Acute respiratory infections (ARI): Influenza (avian and seasonal)

Last update: 2022-06-13

Key facts

To better understand public health terms included in this Disease Tool (e.g. What is a case definition? or What is an infectious agent?), consult our page on Key concepts in epidemiology.

Importance

Respiratory tract infections caused by influenza kill between 290,000 and 650,000 people every year (WHO data from 2017). Seasonal influenza is an acute respiratory infection (ARI) caused by influenza viruses that circulate in all parts of the world. An influenza epidemic occurs when an *influenza A* virus to which most humans have little or no existing immunity acquires the ability to cause sustained human-to-human transmission. This can lead to community-wide outbreaks. Such a virus has the potential to spread rapidly worldwide, causing a pandemic.

Avian and other zoonotic influenza infections in humans may cause disease ranging from mild infection of the eyes (conjunctivitis) to severe pneumonia and even death. Over the past several years, highly pathogenic avian influenza A(H5N1) has been detected in poultry, wild birds or other animals in over 30 countries, causing over 800 human deaths. Controlling the disease in the animal source is critical to decrease risk to humans.

?

Case definition

A **case definition** is a set of uniform criteria used to define a disease for public health surveillance. It enables public health officials to classify and count cases consistently.

The following are standard case definitions to allow national health authorities to interpret data in an international context. However, during an outbreak, case definitions may be adapted to the local context and the Red Cross Red Crescent should use those agreed/established by national health authorities. NB: Consider that during community-based surveillance, ***volunteers*** *should use broad (simplified) case definitions (referred to as community case definitions) to recognize most or all possible cases, provide relevant risk communication and appropriate actions and encourage them to seek care. Other actors such as* ***healthcare workers or investigators*** *studying the cause of a disease, on the other hand, can use more specific case definitions that may require laboratory confirmation.*

The main objective of influenza surveillance is not to identify every single influenza case, but instead to understand transmission patterns, disease burden and changes in the viruses that circulate globally. Accordingly, the following WHO-standardized case definitions are intended not to capture all cases but to describe trends over time.

Suspected case definition:

Influenza-like illness (ILI) case definition: An acute respiratory infection with measured fever of ≥ 38 C° and cough with onset within the last ten days.
Severe acute respiratory infection (SARI) case definition: An acute respiratory infection with history of fever or measured fever of ≥ 38 C° and cough, with onset within the last ten days that requires hospitalization.

Confirmed case definition: Patients meeting the ILI or SARI definitions who have laboratory confirmation of influenza virus infection.

WHO case definition source of information: https://www.who.int/bulletin/volumes/96/2/17-194514.pdf

?

Alert / epidemic threshold

An **alert threshold** is the pre-defined number of alerts that suggest the beginning of a possible disease outbreak and therefore warrant immediate notification.
Epidemic thresholds are the minimum number of cases indicating the beginning of a particular disease's outbreak.

There is no standard definition for an outbreak of seasonal influenza, which usually occurs in annual epidemics.

The term outbreak is more often used for the appearance of cases of a novel or emerging strain of influenza. A single case of a novel strain should trigger a public health response.

Risk factors

Risk factors for pandemic and seasonal influenza:

- No proper sanitation and hygiene measures preventing the droplet spread or the spread by hands contaminated with influenza viruses.
- Outbreaks of the disease are of particular concern when they occur in crowded settings including schools and nursing homes.
- No annual vaccination or when circulating viruses do not match the vaccine viruses.

Risk factors for avian influenza: direct or indirect exposure to infected live or dead poultry or contaminated environments, e.g. live bird markets. Other likely risk factors include slaughtering, defeathering, handling carcasses of infected poultry and preparing poultry for consumption.

?

Attack rate (AR)

The **attack rate** is the risk of getting a disease during a specific time period (such as during an outbreak).

> ***Attack rates will vary from one outbreak to another. In case of an outbreak, consult the latest information provided by health authorities.***

- It depends on the agent, context and affected population.
- About two-thirds of people with pandemic influenza are expected to develop clinical symptoms. Averaged over all (across all age groups), population clinical attack rates are expected to be 25–45 per cent.

Groups at increased risk of severe illness (most vulnerable)

- Elderly.
- Pregnant women.
- Infants under two months of age with signs of pneumonia/sepsis are at risk of suffering severe illness and death more quickly than older children.
- People with weakened immune system e.g. with sickle cell disease, asplenia, HIV, malignancy or receiving chemotherapy or steroids.
- Children younger than five years of age with chronic lung, liver or heart conditions.

?

Infectious agent

Infectious agents are bacteria, viruses, fungi, prions and parasites. A disease caused by an infectious agent or its toxic products is defined as an infectious disease.

