Food and Agriculture Organization of the United Nations

World Organisation for Animal Health

Global Strategy for the Prevention and Control of High Pathogenicity Avian Influenza (2024–2033)

Achieving sustainable, resilient poultry production systems

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The following categories of stakeholders were consulted and had the opportunity to provide suggestions and comments: WOAH delegates representing national veterinary services; FAO national contact points; representatives from regional economic communities, partner organizations from the private sector, and industry associations involved in the production of poultry and the provision of animal health services including veterinary products; representatives from the Quadripartite partner organizations (World Health Organization [WHO] and United Nations Environment Programme [UNEP]) and the Convention on the Conservation of Migratory Species of Wild Animals (CMS); experts from international reference laboratories; WOAH/FAO Network of Expertise on Animal Influenza (OFFLU) members, members of the WOAH Scientific Commission for Animal Diseases and Working Group on Wildlife; members of the GF-TADs global and regional steering committees and the Partnership and Financing Panel (PFP); and experts and officials from FAO and WOAH at the headquarters, regional and national levels.

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Abbreviations

FAO	Food and Agriculture Organization of the United Nations
FAO-PMP-TAB	The FAO Progressive Management Pathway for Terrestrial Animal Biosecurity
GF-TADs	Global Framework for the Progressive Control of Transboundary Animal Diseases
GSC	Global Steering Committee (of GF-TADs)
HPAI	high pathogenicity avian influenza
LMIC	low- and middle-income countries
LPAI	low pathogenicity avian influenza
MEL	monitoring, evaluation and learning
OFFLU	WOAH-FAO Network of Expertise on Animal Influenza
RSCs	Regional Steering Committees (of GF-TADs)
STAR-IDAZ	Global Strategic Alliances for the Coordination of Research on the Major Infectious Diseases of Animals and Zoonoses
TAD	transboundary animal disease
TAHC	Terrestrial Animal Health Code (WOAH)
UNEP	United Nations Environment Programme
WAHIS	World Animal Health Information System
WHO	World Health Organization
WOAH	World Organisation for Animal Health (founded as OIE)

Executive summary

In response to the global ecological and epidemiological changes and repeated intercontinental spread of the H5Nx goose/Guangdong (Gs/GD) lineage high pathogenicity avian influenza (HPAI), the Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (WOAH), under the Global Framework for the Progressive Control of Transboundary Animal Diseases (GF-TADs), have drafted a ten-year global strategy for the prevention and control of high pathogenicity avian influenza (2024–2033).
This replaces the strategy published in 2008 in response to the initial emergence of the H5N1 Gs/GD lineage in Asia. The revised strategy emphasizes a systems approach to contextualize the threat of HPAI against the backdrop of other global concerns. The vision is a world with effective HPAI prevention and control along poultry value chains that supports the protection of domestic animals, wildlife, the environment and humans, and aligns with the sustainable transformation of agrifood systems.
Thus, there is a strong focus on the One Health approach to ensure integrated collaboration between the agriculture, public health and environmental sectors.
It promotes multistakeholder inclusion and the development of public-private partnerships. It encourages the use of both established and innovative means of protecting poultry value chains to reduce the burden of infections and losses. The strategy provides a framework for global and regional coordination to support countries in the effective implementation of national plans that reflect the evolution of the disease and new scientific advances in prevention and control, adapted to their specific context.

An overview of the strategy, including actions to achieve the vision at the global, regional and national levels, can be found at http://www.gf-tads.org/hpai/hpai/en/.
Further, regularly updated guidance and orientation to support implementation will also be provided on this site.

Global Strategy for the Prevention and Control of High Pathogenicity Avian Influenza (2024–2033)

A REVISED GLOBAL STRATEGY TO ADDRESS A CHANGING CONTEXT AND CHALLENGES

High pathogenicity avian influenza (HPAI) is a serious, high-impact transboundary zoonotic disease at the human-animal-environment interface that threatens animal and public health, economies, livelihoods, agricultural productivity and ecosystems.

