Influenza at the human-animal interface

Summary and risk assessment, from 20 March to 22 April 2025[1]

- **New human cases[2]:** From 20 March to 22 April 2025, based on reporting date, the detection of influenza A(H5N1) in four humans and influenza A(H9N2) virus in three humans were reported officially.
- **Circulation of influenza viruses with zoonotic potential in animals:** High pathogenicity avian influenza (HPAI) events in poultry and non-poultry continue to be reported to the World Organisation for Animal Health (WOAH).[3] The Food and Agriculture Organization of the United Nations (FAO) also provides a global update on avian influenza viruses with pandemic potential.[4]
- **Risk assessment[5]:** Sustained human to human transmission has not been reported from these events. Based on information available at the time of the risk assessment, the overall public health risk from currently known influenza viruses circulating at the human-animal interface has not changed remains low. The occurrence of sustained human-to-human transmission of these viruses is currently considered unlikely. Although human infections with viruses of animal origin are infrequent, they are not unexpected at the human-animal interface.
- **IHR compliance:** All human infections caused by a new influenza subtype are required to be reported under the International Health Regulations (IHR, 2005).[6] This includes any influenza A virus that has demonstrated the capacity to infect a human and its haemagglutinin (HA) 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 in humans

Current situation:

Since the last risk assessment of 19 March 2025, single laboratory-confirmed human cases of A(H5N1) infection were reported to WHO from Cambodia, India, Mexico and Viet Nam.

[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 Organisation for Animal Health (WOAH). Avian influenza. Global situation. Available at: https://www.woah.org/en/disease/avian-influenza/#ui-id-2.

[4] Food and Agriculture Organization of the United Nations (FAO). Global Avian Influenza Viruses with Zoonotic Potential situation update. Available at: https://www.fao.org/animal-health/situation-updates/global-aiv-with-zoonotic-potential.

[5] World Health Organization (2012). Rapid risk assessment of acute public health events. World Health Organization. Available at: https://iris.who.int/handle/10665/70810.

[6] 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).

A(H5N1), Cambodia

On 23 March 2025, Cambodia notified WHO of a human case of influenza A(H5N1) in a 3-year-old boy from Kratie Province. On 18 March, he developed symptoms and was seen at a local private clinic. On 21 March, he was admitted to hospital in critical condition. Upper respiratory specimens collected on 22 March tested positive for influenza A(H5N1) by reverse transcription-polymerase chain reaction (RT-PCR) at the National Institute of Public Health of Cambodia. The results were confirmed by the Institut Pasteur du Cambodge (IPC) on 23 March. The patient died on 23 March. Sequence analysis of the haemagglutinin (HA) gene revealed the virus belongs to A(H5) clade 2.3.2.1e (previously classified as clade 2.3.2.1c) and is similar to viruses circulating in poultry in Cambodia in 2025.

Early investigations revealed that several chickens died at the boy's house between 16 and 17 March and were used in meal preparation. The boy played near the area where the chickens died at his house. The Cambodian Communicable Disease and Control Department (CDC), Ministry of Health (MoH), and local Rapid Response Team (RRT) established enhanced surveillance and conducted further investigations. As of 25 March 2025, upper respiratory specimens collected from all contacts tested negative for influenza A(H5N1). Samples from local poultry were collected, and test results are pending.

This case is the third human infection with influenza A(H5N1) reported in Cambodia in 2025.

A(H5N1), India

A human infection with an H5 clade 2.3.2.1a A(H5N1) virus was detected in Andhra Pradesh, India in a child in March 2025, who subsequently died, according to genetic sequence data available in GISAID (EPI_ISL_19836227; submission date 21 April 2025; ICMR-National Institute of Virology). WHO was notified of this case on 8 April 2025. Since early January 2025, several A(H5N1) outbreaks among animals have been reported in India. Multiple outbreaks of HPAI A(H5N1) have been reported in poultry farms across Andhra Pradesh state since January 2025.[7]

This is the second human infection with an influenza A(H5N1) virus notified to the WHO from India; the first case was reported in 2021.

A(H5N1), Mexico

On 2 April 2025, Mexico notified WHO of a laboratory-confirmed human infection with an avian influenza A(H5N1) virus in a child in the state of Durango. The patient did not have any underlying medical conditions and had no history of travel. On 7 March, the patient had onset of symptoms, was admitted to hospital on 13 March due to respiratory failure and died on 8 April due to respiratory complications.

A nasopharyngeal swab collected on 18 March was positive for influenza A by real-time RT-PCR but was unsubtypeable. These results were confirmed at the Centro de Investigación Biomédica del Noroeste (CIBIN, by its Spanish acronym), IMSS Monterrey, along with simultaneous detection of parainfluenza 3 virus. On 31 March, the sample was forwarded to the Laboratorio Central de Epidemiología (LCE, by its Spanish acronym) where it was molecularly identified as influenza A(H5). On 1 April, the sample was received by the Instituto de Diagnóstico y Referencia Epidemiológicos (InDRE, by its Spanish acronym), where the positive result for influenza A(H5N1) was confirmed by RT-PCR. The sample was further characterized as avian influenza A(H5N1) clade 2.3.4.4b genotype D1.1 virus. The genotype D1.1 is currently the most frequently detected genotype in the Americas

[7] WOAH. WAHIS. India - High pathogenicity avian influenza viruses (poultry) (Inf. with). Event 6344. Available at: https://wahis.woah.org/#/in-event/6344/dashboard.

and has affected wild birds, poultry and been detected in mammals, including previous human cases of infection with A(H5N1) viruses.

