

# ONE HEALTH ATLAS

François Roger  
Marie-Marie Olive  
Marisa Peyre  
Dirk Pfeiffer  
Jakob Zinsstag, eds



éditions  
Quæ

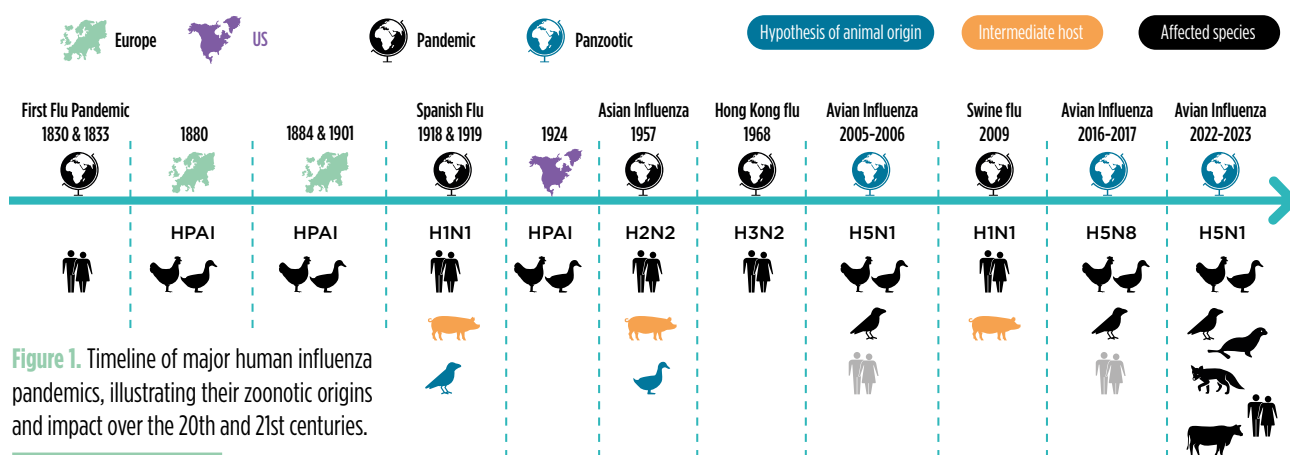
# From past pandemics to recent threats: the ongoing zoonotic risks of influenza

Claire Hautefeuille,  
Marisa Peyre

**P**rior to the emergence of coronavirus diseases, the four major pandemics of the twentieth century were all caused by animal influenza viruses. The Spanish influenza of 1918, which killed between 50 and 100 million people, was linked to an H1N1 serotype virus that emerged as a result of an adaptation of a low pathogenic avian influenza virus to mammals. The Asian influenza of 1957 (H2N2), which caused 70,000 deaths, and the Hong Kong influenza of 1968 (H3N2), which caused 56,000 deaths, both emerged as a result of recombination between human and low pathogenic avian influenza viruses. Finally, the H1N1pdm (2009) killed 200,000 people and developed from pig viruses (Figure 1).

Increased surveillance in humans and animals and improved sequencing made it possible to identify human infection with swine and avian influenza viruses. These infections are more often observed in people in close contact with animals (e.g. people working on farms or in live animal markets or slaughterhouses). Human infection with animal influenza viruses mainly causes clinical signs similar to the human flu and is often not detected.