In 2008, the Global Strategy for the Prevention and Control of H5N1 Highly Pathogenic Avian Influenza was developed under the Global Framework for the Progressive Control of Transboundary Animal Diseases (GF-TADs) to address the issue of emerging H5N1 Goose/Guangdong (Gs/GD) Eurasian lineage HPAI.[1] Since then, valuable advances in overarching avian influenza prevention and control processes have been developed and applied in emergency management, diagnostics, vaccines and vaccination, biosecurity measures, communication, data management, risk assessment, monitoring and surveillance systems, outbreak investigation, and systems-based approaches such as value chain analysis.[2, 3, 4] Since 2008, 15 HPAI viruses have emerged from H5 or H7 low pathogenicity avian influenza (LPAI) in poultry. These HPAI viruses have been eradicated because of these advances in prevention and control processes focused on rapid detection, movement controls, depopulation, indemnities and compensation, environmentally sound carcass disposal, and cleaning and disinfection. These processes will continue to be the foundation of HPAI prevention and control programmes, especially for high-income countries.[4] More details on the virological scope of the strategy can be found in Annex 3.

However, over the same time period, some HPAI viruses have evaded the advanced processes, evolving biologically and expanding geographically to become three well-entrenched viral lineages (the H5Nx 2.3 clade and subclades of the Gs/GD virus lineage, the H7N9 Eurasian virus lineage and the H7N3 North American virus lineage). Some countries and regions have enzootic infections of poultry, other domestic birds and wild birds, including by more than one HPAI lineage, which threaten to produce negative long-term global impacts on agricultural food systems, economies, the environment and the health of humans, domestic animals and wildlife.

Since 2020, further changes in H5 Gs/GD HPAI epidemiology and ecology have occurred with the emergence of the H5N1 2.3.4.4b clade viruses, which have spread along short- and long-distance migratory bird pathways and flyways across broad geographic areas of Asia, Europe and Africa, and extending into North America during 2021, Central and South America during 2022, and the Antarctic mainland in February 2024.[5, 6] This has resulted in severe infection with disease and death in domestic, captive and wild birds and mammals, including major die-offs in seabird and sea mammal colonies and disease and deaths among endangered species. Virus spread among and by some sea mammals has been documented.[7] Outbreaks have been reported on fur animal farms (mink, foxes, sable and raccoon dogs) and in dairy cows, goats and alpacas, and infections have been reported in some domestic pets (dogs and cats).[8, 9, 10] The virus has been transmitted to poultry leading to unprecedented levels of ongoing outbreaks that have exceeded all prior disease metrics and negative economic and welfare indicators for poultry and other domestic birds.[11, 12] Furthermore, the trend of intensification of poultry production systems and increased global movement of poultry-associated items[13] will further increase the risk to poultry production and health and food security. The bidirectional spread of H5 Gs/GD lineage HPAI at the poultry–wildlife interface, especially between range-reared domestic ducks and wild waterfowl, has become one of the most critical control points to limit further emergence of new clades and genotypes of Gs/GD lineage HPAI.[14] In addition, sporadic human cases of H5N1 2.3.4.4b and H5N6 2.3.2.1c clades of HPAI have been reported, predominately in association with exposure to infected domestic birds and a few cases with exposure to infected wild birds, livestock and pets, indicating a continuing pandemic potential.[15, 16]

With such a changing context, the 2008 control strategy and programmes and their positive achievements have been outpaced by the changes in the new global HPAI situation. Thus, a revised strategy is required to: 1) contextualize the threat of HPAI using a systems approach against the backdrop of other global concerns; and 2) design and implement a more practical, holistic method to tackle the disease at the country level with the

support of a global and regional coordination framework. It is recognized that different countries have different HPAI statuses and that these statuses are continually changing, with some countries being disease free, others with isolated or extensive outbreaks, and others with endemic HPAI virus circulation in poultry, wild birds or mammals. Therefore, an assessment of the new situation and a tailored approach to meet the needs of countries are required to prevent the spread of HPAI, protect poultry, farmed mammals, wildlife and people from infection, and transform current practices to ensure resilient, safe and sustainable poultry value chains.

