

# WHY ENVIRONMENTAL SURVEILLANCE FOR AVIAN INFLUENZA IS VITAL

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Lacking: In India, there is no active surveillance for avian influenza virus in poultry birds.

The world's largest northern gannet colony at the Bass Rock, an island off the coast of North Berwick, Scotland has been recently decimated by avian influenza (H5N1) or bird flu. H5N1 has caused unprecedented loss of tens of thousands of birds in the U.K. The annual congregations on breeding grounds quickly turned into a super-spreader event as highly pathogenic H5N1 ripped through bird colonies, leaving many lying dead on the beaches or remote islands.

The impact of this disease is very serious for bird conservationists. From epidemiological perspective, transmission from dead birds to scavenging animals such as sea lions, foxes, and gulls has posed serious risks. Recently, intra-mammal transmission of H5N1 in captivity in mink farms was recorded, posing a bigger concern in relation to zoonotic potential.

In India, the latest major avian flu outbreak in 2020-2021 swept through many States causing mass mortality of wild birds which brought the concerns on the lack of active surveillance to the forefront, and how wetland and waterfowl habitats at the interface of poultry need to be monitored. India is a major wintering ground for many waterfowl that rely on the central Asian Flyway.

While the avian flu outbreaks coincide with the peak migratory season leading to post-outbreak surveillance and culling, there are also reports of outbreaks in the off-season suggesting endemic transmission within the poultry sector. India is the fastest growing egg producer in the world, but unlike in Europe, poultry birds here are not vaccinated against flu. Furthermore, the farms with a diversity of animals or in the vicinity of nearby wetlands increases the potential for the viruses to undergo reassortment that can potentially generate more virulent strains — H5N1 or H7N9 — which could then infect humans.

Despite this potential, there is no active surveillance in the poultry sector. There may be no efficient human-to-human transmission mechanism yet, however, the risk cannot be ruled out as the virus continues to evolve.

We need an active and passive year-round surveillance network under One Health which connects monitoring of human and animals in a shared environment.

Wastewater-based epidemiology or pathogen surveillance has become an integral component of environmental surveillance providing near real-time information on health and community exposure to pathogens. While environmental surveillance is not a new concept and has been used widely for monitoring several pathogens, it offers an excellent tool.

Birds infected with avian influenza virus shed large quantities of virus in their faeces, saliva and nasal secretions for about a week. Wild aquatic birds in the Orders *Anseriformes* and *Charadriiformes* are the primordial reservoir for the virus. The transmission of the virus within these wild bird populations is dependent on faecal/oral transmission via contaminated water.

Avian influenza viruses have been isolated from unconcentrated water in lakes in the U.S., Canada and China. Recurrent infections of animal hosts with the virus have posed a persistent threat. Having a large-scale influenza A virus surveillance network in place across multiple sites is crucial for improving our understanding on the diversity, seasonal and geographical distributions of the virus in environments associated with poultry and wild birds. The surveillance needs to target the locations where spillover is most likely.

Avian influenza viruses can remain viable for extended periods of time in surface water and carcasses, suggesting that lakes and wetlands can act as environmental reservoirs at variable temperatures for several months. In a study in Hong Kong, an H3N2 virus was isolated from faeces and pond water every month during a one-year period, and the maintenance of this virus was proposed to be dependent on environmental persistence and the continued introduction of susceptible ducklings.

Domestic ducks are recognised as an important reservoir for H5N1. Environmental surveillance is an important area that can enhance the information on prevalence diversity of avian influenza viruses in free-ranging domestic flocks or under confinement conditions where faeces or other effluent are deposited into the environment.

Currently, virus surveillance is reactive and relies on sampling dead birds. Environmental surveillance would be a great non-invasive tool that can be done without disturbing the birds and can be used to obtain both host and viral genetic material.

Most importantly, environmental surveillance should be complemented with effective carcass collection and testing, and better biosecurity on poultry farms to improve preparedness and response in the future.

( *Farah Ishtiaq is a scientist at the Tata Institute for Genetics and Society, Bengaluru*)

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