> Influenza is caused by infection with influenza viruses, RNA viruses of the *Orthomyxovirus* genus and are classified into types A, B, C and D. However, only types A and B commonly cause illness in humans. The four types co-circulate among humans around the world, but their distribution changes from one year to another and across geographic areas. The emergence of a new and very different influenza A virus with the ability to infect people and have sustained human to human transmission can cause an influenza pandemic. This is the reason why influenza A viruses are of most significance to public health.

?

Reservoir / host

A **reservoir of infection** is a living organism or material in or on which an infectious agent lives and/or usually multiplies. Reservoirs include humans, animals and the environment.

A **susceptible host** is a person at risk of being infected. The level of susceptibility depends on age, sex, ethnicity and genetic factors, specific immunity also depends on other factors that affect an individual's ability to resist

infection or to limit its ability to cause infection.

A **zoonotic disease** or **zoonosis** is an infectious disease that has jumped from a non-human animal to humans.

Mainly only humans for seasonal influenza.

Zoonotic disease: Animals, particularly birds and poultry, for avian influenza.

?

How disease is spread (modes of transmission)

Categorisation of **modes of transmission** varies from one agency to another. In addition, some infectious agents can be transmitted by more than one mode. A list of modes of transmission can be found in the key concepts to serve as guidance to better understand the diseases included in this website.

- Seasonal influenza: **Droplet and airborne spread:** Large respiratory droplets when someone coughs or sneezes either by direct contact (e.g. touching hands), indirect contact (e.g. touching contaminated surfaces) or by airborne droplets.
- Avian influenza: **Contact transmission:** Human infections of avian influenza are acquired mostly through direct contact with infected animals or contaminated environments. Most avian influenza cases in humans of A(H5N1) and A(H7N9) are associated with direct or indirect contact with infected live or dead poultry. While recently identified avian influenza viruses do not currently transmit easily from person to person, the viruses have the potential to mutate to become more contagious between people.

?

Incubation period

This time from when infection occurs to the onset of symptoms is called the **incubation period**. It is a range of days and it can be different for each disease.

Usually, two days for seasonal influenza but ranges from one to four days.

For avian influenza A(H5N1) virus infection in humans is about two to five days and ranging up to seventeen days. For infections with the avian influenza A(H7N9) virus, incubation averages five days, ranging from one to 10 days.

?

Period of infectiousness

Period of infectiousness is the time interval during which an infected person can transmit the infection to other susceptible persons.

Depends on the infectious agent. This includes five days for influenza virus, but longer in infants, young

children and people with compromised immune systems.

Clinical signs and symptoms

- Seasonal and avian influenza virus infections in humans may cause disease ranging from mild upper respiratory tract infection (fever and cough), to severe pneumonia, sepsis with shock and even death.
- Some common symptoms of pneumonia in children and infants include rapid or difficult breathing, cough, fever, chills, headaches, loss of appetite and wheezing.
- Children under five years of age with severe cases of pneumonia may struggle to breathe, with their chests moving in or retracting during inhalation.
- Young infants may suffer convulsions, unconsciousness, hypothermia, lethargy and feeding problems.
- Red eyes (conjunctivitis), gastrointestinal symptoms, encephalitis and encephalopathy have also been reported to varying degrees depending on subtype.

Other diseases with similar clinical signs and symptoms

COVID-19 or MERS, respiratory syncytial virus (RSV), bacterial or mycotic pneumonia. Other similar symptoms exist for exacerbated chronic respiratory diseases and allergies.

Diagnosis

- Conventional polymerase chain reaction (PCR) tests or real-time reverse transcription (RT-PCR) for the detection of influenza virus.
- Rapid influenza diagnostic tests (RIDTs) have lower sensitivity compared to PCR and their reliability depends largely on the conditions under which they are used.
- Viral antigen detection by immunofluorescence or enzyme immunoassay methods.

Vaccine or treatment

Please refer to the appropriate local or international guidelines for clinical management. All clinical management including the administration of any treatment or vaccine should be conducted by health professionals.

- Severe influenza disease might need hospitalization. Isolation is desirable.
- Antiviral drugs for influenza are available in some countries and may reduce severe complications and deaths.
- Vaccines against seasonal influenza are available. Because influenza viruses change rapidly due to antigenic drift, vaccines are reformulated and delivered annually, commonly through seasonal campaigns. Licensed influenza vaccines include inactivated or live-attenuated influenza type A and B viruses, with three or four subtypes per vaccine. Among adults, influenza vaccine provides protection or reduces severity of disease, even when circulating viruses do not exactly match the vaccine viruses. Inactivated influenza vaccines (IIV) are administered by injection; live-attenuated influenza vaccines (LAIV) are delivered as nasal spray. Only IIV's are licensed for children younger than two years of age.

Two doses of influenza vaccine given four weeks apart are recommended during the first season a child is vaccinated, followed by annual vaccination before influenza season. Maternal influenza immunization during pregnancy can protect infants too young to be vaccinated against influenza disease through transplacental transfer of antibodies.