These concerns have been discussed in many international meetings, including at the FAO Global Consultation on HPAI, Rome, 2–4 May 2023[2] and the ninetieth General Session of the WOAH, Paris, 21–25 May 2023, where a revised global HPAI control strategy was formally requested by the 183 Members of the WOAH.[3]

The revised strategy has been informed by evidence provided through 1) regional and subregional virtual consultations, reports and documents; 2) an online survey; 3) reports and documents from the Regional GF-TADs Standing Group of Experts, regional economic communities and other regional organizations; and 4) recommendations on avian influenza prevention and control from both FAO and WOAH global meetings in 2023. The importance of adopting a One Health approach for the control of HPAI has been highlighted in a range of global strategies and guidelines, including the WHO Global Influenza Strategy 2019–2030[15] and the statement from the Scientific Task Force on Avian Influenza and Wild Birds.[17] This revised 10-year strategy, with a mid-term review, concentrates on preventative and control strategies and presents clearly defined objectives, activities and achievable short-, medium- and long-term goals at the global, regional/subregional and national levels. To be successful, activities must be strongly focused and targeted, based on One Health with multi-organization input and have cross-sectoral buy-in.

Vision statement

A world with effective HPAI prevention and control along poultry value chains that supports protection of humans, animals and the environment and aligns with the sustainable transformation of poultry and livestock agrifood systems.

Goal

To substantially and sustainably reduce the impacts of HPAI on poultry, improve the resilience of poultry agrifood systems, safeguard ecosystems, and protect animal and human health.

Scope of the global strategy

This global strategy addresses the prevention, detection and control of HPAI, especially H5 2.3.4.4b and other clades of Gs/GD lineage, that affects poultry, wild birds and other domestic and captive birds and spills over to humans, livestock and wild mammals. Some aspects of the strategy can be used to prevent and control other H5 and H7 HPAI and zoonotic LPAI, such as H9N2, in poultry where measures can significantly reduce the disease burden. Broader application of the strategy can be more limited in wildlife, livestock and human health depending on the avian influenza subtype and pathotype (see Annex 3).

Therefore, the strategy covers the domestic animal health sector component of a wider One Health approach to the prevention and control of HPAI and complements other strategies such as strategies for the human health sector, the WHO Global Influenza Strategy 2019–2030,[14] strategies for the environmental sector including wildlife health, and the July 2023 statement of the Scientific Task Force on Avian Influenza and Wild Birds.[16]

PRIMARY TARGET AUDIENCE

The primary target audience of this strategy includes national veterinary services; wildlife, environment and public health services including laboratories; relevant national One Health partners and sectors; international and regional organizations; economic communities; the private sector; research and educational institutions; and civil society organizations involved in animal health, production and value chains, and zoonotic disease prevention and control.

DURATION OF THE STRATEGY

The strategy covers a 10-year period, i.e. 2024–2033, with a mid-term review to evaluate and update the strategy.

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Theory of change

OVERVIEW OF THE THEORY OF CHANGE

The strategy's theory of change identifies three objectives in the "sphere of interest" that are interlinked and necessary to achieve the goal of substantially reducing the impact of HPAI on poultry and other domestic animals, improving the resilience of agrifood systems, and protecting wildlife and human health (Figure 1).

The objectives are:

1. **Prevent** HPAI epizootics, panzootics and negative impacts on human health and ecosystems through multisectoral early detection and control;
2. **Protect** poultry value chains, livelihoods, trade, and the health of humans, animals and ecosystems from HPAI impacts; and
3. **Transform** poultry value chains to improve resilience to HPAI and other disease threats.

The objectives align with the key themes of the strategy: prevent, protect and transform.

- **Prevent** is focused on strengthening systems and capacities to ensure timely detection and information sharing to inform risk assessment and risk management decisions. It advocates for optimizing the One Health approach to ensure timely data are gathered on domestic birds, other domestic animals, wildlife and potential human cases to identify upstream drivers for spillover and spillback of HPAI, as well as rapid, coordinated intersectoral responses.
- **Protect** emphasizes actions to protect poultry from HPAI infection through strengthening the use of effective tools such as biosecurity, proper vaccination, zoning and compartmentalization. Improving protection of poultry along value chains is required to safeguard livelihoods and trade, and will also reduce virus circulation and its negative impacts on other domestic animals, wildlife, humans and ecosystems.
- **Transform** reflects a broader vision to ensure viable, safe poultry production that meets future market and animal welfare demands and is resilient to disease threats and a changing climate. This includes changing practices and policies by building partnerships and networks, sharing knowledge to support poultry farmers and traders in all contexts, strengthening public and private veterinary services, and supporting targeted research to provide cost-effective interventions.

Each objective is accompanied by outcomes that are within the "sphere of influence" and will require actions and commitments from multiple partners and stakeholders.

