



Dramatic re-emergence of avian influenza in Colombia and Latin America

ARTICLE INFO

Keywords

Preventive medicine public health
Highly pathogenic avian influenza virus
H5N1
Migratory bird
One health
Influenza A virus
Orthomyxovirus
Reemerging infectious diseases

Although SARS-CoV-2 infections have decreased, zoonotic epidemics remain in memory. Therefore, concerns about the possibility of another respiratory virus infecting us are understandable [1,2]. Currently, Highly Pathogenic Avian Influenza viruses (HPAIV) are of concern because they are part of the list of viruses that can potentially cause a pandemic, mainly due to their ability to infect humans and animal species [1]. HPAIVs belong to the *Orthomyxoviridae*; they are negative-sense single-stranded RNA viruses with segmented genomes. The Avian Influenza virus subtypes H5 and H7 are the most respiratory prevalent and can become HPAIV. Wild waterfowl are considered their natural reservoir [2].

Since 2004, a total of 874 human cases of avian influenza A(H5N1) have been reported in 23 countries, and 458 people have died, with a fatality rate of 52.4% [3]. In 2015, the first HPAIV H5N1 clade 2.3.4.4b detections were reported in the USA. However, in December 2021 in North America (Canada), the 6-year epidemiological silence was interrupted, and the H5N1 virus reemerged. Due to the migrations of infected birds and the pathogenicity of the virus, it has spread from Alaska, Canada, the United States, and Central and South America. The virus has been detected in more than 59 million wild birds and commercial farms. Genetic sequencing and RT-PCR tests show these viruses belong to the H5N1 clade 2.3.4.4 [1,2]. Between 2023 and February 2024, several human cases were reported: 1 in Ecuador (2.3.4.4b), 1 in Chile (2.3.4.4b), 1 in China (2.3.4.4b), 4 in the United Kingdom (2.3.4.4b) 9 in Cambodia (2.3.2.1c) [1,3].

The Latin American tropics are the favorite destination for birds from the cold Northern Hemisphere. The Caribbean regions of Colombia and Venezuela are the first stop points for birds' migration to start the journey to the south. Colombia, Panama, and Venezuela are the gateway to South America. The routes of migratory birds pass along the great rivers of Colombia, the Magdalena (1,525 km), the Cauca (965 km), Atrato (750 km), Sinu (415 km) and many lakes along the rivers [4]. The Colombian Agricultural Institute (ICA) declared a health emergency with the World Organization for Animal Health in October 2022 [5]. The first outbreak in South America was in Colombia on October 18, 2022, in

Acandí, department of Chocó, close to the border with Panama. Between 2022 and February 2024 in Colombia, there was an increase in avian influenza outbreaks, with 66 cases, 60 in backyard birds, 6 outbreaks in wild birds, and 740 notifications (Fig. 1) [3,5,6]. To date, there are no outbreaks detected in commercial poultry farms. Between February and March 2023, two outbreaks occurred in wild birds in southern Colombia in the departments of Cauca and Nariño, bordering Ecuador. The outbreak in the Department of Cauca affected 1,600 birds; this has been the focus with the highest number of infected birds. In addition to the economic impact on inhabitants who use backyard birds for consumption, possible ecosystem imbalances could be generated due to declines in avian species [1]. The risk of transmission to humans is high, and the jump between species in a country with one of the most incredible biodiversity in the world is latent [3–5]. In November 2023, in Nariño (near Ecuador's border), the last outbreak of H5N1 was reported by ICA.

The role of bird migration worldwide is essential for surveillance of the transmission of *Orthomyxoviridae* respiratory viruses [1,3]. At the end of 2021, in Canada, the H5N1 virus spread to the U.S. and later to Central America and South America following the routes of migratory birds (Table 1, Fig. 1) [3,6,7]. This migration led to the beginning of Latin America's HPAIV outbreaks between 2022 and 2023. The migration agrees with the periods where HPAIV outbreaks were detected in Colombia [5,6]. In 2023, studies in Peru suggest that H5N1 killed more than 300,000 wild birds in different protected natural parks [7]. Despite reports throughout America, asymptomatic infections in migratory and wild birds remain unknown, which could hide more cases and viral dissemination [1].

Genomic surveillance of HPAIV in South America is essential [6], especially in countries like Colombia that provide comfortable bird stopovers during migrations [4,5]. Person-to-person transmission of H5N1 has yet to be reported in Colombia, as in Ecuador and Chile [3,6]. However, the transmission between mink with H5N1 clade 2.3.4.4b occurred in Spain, in seals in the U.S. in June 2023, and in Peru in sea lions is worrying. The involvement of these mammals warns about possible recombination of the viral genome, which could increase the

<https://doi.org/10.1016/j.tmaid.2024.102711>

Received 6 November 2023; Received in revised form 2 March 2024; Accepted 5 March 2024