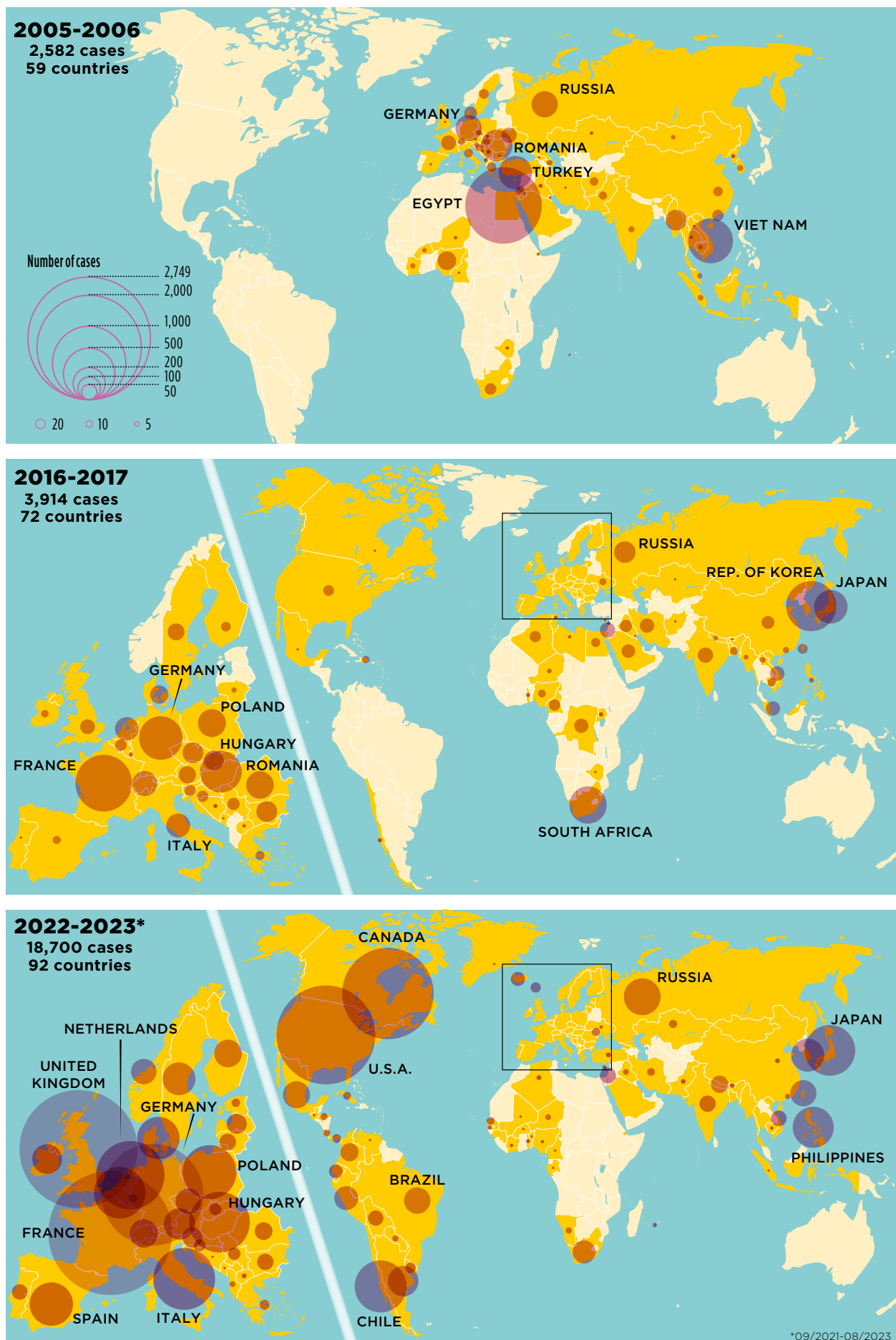
That said, since 1997 over 900 cases of human infection were reported for H5N1 and over 1,500 for H7N9 avian influenza viruses. Wild aquatic migratory birds from the Anatidae family are known to play a role in the emergence of new strains and the global spread of avian influenza viruses. Climate change has an impact on migratory patterns and thus on the occurrence of avian influenza outbreaks. Since 2021, the emergence of a new H5N1 strain caused a large number of cases in various wild bird species (including non-Anatidae birds) on all continents – even in South America, which was previously relatively free of avian influenza. This H5N1 strain also caused many cases in mammals, with viral transmission observed between mammals. In domestic animals, the most critical situation was the high number of outbreaks in cattle in the United States, with more than 130 infected dairy herds in 12 states identified in June 2024. A wide range of wild mammal species were also affected, with transmission between mammals suspected (e.g. within a sea lion colony in Peru). These cases highlight the potential zoonotic risk of this strain (Figure 2).



**Figure 1.** Timeline of major human influenza pandemics, illustrating their zoonotic origins and impact over the 20th and 21st centuries.

## References

- Adlhoch C., Fusaro A., Gonzales J.L., Kuiken T., Marangon S. *et al.* 2023. Avian influenza overview December 2022 – March 2023. *EFSA Journal*, 21(3), e07917. <https://doi.org/10.2903/j.efsa.2023.7917>
- Alexakis L., Fusaro A., Kuiken T., Mirinavičiūtė G., Ståhl K. *et al.* 2024. Avian influenza overview March – June 2024. *EFSA Journal*, 22(7), e8930. <https://doi.org/10.2903/j.efsa.2024.8930>



**Figure 2.** Global distribution of recent avian and swine influenza outbreaks, highlighting their spread and zoonotic risk.