The source of infection in this case remains under investigation. Upper respiratory specimens collected from many of the case's contacts tested negative for influenza A(H5N1). To date, no further cases of human infection with influenza A(H5N1) linked to this case have been identified.

According to information from the National Service for Agrifood Health, Safety and Quality (SENASICA per its acronym in Spanish), between January 2022 and August 2024, 75 outbreaks of A(H5N1) in poultry were reported across various regions of Mexico. In 2025, high pathogenicity avian influenza (HPAI) A(H5N1) has been detected in captive birds in a zoo and wild birds in Durango.

This is the second reported human infection with avian influenza A(H5) in Mexico, and the first confirmed case of infection with an influenza A(H5N1) virus in the country. In 2024, Mexico detected influenza A(H5N2) in an individual.[8]

A(H5N1), Viet Nam

On 22 April 2025, Viet Nam notified WHO of a laboratory-confirmed human infection with an avian influenza A(H5N1) virus in child in Tay Ninh Province. The case developed fever, headache, and vomiting on 11 April 2025 and was seen at a hospital on the same day. On 13 April, the case was admitted to a tertiary children's hospital in Ho Chi Minh City (HCMC) and was diagnosed with encephalitis. As of 21 April 2025, the patient was showing clinical improvement.

On 13 and 16 April, cerebrospinal fluid (CSF) samples were collected. On 16 April, testing indicated possible A(H5N1) virus detection and treatment with antivirals was initiated. On 17 April, nasopharyngeal (NP) swabs were collected and sent to the Oxford University Clinical Research Unit (OUCRU) of the Hospital of Tropical Diseases in HCMC, together with the CSF sample collected on 13 April, for RT-PCR testing. On the same day, the hospital also sent NP swabs and the CSF sample collected on 16 April to the Pasteur Institute (PI) in HCMC for RT-PCR testing. The CSF sample tested positive for influenza A(H5N1), while the NP sample tested negative for influenza A(H5N1) at both laboratories. Genomic sequencing conducted by the OUCRU indicated the virus belongs to the H5 HA clade 2.3.2.1e. The genomic sequencing results from PI HCM were pending at the time of reporting.

Two weeks before developing symptoms, the case attended a burial for about 50 chickens in their village. At the time of notification, no other outbreaks of dead poultry were reported in the area where the patient lives. Samples collected from chickens from households near the patient's residence tested negative for A(H5N1) virus. Epidemiological case investigations did not find any further cases among the close contacts of the patient.

According to reports received by WOAH, various influenza A(H5) subtypes continue to be detected in wild and domestic birds in the Americas, Asia and Europe. Infections in non-human mammals are also reported, including in marine and land mammals.[9] A list of bird and mammalian species affected by HPAI A(H5) viruses is maintained by FAO.[10]

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[8] World Health Organization (14 June 2024). Disease Outbreak News; Avian Influenza A(H5N2) in Mexico. Available at: http://www.who.int/emergencies/disease-outbreak-news/iten/2024-DON524

[9] World Organisation for Animal Health (WOAH). Avian influenza. Global situation. Available at: https://www.woah.org/en/disease/avian-influenza/#ui-id-2.

[10] Food and Agriculture Organization of the United Nations. Global Avian Influenza Viruses with Zoonotic Potential situation update. Available at: https://www.fao.org/animal-health/situation-updates/global-aiv-with-zoonotic-potential/bird-species-affected-by-h5nx-hpai/en.

Risk Assessment for avian influenza A(H5) viruses:

1. What is the current global public health risk of additional human cases of infection with avian influenza A(H5) viruses?
Most human cases so far have been infections in people exposed to A(H5) viruses, for example, through contact with infected poultry or contaminated environments, including live poultry markets, and occasionally infected mammals and contaminated environments. While the viruses continue to be detected in animals and related environments humans are exposed to, further human cases associated with such exposures are expected but unusual. The impact for public health if additional cases are detected is minimal. The current overall global public health risk of additional human cases is low.

2. What is the likelihood of sustained human-to-human transmission of currently circulating avian influenza A(H5) viruses?
No sustained human-to-human transmission has been identified associated with the recent reported human infections with avian influenza A(H5). There has been no reported human-to-human transmission of A(H5N1) viruses since 2007, although there may be gaps in investigations. In 2007 and the years prior, small clusters of A(H5) virus infections in humans were reported, including some involving health care workers, where limited human-to-human transmission could not be excluded; however, sustained human-to-human transmission was not reported.

Available evidence suggests that influenza A(H5) viruses circulating have not acquired the ability to efficiently transmit between people, therefore the likelihood of sustained human-to-human transmission is thus currently considered unlikely at this time.

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.