Available online 6 March 2024

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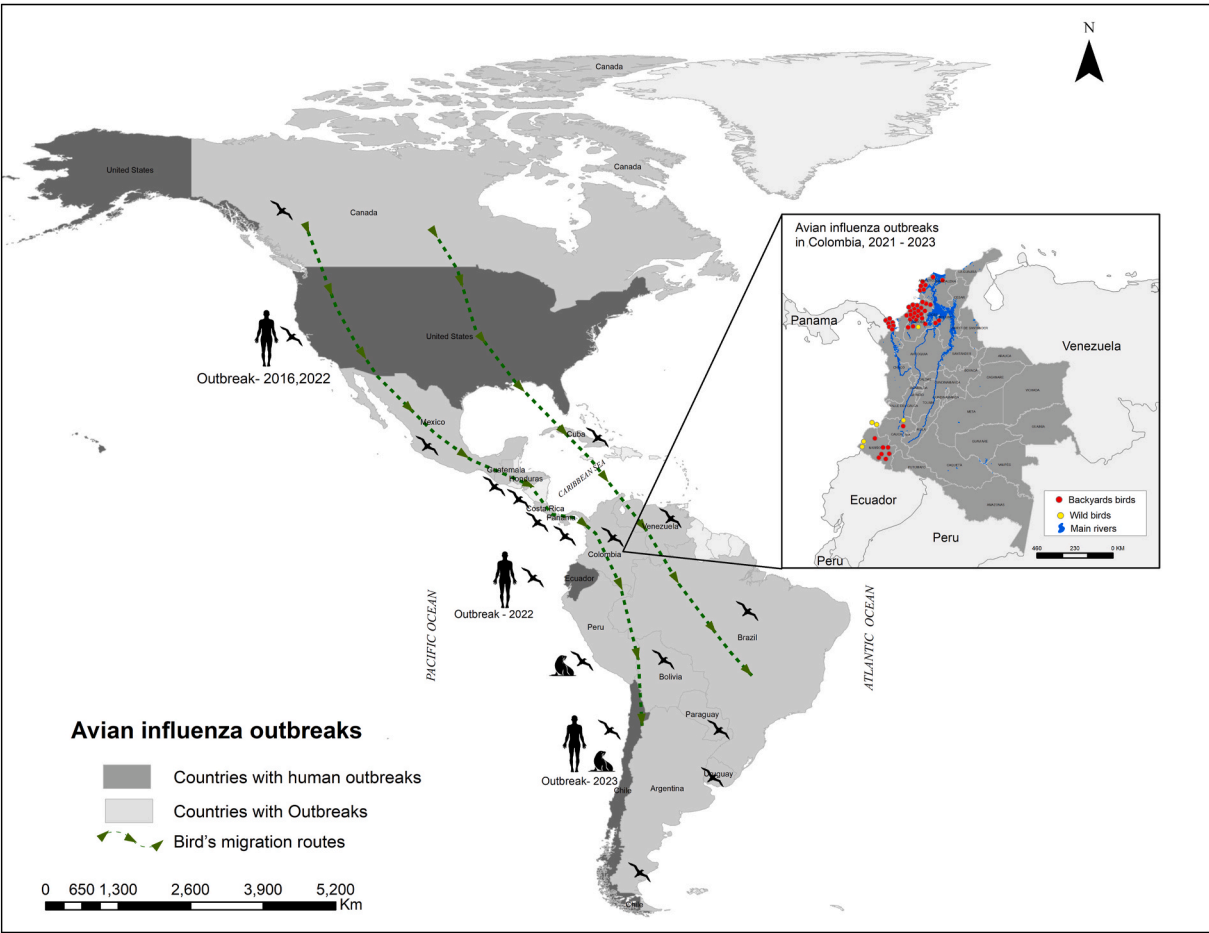


Fig. 1. Outbreaks of avian influenza H5N1 in birds and humans in the Americas, 2021–2024.

Table 1
Chronologic outbreaks of first cases of avian influenza H5N1 in the Americas, 2021–2024.

Country	Area that reported the first case/ Date	Animals affected
Canadá	Newfoundland, and Labrador/ December 2021	Backyard, poultry, and wild birds/mammals
EE. UU ^a	South Carolina, and North Carolina/ January 2022	Backyard, poultry, and wild birds/mammals
México	Estado de México/October 2022	Poultry, and wild birds
Colombia	Chocó/October 2022	Backyard, and wild birds
Perú	Piura/November 2022	Backyard, poultry, and wild birds/mammals
Venezuela	Anzoátegui/November 2022	Wild birds
Ecuador ^a	Cotopaxi/November 2022	Poultry, and wild birds
Chile ^a	Antofagasta/December 2022	Backyard poultry, and wild birds/mammals
Panamá	Ciudad de Panamá/December 2022	Backyard, and wild birds
Honduras	Atlántida/January 2023	Wild birds
Cuba	La Habana/February 2023	Wild birds
Guatemala	Izabal/February 2023	Wild birds
Uruguay	Maldonado/February 2023	Backyard, and wild birds/ mammals
Argentina	Jujuy/February 2023	Backyard, poultry and wild birds
Costa Rica	Guanacaste/February 2023	Wild birds
Bolivia	Cochabamba/February 2023	Backyard poultry, and wild birds
Brasil	Espírito Santo/May 2023	Backyard, and wild birds
Paraguay	Boquerón/May 2023	Backyard birds

^a Human cases reported with H5N1 clade 2.3.4.4b.

risks of a possible pandemic [3,7]. In Peru, the dramatic and excessive mortality of sea lions (*O. flavescens*) is unprecedented; more than 6,000 dead animals were found, and it is estimated that the reemerging virus killed 5% of the sea lion population in that wild area on an island protected [7].

While the world is still grappling with the COVID-19 pandemic caused by the zoonotic transmission of a virus from animals to humans, concerns are growing about the possibility of another pandemic virus taking hold [2,6,7]. Global surveillance of influenza A viruses from the perspective of healthy animals, people, and their influence on ecosystems is essential for preparation and response to a potential pandemic. It is crucial, then, that research focuses on the design of future vaccines so that we are not surprised by another respiratory virus, as with coronaviruses.

Funding

No funds were obtained for this research.

CRediT authorship contribution statement

Daniela Paternina: Methodology, Writing – original draft, Writing – review & editing. **Rene Herazo:** Data curation, Formal analysis. **Misael Oviedo:** Data curation, Formal analysis. **Salim Mattar:** Investigation, Visualization, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial

interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

To Yeimi Fernanda Lopez, who made a great migration map. To the University of Cordoba.

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