation:

Since the risk assessment of 1 November 2023, one human infection with an influenza A(H1N1)v virus was reported from Switzerland and one human infection with an influenza A(H1N2v) virus was reported from United Kingdom of Great Britain and Northern Ireland.

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

On 5 December 2023, Switzerland notified WHO of one confirmed human infection with an influenza A(H1N1)v virus. The case was detected as part of a surveillance project of influenza at the human-animal interface. A farm worker reported mild symptoms including cough and rhinorrhea which started on 14 November 2023. A nasopharyngeal sample was taken from the case on 27 November and on 4 December 2023, analyses confirmed infection with an influenza A(H1N1) variant virus. The case has now recovered. The case had direct exposure with pigs on the farm. Pigs on the swine farm were tested and also found to be infected with swine influenza A virus. Further information on this surveillance project can be found on the website of the [Federal Office for Food Safety and Veterinary Affairs](#).

All household contacts were tested using reverse transcription polymerase chain reaction (RT-PCR) on 4 December 2023 and were negative for influenza A and B on 6 December 2023. Only one household contact was symptomatic at the time of testing and was negative. There are no further contacts under investigation.

Initial laboratory investigations were performed at the National Influenza Centre in Geneva and the sample was shared with the WHO Collaborating Center on 6 December. Sequencing results indicate that this virus is an A(H1N1)v strain of clade 1C.2.2 and further viral characterization is ongoing.

Influenza A(H1N2) variant viruses [A(H1N2)v], United Kingdom of Great Britain and Northern Ireland

On 25 November 2023, the United Kingdom Health Security Agency (UKHSA) notified WHO of one confirmed human infection with an influenza A(H1N2)v virus. The case was detected during routine influenza surveillance.

The case is an otherwise healthy individual over 75 years of age who reported onset of mild symptoms on 5 November. The case visited his general practitioner on 9 November. During this visit, a respiratory sample was collected and further analyzed as part of the national routine influenza surveillance programme. On 13 November, the sample was sent to UKHSA laboratories and tested positive on 23 November for influenza A(H1N2)v virus using RT-PCR. The sample was further characterized by whole genome sequencing and results were available on the same date. On 25 November, a follow-up RT-PCR test was performed and tested negative for influenza. The case is now fully recovered.

Further laboratory analyses conducted at the Worldwide Influenza Centre at the Francis Crick Institute (a WHO Collaborating Centre) and the World Organisation for Animal Health (WOAH) avian and swine influenza reference laboratory at the Animal and Plant Health Agency, indicated that this influenza A(H1N2)v virus belongs to the swine influenza virus genetic clade 1B.1.1. Similar A(H1N2) viruses from this genetic clade have been previously detected in pigs in the United Kingdom.

However, this is the first time a virus from this swine genetic clade has been detected in a human in the United Kingdom.

According to ongoing investigations, pig farms are located within a few miles of where the case resides; however, the case reported no direct exposure to pigs, pets, or farms. Thus far, no other cases have been detected in contacts of the case nor in enhanced surveillance in local general practitioner (GP) practices and hospitals. Serological assessment and further investigations are ongoing.⁵

Risk Assessment:

1. What is the risk of additional sporadic human cases of infection with swine influenza viruses?

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 but remain unusual. The impact to public health if additional sporadic cases are detected is minimal. The overall risk is low.

2. What is the likelihood of human-to-human transmission of swine influenza viruses?

No human-to-human transmission was identified associated with the event described above. Current evidence suggests that contemporary swine influenza viruses have not acquired the ability of sustained transmission among humans. Human-to-human transmission is thus currently considered unlikely.

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 current evidence suggest that 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 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 [WOAH](#) guidance.
- Given the observed extent and frequency of avian influenza cases in wild birds and some wild mammals, the public should avoid contact with animals that are sick or dead from unknown causes, including wild animals, and should report dead wild birds and mammals or request their removal by contacting local wildlife or veterinary authorities. Eggs, poultry meat and other poultry food products should be properly cooked and properly handled during food preparation.
- 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.

⁵ <https://www.gov.uk/government/publications/influenza-ah1n2v-technical-briefings/influenza-ah1n2v-rapid-technical-assessment>

- 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>.
- Vigilance for the emergence of novel influenza viruses of pandemic potential should be maintained at all times including during a non-influenza emergency. In the context of the co-circulation of SARS-CoV-2 and influenza viruses, WHO has developed practical guidance for integrated surveillance. 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).⁶ State Parties to the IHR (2005) are required to immediately notify WHO of any laboratory-confirmed⁷ case of a recent human infection caused by an influenza A virus with the potential to cause a pandemic⁸. 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 with pandemic potential on a **timely basis**⁹ 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.
- The Tool for Influenza Pandemic Risk Assessment (TIPRA) provides an in-depth assessment of risk associated with some zoonotic influenza viruses – notably the likelihood of the virus gaining human-to-human transmissibility, and the impact should the virus gain such transmissibility. TIPRA maps relative risk amongst viruses assessed using multiple elements. The results of TIPRA complement those of the risk assessment provided here, and those of prior TIPRA analyses will be published at [http://www.who.int/teams/global-influenza-programme/avian-influenza/tool-for-influenza-pandemic-risk-assessment-\(tipra\)](http://www.who.int/teams/global-influenza-programme/avian-influenza/tool-for-influenza-pandemic-risk-assessment-(tipra)).

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

⁶ World Health Organization. [Case definitions for the four diseases requiring notification in all circumstances under the International Health Regulations \(2005\)](#).

⁷ World Health Organization. Manual for the laboratory diagnosis and virological surveillance of influenza (2011). Available at: <https://apps.who.int/iris/handle/10665/44518>

⁸ World Health Organization. Pandemic influenza preparedness framework for the sharing of influenza viruses and access to vaccines and other benefits, 2nd edition. Available at: <https://iris.who.int/handle/10665/341850>

⁹ 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>

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

WHO Public health resource pack for countries experiencing outbreaks of influenza in animals:

<https://www.who.int/publications/i/item/9789240076884>

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 United Nations (FAO) webpage: Avian Influenza

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

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