For each objective, outputs are described as activities that will contribute to those outputs. It is important to note these are not exhaustive lists, but examples of activities that could be performed within the "sphere of control" under the governance of the strategy. Outputs may contribute to multiple outcomes, as the outcomes and objectives are interlinked.

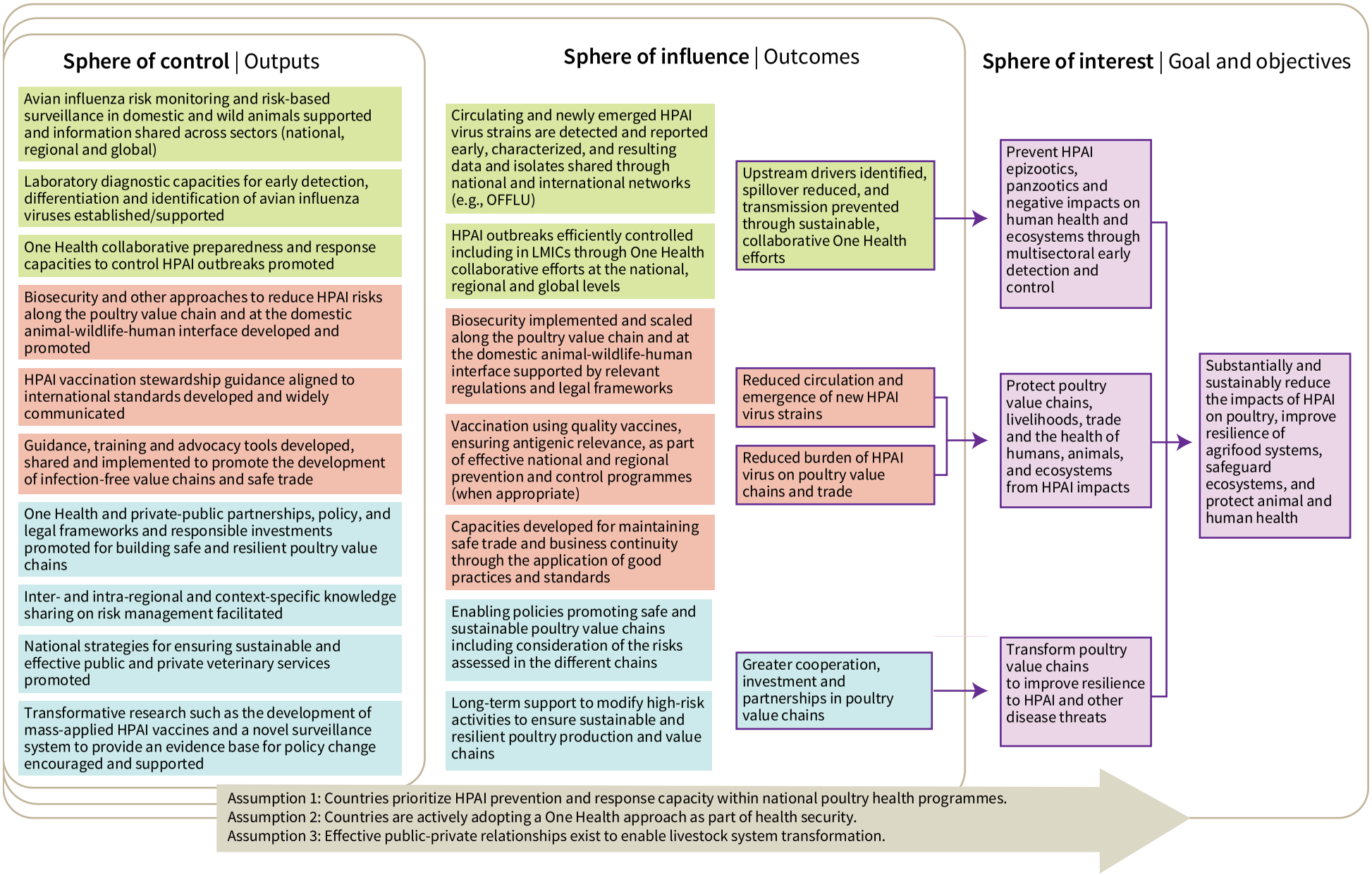
Assumptions are included to clarify areas in which other partners or stakeholders will need to contribute to achieve the objectives and conditions for success.

