

Proactive surveillance for avian influenza H5N1 and other priority pathogens at mass gathering events



Recurring mass gatherings at religious, sporting, or festival events have historically been the focus and sources of infectious disease transmissions¹ since they serve as hubs for international spread. Advanced planning, risk assessment, and updates on guidance to countries hosting the event, and to those from which the attendees arise, are crucial for reducing risk, prevention, surveillance, and outbreak response.^{2,3} Preventing outbreaks of influenza has always been on the radar of WHO⁴ and of countries hosting mass gathering events.⁵⁻⁷ In 2004, the emergence of the novel Highly Pathogenic Avian Influenza (HPAI) virus, A(H5N1), had focused attention of Saudi Arabia's government and of WHO because of the nearly 1.6 million pilgrims from across the world expected for the annual Hajj pilgrimage at the time.⁵ Fortunately, there have been no major outbreaks from any mass gathering events.

Most of the human avian influenza cases reported worldwide to date, have been avian influenza A(H7N9), A(H5N1), and A(H5N6) viruses.^{4,8} Although these viruses do not currently transmit easily from person to person, the recent (April, 2024) reports of mild or asymptomatic human cases of A(H5N1)⁸⁻¹⁰ infections detected in the USA, China, Viet Nam, and Europe should be taken seriously by countries preparing to host mass gatherings at religious, festival, and sporting events. The first human case of influenza A(H5N1) in the USA was reported in 2022 in a person in Colorado who had direct exposure to poultry.⁹ In England, UK, there have been 298 cases reported since October, 2021, with four cases since October, 2023.¹⁰ The widespread circulation of HPAI viruses in millions of birds has been driving rapid diversification with emergence of different genotypes and reassortment events. Although circulating avian influenza viruses continue to prefer avian-type receptors, sporadic mutations are being detected in infected wild birds and domestic poultry, associated with onward transmission to mammals.¹¹

Public health preparedness and careful planning and surveillance before and during mass gathering events remain important for preventing major outbreaks, interruption of the events, or onward transmission globally after the event. Evidence of this preparedness

comes from no adverse outcomes of mass gatherings at religious events held over the past decade during WHO's public health emergency of international concern of Zika virus disease, Ebola virus disease, and COVID-19 for Hajj (2015-23) and Kumbh Mela (2015, 2017, 2023). Similarly, during mass gathering sporting events, such as the Tokyo 2022-2023 Olympics, during the COVID-19 pandemic; the 2015 Africa Cup of Nations Football tournament in Equatorial Guinea during the outbreak of Ebola virus disease; and the Rio 2016 Olympics during the Zika virus outbreak.

Proactive detection and surveillance programmes need to be incorporated using the latest diagnostic platforms for the whole range of viral and bacterial pathogens (panel). The shared risk for preventing spread of zoonotic pathogens and antimicrobial resistance should be addressed jointly through a One Health approach by countries hosting mass gathering events in liaison with the quadripartite alliance of the UN Food and Agriculture Organization, the UN Environment Programme, WHO, and the World Organisation for Animal Health.

Mass gathering events provide several opportunities to identify current risks and mitigate the transmission of HPAI H5N1. The actual burden of HPAI in the animal and human populations globally is unknown due to a lack of active surveillance. The mode of transmission of HPAI H5N1 from different animal groups and risk to humans is not fully understood. Several knowledge gaps on H5N1 need to be filled and mass gathering events provide opportunities to address them. Because many animal products are consumed at mass gathering events and some religious rituals require live animal sacrifice, extensive screening and testing for HPAI H5N1 of poultry, the meat industry, and sacrificial animals, both local and imported, should be mandated and monitored. Currently, not enough testing is being done by countries across the globe. Standardised protocols need to be put in place for wastewater surveillance for detection of HPAI at any mass gathering events. Animals used at religious mass gathering events for sacrifice or consumption need to randomly be sampled and tested. Imported animals should be screened at the

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Panel: Growing list of viral and bacterial pathogens with epidemic potential of concern at 2024 mass gathering events

Viral pathogens

WHO Blueprint Priority pathogens list

- Crimean–Congo haemorrhagic fever virus
- Ebola virus
- Marburg virus
- Lassa fever virus
- MERS-CoV
- SARS-CoV
- SARS-CoV-2
- Nipah virus and henipaviruses
- Rift Valley fever virus
- Zika virus
- Monkeypox virus

Other re-emerging viruses of concern

- Highly pathogenic avian Influenza virus (H5N1)
- HIV (antiretroviral resistant strains)
- Non-polio enteroviruses (EV-71, EV-68)
- Influenza A and variants
- Dengue virus
- Yellow fever virus
- Rabies virus
- Equine encephalitis virus
- Other

Bacterial pathogens

WHO priority AMR pathogens list

Critical priority

- *Acinetobacter baumannii* (carbapenem-resistant)
- *Pseudomonas aeruginosa* (carbapenem-resistant)
- Enterobacteriaceae (carbapenem-resistant, ESBL-producing)
- *Mycobacterium tuberculosis* (multidrug-resistant, extensively drug-resistant, and totally drug-resistant)

High priority

- *Enterococcus faecium* (vancomycin-resistant)
- *Staphylococcus aureus* (meticillin-resistant, vancomycin-intermediate, and vancomycin-resistant)
- *Helicobacter pylori* (clarithromycin-resistant)
- *Campylobacter* spp (fluoroquinolone-resistant)
- *Salmonellae* spp (*Typhi* and non-typhoidal; fluoroquinolone-resistant)
- *Neisseria gonorrhoeae* (penicillin-resistant, cephalosporin-resistant, and fluoroquinolone-resistant)

Medium priority

- *Streptococcus pneumoniae* (penicillin non-susceptible)
- *Haemophilus influenzae* (ampicillin-resistant, azithromycin-resistant, ceftriaxone-resistant)
- *Shigella* spp (fluoroquinolone-resistant)
- *Bordetella pertussis* (macrolide-resistant)
- *Vibrio cholerae* (resistant to ampicillin, nalidixic, chloramphenicol, and tetracycline)

source or on arrival, and quarantined if tested positive to prevent spread to humans and other animals. Ultimately, the development, advancement, and scaling up of the production of a vaccine for human A(H5N1) and its variants will be crucial for preventing spread at mass gathering events.

Mass gatherings offers an opportunity to collect evidence on H5N1. Any findings could be eye-opening, particularly if H5N1 is widely present in animals given the apparently lack of human infection.

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