A(H9N2), China

Since the last risk assessment of 19 March 2025, three human cases of infection with A(H9N2) influenza viruses were notified to WHO from China on 9 April 2025. The cases were detected in Guangxi, Guizhou and Henan provinces. One case, in an adult, had underlying conditions at the time of illness and was hospitalized with pneumonia. The other cases in children involved mild illnesses, were detected through the influenza-like illness (ILI) surveillance system, and the cases have recovered. Each case had a known history of exposure to poultry prior to the onset of symptoms. Environmental samples collected from areas associated with two cases tested positive for influenza A(H9) virus. No further cases were detected among contacts of these cases and there was no epidemiological link between the cases.

Risk Assessment for avian influenza A(H9N2):

1. What is the global public health risk of additional 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. Most human infections of A(H9N2) to date have resulted in mild clinical illness in most cases. Nearly 130 human infections with A(H9N2) cases have been reported to date since 2003, and six of these have been severe or fatal and three of these were known to have

underlying medical conditions. Since the virus is endemic in poultry in multiple continues in Africa and Asia[11], further human cases associated with exposure to infected poultry are expected but remain unusual. The impact to public health if additional cases are detected is minimal. The overall global public health risk of additional human cases is low.

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

At the present time, no sustained human-to-human transmission has been identified associated with the event described above. Current evidence suggests that influenza A(H9N2) viruses from these cases have not acquired the ability of sustained transmission among humans, therefore sustained 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.

Overall risk management recommendations:

Surveillance and investigations

- Due to the constantly evolving nature of influenza viruses, WHO continues to stress the importance of global strategic surveillance in animals and humans 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. Close collaboration with the animal health and environment sectors is essential to understand the extent of the risk of human exposure and to prevent and control the spread of animal influenza. WHO has published guidance on surveillance for human infections with avian influenza A(H5) viruses.
- As the extent of influenza virus 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.
- Countries should increase avian influenza surveillance in domestic and wild birds, enhance surveillance for early detection in cattle populations in countries where HPAI is known to be circulating, include HPAI as a differential diagnosis in non-avian species, including cattle and other livestock populations, with high risk of exposure to HPAI viruses; monitor and investigate cases in non-avian species, including livestock, report cases of HPAI in all animal species, including unusual hosts, to WOAH and other international organizations, share genetic sequences of avian influenza viruses in publicly available databases, implement preventive and early response measures to break the HPAI transmission cycle among animals through movement restrictions of infected livestock holdings and strict biosecurity measures in all holdings, employ good production and hygiene practices when handing animal products, and protect persons in contact with suspected/infected animals.[12]
- When there has been human exposure to a known outbreak of an influenza A virus in domestic poultry, wild birds or other animals – or when there has been an identified human case of

[11] Food and Agriculture Organization of the United Nations (FAO). Global Avian Influenza Viruses with Zoonotic Potential situation update. Available at: https://www.fao.org/animal-health/situation-updates/global-aiv-with-zoonotic-potential.

[12] World Organisation for Animal Health. Statement on High Pathogenicity Avian Influenza in Cattle, 6 December 2024. Available at: https://www.woah.org/en/high-pathogenicity-avian-influenza-hpai-in-cattle/.

infection with such a virus – enhanced surveillance in potentially exposed human populations becomes necessary. Enhanced surveillance should consider the health care seeking behaviour of the population, and could include a range of active and passive health care and/or community-based approaches, including: enhanced surveillance in local influenza-like illness (ILI)/SARI systems, active screening in hospitals and of groups that may be at higher occupational risk of exposure, and inclusion of other sources such as traditional healers, private practitioners and private diagnostic laboratories.

- 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 updated and published practical guidance for integrated surveillance.

Notifying WHO

- All human infections caused by a new subtype of influenza virus are notifiable under the International Health Regulations (IHR, 2005).[13] State Parties to the IHR (2005) are required to immediately notify WHO of any laboratory-confirmed[14] case of a recent human infection caused by an influenza A virus with the potential to cause a pandemic[15]. Evidence of illness is not required for this report.
- WHO published the case definition for human infections with avian influenza A(H5) virus requiring notification under IHR (2005): https://www.who.int/teams/global-influenza-programme/avian-influenza/case-definitions.

Virus sharing and risk assessment

- 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**[16] with a WHO Collaborating Centre for influenza of GISRS. 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).

Risk reduction

- Given the observed extent and frequency of avian influenza in poultry, wild birds and some wild and domestic mammals, the public should avoid contact with animals that are sick or dead from unknown causes, including wild animals, and should report dead birds and mammals or request their removal by contacting local wildlife or veterinary authorities.

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

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

[15] 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

[16] 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

- Eggs, poultry meat and other poultry food products should be properly cooked and properly handled during food preparation. Due to the potential health risks to consumers, raw milk should be avoided. WHO advises consuming pasteurized milk. If pasteurized milk isn't available, heating raw milk until it boils makes it safer for consumption.
- WHO has published practical interim guidance to reduce the risk of infection in people exposed to avian influenza viruses.

Trade and travellers

- 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.
- 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.

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)
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
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-a-h5n1-virus
Avian Influenza A(H7N9) Information
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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