- The World Health Organization (WHO) suggests that countries make decisions on influenza vaccines based on local disease burden, resources, capacity and other health priorities. The WHO recommends annual vaccination for pregnant women, children aged between six months and five years, elderly aged more than 65 years, individuals with chronic medical conditions and healthcare workers.

?

Immunity

There are two types of immunity:
- **Active immunity** results when exposure to an agent triggers the immune system to produce antibodies to that disease.
- **Passive immunity** is provided when a person is given antibodies to a disease rather than producing them through his or her own immune system.

- Immunity following infection by one influenza virus will not fully protect against antigenic or genetic variants of influenza A or B viruses.
- Immunity from vaccination wanes over time so annual vaccination is recommended to protect against influenza. This is why new outbreaks occur every year and new vaccines have to be designed.

Which interventions are most effective for prevention and control?

The following is a list of activities that Red Cross Red Crescent volunteers might take part in. It is not an exhaustive list of all prevention and control activities for the specific disease.

- Communicate risks about the disease or epidemic, not only to share information on prevention and mitigation measures, but also to encourage informed decision-making, positive behaviour change and maintenance of trust in the Red Cross Red Crescent response. This includes the identification of rumours and misinformation around disease—frequent during health emergencies—to manage them appropriately. Volunteers should use the most context-appropriate communication techniques (ranging from social media to face-to-face interactions).

Seasonal and avian influenza

- Community education and engagement activities to encourage the adoption of appropriate behaviours including:
  - Regular handwashing with soap.
  - Avoiding contact with those who are sick. If contact is necessary, use personal protection/barriers (e.g. masks that cover mouth and nose).
  - Early isolation when presenting symptoms of influenza.
  - Coughing etiquette (cover mouth when coughing or sneezing; tissues should be disposed of immediately).

- Social mobilization for vaccination, including extensive Information, Education and Communication (IEC) activities on the benefits of the influenza vaccine, the vaccination schedule (seasonal) in country for priority groups, and the dates and locations to get the vaccine for such groups.

Avian influenza specific

- Prevention at animal source: includes activities such as keeping poultry away from areas frequented by wild fowl, ensuring sanitation of poultry houses and equipment, reporting any bird illnesses and deaths to veterinary services, ensuring appropriate disposal of dead poultry.
- Safe preparation and consumption of poultry (e.g. handwashing, well-cooked, washed utensils). Raw poultry should be handled hygienically.
- Strong coordination between animal and public health authorities.

Which interventions have NO evidence and therefore are NOT recommended?

- Spraying of humans with chlorine is a practice implemented in other disease epidemics, but for which there is no evidence as a recognized outbreak control measure. In fact, deliberate exposure of humans to chlorine may lead to detrimental health effects, such as skin, respiratory and eye conditions. Other negative effects may be to create a false sense of security among those sprayed; in some cultures, it may create fear and subsequent resistance not only to spraying but also to other necessary outbreak response activities.

Epidemic characteristics and RCRC indicators and targets

The first table below includes data that should be gathered from health authorities and relevant non-governmental actors to understand the progress and characteristics of the epidemic in the specific country and area of intervention. The second table includes a list of suggested indicators that can be used for monitoring and evaluating Red Cross Red Crescent activities; wording of indicators may be adapted to specific contexts. Target values for a specific indicator can vary widely from one context to another and therefore managers should define them based on the specific population, area of intervention and programmatic capacity. Exceptionally, some indicators on this website may include target values when these are globally agreed as a standard; e.g. 80 per cent of individuals who slept under an insecticide-treated net (ITN) the previous night—the normative World Health Organization benchmark for universal coverage with ITNs.

Epidemic characteristics and progression
Influenza cases in total population per week
Influenza cases in children < 5 years per week
Deaths from influenza in total population per week
Deaths from influenza in children < 5 years per week

Indicators for Red Cross Red Crescent activities
Number of volunteers trained on a specific topic (e.g. Epidemic Control for Volunteers (ECV); Community-based surveillance (CBS); WASH training; CBHFA training, etc.) *Numerator*: Number of volunteers trained Source of information: Training attendance sheets
Number of active CBS volunteers actively engaged on influenza health risks (NB. Only for National Societies conducting CBS programming) *Numerator*: Number of active CBS volunteers actively engaged Source of information: CBS volunteer lists and diseases prioritized
Number of people supported through overall health and hygiene promotion that reduces the risk of influenza transmission *Numerator*: Number of people supported Source of information: WASH activities' reports

See also:

- For Community Engagement and Accountability (CEA) indicators for activities accompanying ECV actions, please refer to: IFRC *CEA toolkit (Tool 7.1: Template CEA logframe, activities and indicators).* Available at: https://www.ifrc.org/document/cea-toolkit

Impact on other sectors

Sector	Link to the disease
WASH	Droplet spread can be reduced by proper sanitation and hygiene like regular handwashing with water and soap and covering mouth and nose while coughing or sneezing.
Nutrition	Breastfeeding in the first six months of an infant's life has a protective factor against ARI, like influenza disease. Malnutrition increases the risk for severe seasonal or avian influenza.
Shelter and settlements (including household items)	The need for shelter often comes along with reduced WASH conditions and crowded areas where influenza can spread easily and cause a pandemic. Close exposure to infected animals like birds increases the risk of avian influenza. This is especially the case in communities breeding birds and trading them in live bird markets.