NARRATIVE FOR THEORY OF CHANGE

Objective 1: Prevent HPAI epizootics, panzootics and negative impacts on human health and ecosystems through multisectoral early detection and control

Using a One Health approach to prevent, detect early and rapidly respond is key to reducing the devastating impacts of HPAI outbreaks in domestic and wild animals, and to preventing virus spillover/spillback to wild animals and humans. It is essential, even where detection and response capacities are limited, to prepare for incursions and the spread of HPAI before significant poultry and other animal losses appear and become more difficult to manage. Laboratory capacity is needed to ensure accurate diagnosis in multiple species. The systematic assessment of risks at the interface between poultry, wild birds and mammals can help identify settings and risk mitigation measures that may help prevent interaction and spillover. The first line of defence to address HPAI threats is to prevent exposure and the spread of HPAI viruses at the interface of wildlife and domestic birds; in both large-scale, intensive farming systems and small-scale systems; and to prevent the introduction and spread of HPAI viruses through the movement of infected animals, fomites and other pathways.

FIGURE 1. Global Strategy for the Prevention and Control of High Pathogenicity Avian Influenza (2024–2033): Achieving sustainable, resilient poultry production systems



Source: Adapted from **FAO, WOAH.** 2024. *Global Strategy for the Prevention and Control of Highly Pathogenic Avian Influenza (2024–2033)*. In brief. Rome, FAO.

ASSUMPTIONS	Countries have identified HPAI as a priority TAD in their national priority animal and zoonotic diseases programme; benefit from investment; build strong HPAI prevention and risk-based surveillance systems; and have appropriate response capacities under a One Health approach.
RISKS	HPAI is not a priority and is not included in national animal disease control strategies, or available funding is insufficient to build and maintain capacities to prevent, detect and respond to threats in a timely manner.
APPROACH	HPAI can be used as a model for building One Health collaborations and integrated risk-based surveillance and response systems for HPAI and other diseases and threats. Capacity is strengthened within the framework of One Health collaboration. These efforts are supported through advocacy to mobilize national resources and foster investment.

Output 1.1: Avian influenza risk monitoring and risk-based surveillance in domestic and wild animals supported and information shared across sectors at the national, regional and global levels

Weak surveillance leads to late detection of virus circulation and increased risk of epizootics or endemicity of HPAI viruses. Thus, improved capacities to detect circulation of avian influenza viruses early will enable the use of surveillance and epidemiological data to support risk management. In addition, countries' transparency in reporting disease events and sharing related data support safe trade and will help the mobilization of national, regional and international support. Given the role of wild animals in the spread of H5 Gs/GD lineage HPAI globally and the risks of virus spread to humans and other mammals, integrated One Health approaches for risk-based surveillance, prevention and response are required to address the threats. Epidemiological surveillance of diseases in wildlife should be integrated into wildlife management and conservation systems.

Activities:

- Improve avian influenza risk-based surveillance systems for domestic and wild animals and include testing of diagnostic samples for avian influenza virus or antibodies in avian and mammalian species where relevant.
- Support mechanisms for timely, transparent reporting of HPAI from all domestic animals and wildlife to WOAH (WAHIS), and information exchange on HPAI virus detection, disease events and related data.
- Foster interregional collaboration to enhance early warning and early detection of HPAI along wild bird pathways and flyways, poultry trading pathways and other relevant contexts to raise awareness of disease hot spots and risks to poultry value chains, other domestic animals, and at-risk wild species.
- Maintain and strengthen global avian influenza surveillance including genomic surveillance and early warning tools, platforms and standards to detect mutations and reassortments in avian influenza viruses and inform evidence-based guidance to mitigate spillover at the human–animal–environment interface.
- Advocate for the integration of HPAI prevention and control into regional and national priority animal health programmes, especially in low- and middle-income countries (LMICs).

Output 1.2: Laboratory diagnostic capacities for early detection, differentiation and identification of avian influenza viruses established and supported

Sufficient laboratory diagnostic capabilities to rapidly detect circulating avian influenza viruses and share virological information are essential for the prevention and rapid control of HPAI infections. In LMICs, the limited resources dedicated to diagnostic laboratories hinder early detection and response leading to increased risk of epizootics or enzootic infections. Addressing diagnostic capacity gaps in each region, including appropriate access to laboratory-based and pen-side tests, is important for identifying infections globally and assessing the efficiency of response measures, as the virus continues to mutate and spread through various pathways, including intercontinental wild bird flyways. This is particularly important when vaccination is practised and to substantiate disease-free status.