Sector	Link to the disease
Psychosocial support and mental health	Influenza can have several negative impacts on psychological, social and emotional aspects of a person's life, apart from its physical effects only. Psychological reactions may include fear of social stigma, anxiety and worry about the outcome and stress, among others.
Gender and sex	With regard to morbidity and mortality from seasonal and pandemic influenza viruses, there is evidence that the outcome of infection is worse for females, but that the magnitude of this difference varies across geographical regions. The reasons might include the following: the disease is more severe among pregnant women, especially during the second and third trimesters, than in the general population in most regions of the world; the severity of asthma and other chronic respiratory conditions as well as rates of diabetes and obesity, all predisposing to increased seasonal influenza-related morbidity, is often worse in women than men. Women are also more likely than men to be caregivers and to work in healthcare professions, which may increase their exposure rate to influenza. Women mount higher antibody responses following vaccination against influenza and experience more frequent and severe side effects than men. Avian influenza: in many countries women play a key role in small-scale backyard poultry production and marketing but are neglected in poultry management courses or specific courses for avian influenza control. Therefore, they are at increased risk of exposure and of missing outbreaks.
Education	When schools do not have clean running water, the fact can add transmission risks in places where there are influenza outbreaks ongoing. Children may then be at risk of getting the disease if attending classes, or at risk of losing out on education if staying at home because of disease. Importantly, schools and other facilities dedicated to children and youth can offer an important space for them to engage, mobilize and raise awareness around health education issues. With support, trust and appropriate capacity-building, young people can be effective advocates for the adoption of preventive measures during an epidemic and are those best placed to mobilize their peers.
Livelihoods	Keeping small poultry flocks is a key income-generating activity (e.g. for the sale of birds) and an affordable source of animal protein for a household in various parts of the world. An avian influenza outbreak may lead to dramatic socio-economic losses due to the decrease in poultry to consume and sell. This may also lead to the deterioration of the nutrition status of household members, particularly children. In several countries, it is commonly women who look after poultry, and may therefore be more disproportionately affected by an epidemic. At a country level, a range of consequences of an avian influenza outbreak may include that poultry meat exporters suffer significant economic losses; large commercial producers serving domestic markets may suffer from loss of consumer confidence; and small farmers may get no compensation for poultry losses, among other repercussions. Overall, influenza epidemics can result in high levels of worker absenteeism and productivity loss as people may not be able to work due to disease. This can lead to loss of income due to the reduction in work activity and to the diversion of resources to seek medical treatment.

Resources:

- Forum of International Respiratory Societies (2017) *The Global Impact of Respiratory Disease*. Second Edition. Sheffield, European Respiratory Society. Available at: https://www.who.int/gard/publications/The_Global_Impact_of_Respiratory_Disease.pdf
- WHO (2017) *Up to 650 000 people die of respiratory diseases linked to seasonal flu each year*. Available at: https://www.who.int/news/item/13-12-2017-up-to-650-000-people-die-of-respiratory-diseases-linked-to-seasonal-flu-each-year
- WHO (2018) *Influenza: Vaccine preventable diseases surveillance standards*. Available at: WHO_SurveillanceVaccinePreventable_09_Influenza_R2.pdf
- WHO (2018) *Influenza (avian and other zoonotic)*. Available at: https://www.who.int/news-room/fact-sheets/detail/influenza-(avian-and-other-zoonotic)
- WHO (2010). *Sex, gender and influenza*. Available at: https://apps.who.int/iris/handle/10665/44401
- Velasco, E., Dieleman, E., Supakankunti, S., and Mai Phuong, T. (2008) *Gender Aspects of the Avian Influenza Crisis in Southeast Asia: Laos, Thailand and Vietnam*. European Commission. Available at: https://ec.europa.eu/world/avian_influenza/docs/gender_study_0608_en.pdf
- Limon, G., de Haan, N, Schwabenbauer, K., S. Ahmed, Z., and Rushton, J. (2009) 'Highly pathogenic avian influenza: a rapid assessment of its socio-economic impact on vulnerable households in Egypt'. *FAO*. Available at: https://www.fao.org/3/al686e/al686e00.pdf