Activities:

- Identify and address regional and national gaps in diagnostic capacity, including in molecular diagnosis and analysis, and in knowledge on genetic variations and evolution of avian influenza viruses and cross-species transmission and reservoirs.
- Promote and facilitate the implementation of the laboratory quality management system under ISO 17025 and capacities for maintenance and calibration of laboratory equipment.
- Develop plans for building capacity in molecular diagnosis, especially in LMICs, and support laboratory networks at the national, regional and

international levels, including WOAH and FAO avian influenza reference laboratories/centres and collaborating centres, and academic and governmental research institutions.

- Promote information and virus data sharing at the national level among key One Health stakeholders and through international scientific coordination and cooperation among WOAH and FAO Reference Laboratories, research institutions and academic partners, led by OFFLU.

Output 1.3: One Health collaborative preparedness and response capacities to control HPAI outbreaks promoted

Sustainable One Health collaboration is essential to achieve a coordinated, rapid and efficient response to prevent and decrease production losses, support animal welfare, maintain wildlife biodiversity and prevent infections in humans. There is an opportunity to build on existing multidisciplinary, multisectoral and multistakeholder collaborations, intraregional and interregional cooperation, and collaborative response capacities to control HPAI outbreaks, including in LMICs.

Activities:

- Facilitate multidisciplinary, multisectoral and multistakeholder One Health collaborations for preventing and responding to HPAI events at the national, regional and global level and ensuring a common understanding of roles, responsibilities, applicable legal frameworks and governance during a response.
- Support the development of documented intersectoral disease control and operational plans and exercises as key components of national emergency management plans.
- Develop multisectoral guidance for HPAI contingency planning including the safe management of mass mortality events in domestic birds, wild birds and mammals. This guidance should be developed with representatives from all relevant sectors (environment, agriculture, public health and security services) and stakeholders (e.g., ornithologists, hunters' associations and associations related to sporting birds and game farming). This should be accompanied by advocacy for the provision of emergency funds to help the timely management of mass mortality events.

Objective 2: Protect poultry value chains, livelihoods, trade and the health of humans, animals and ecosystems from HPAI impacts

Action must be taken on several fronts to ensure the ongoing protection of poultry value chains, which will have benefits for protecting humans, ecosystems and other animals and preventing HPAI infections. This action includes reducing opportunities for the circulation and emergence of new HPAI strains that can spill over and back between poultry, wild birds and mammals, and applying approaches to protect and promote business continuity, thus reducing risks to food security and livelihoods. Good biosecurity practices are required to prevent exposure and bidirectional spread of HPAI at the wildlife–domestic bird interface and along poultry value chains. Strategies such as proper vaccination of poultry with efficacious, registered and antigenically relevant HPAI vaccines and accompanying appropriate surveillance can reduce the burden of infections and virus circulation to prevent or control outbreaks. In addition, producers require accepted approaches to safeguard their flocks and demonstrate the safety of their products to protect their ability to market their product. An understanding of the social, behavioural and economic barriers to taking these actions is needed to ensure viable, safe poultry production and protect wildlife health and ecosystems.

ASSUMPTIONS	The use of vigilant exclusionary biosecurity, good production practices, and where appropriate, vaccination, zoning and compartmentalization will be accepted by communities and trading partners and appropriate stewardship approaches used by producers. Countries will recognize and accept the application of internationally adopted approaches to ensure continued trade of safe poultry and poultry products.
RISKS	Internationally accepted guidance and standards are not followed, or non-justified non-tariff trade barriers are not addressed.
APPROACH	Build on existing WOAH and FAO guidance and international standards to provide tools and technical support to adapt to local and national contexts while ensuring safe trade and adapt standards as scientific knowledge evolves.

Output 2.1: Biosecurity and other approaches to reduce HPAI risks along the poultry value chain and at the domestic animal-wildlife-human interface developed and promoted

With the spread of HPAI in migrating wild birds and infections of wild and domestic mammalian species, risk mitigation approaches must take both a national view and a regional view to reflect the interconnections between countries and the changing risks along flyways with seasonal migrations as well as local maintenance and spread in peridomestic and commensal bird populations. Biosecurity is a cornerstone of good animal production practices, disease control and prevention, including for HPAI. Close attention needs to be paid to biosecurity not just at the farm level, but at the domestic animal–wildlife–human interface and along poultry value chains. Appropriate legislative frameworks and regulations may be needed to ensure authorities have the tools they need to take necessary action. Successful approaches, new scientific findings and best practices should be shared to support effective interventions and mitigate the impacts.

Activities:

- Support countries in taking a One Health approach in identifying and assessing biosecurity risks for HPAI introductions onto farms and along poultry value chains and develop progressive biosecurity mitigation options using existing tools (see Annex 2).
- Promote collaboration with wildlife authorities to identify high risk wild, avian and mammalian species, habitats and breeding sites where heightened biosecurity or other protections may be needed to prevent exposure, infection and mass mortality of wildlife and protect people and susceptible domestic animals.[18]
- Identify and share successful science-based policies and regulatory approaches to protect poultry and wildlife from HPAI infections.
- Advocate for investment in sustainable small-scale poultry production systems to support the implementation of basic biosecurity and good management practices tailored to local conditions to minimize HPAI risks and avoid losses.
- Promote private–public partnerships to identify and share practical solutions that address social, cultural and economic barriers to the implementation of appropriate biosecurity and effective management practices to protect poultry from HPAI.

Output 2.2: HPAI vaccination stewardship guidance aligned to international standards developed and widely communicated

While the WOAH Terrestrial Animal Health Code (TAHC) recognizes the use of vaccination for HPAI prevention and control under specific conditions, there is a need for further guidance and protocols on the wider use of HPAI vaccines to enable the complementary use of vaccination when supported by careful stewardship (Annex 2) and appropriate surveillance.

Activities:

- Convene experts to develop international guidance to complement chapter 10.4 of the current WOAH Terrestrial Animal Health Code (TAHC) on infection with HPAI viruses, and chapter 3.3.4 of the WOAH Terrestrial Manual on diagnostics and vaccine for HPAI for the registration, selection, safe and effective use, and appropriate stewardship of HPAI vaccines. These should be accompanied by tools to assess the contexts/settings where vaccines can be best applied.
- Support OFFLU (e.g., through the provision of data and viruses) to provide expert technical advice on the characteristics of circulating strains, vaccine matching and quality, and postvaccination surveillance.
- Develop and disseminate communication materials to address concerns about when vaccination can be most useful, dispel any misinformation or disinformation, and resolve barriers to safe trade.
- Support countries that use vaccines in the application of proper vaccination programmes, assessment of postvaccination surveillance for virus circulation and monitoring for protection through training and regular updates.
- Promote increased uptake of efficacious vaccines to increase resistance to infection and minimize bidirectional spread at the domestic animal–wildlife interface, such as in domestic ducks reared outdoors and interacting with wild aquatic birds, which is common in many LMICs. Such intervention will reduce mutation and reassortment opportunities, limiting the emergence of new variant H5Nx HPAI viruses. Furthermore, as such duck rearing systems have minimal biosecurity and the HPAI virus produces inconsistent disease in ducks, efficacious species-appropriate vaccines combining an antigenically relevant HPAI vaccine with other economically significant waterfowl diseases such

as duck virus enteritis could be of particular use given the limited vaccine administration opportunities.

Output 2.3: Guidance, training and advocacy tools are developed, shared and implemented to promote the development of infection-free value chains and safe trade

There are effective tools defined in the WOAH TAHC, such as zoning and compartmentalization, which can be used to establish and maintain infection-free subpopulations within a country that is not free from HPAI. Zoning applies to a subpopulation defined by geography; compartmentalization applies to a subpopulation defined by their biosecurity management and husbandry practices. Zoning is frequently used during HPAI outbreaks to control disease spread and maintain safe trade in previously HPAI-free countries, but it is not universally accepted among trading partners. Compartmentalization has rarely been used, however, with the changing ecology and epidemiology of HPAI, it may be an increasingly viable option in some production systems. Even outside the context of international trade, both approaches can contribute significantly to safe national business continuity.

Activities:

- Develop guidance and training for the development and implementation of HPAI-free zones which can be employed in various geographic scenarios, highlighting examples from several regions to increase awareness and acceptance of these approaches.
- Develop guidance and training for the application of compartmentalization for HPAI to assist countries in establishing secure compartments, and for importing countries to assess compartments of trading partners to ensure confidence in product safety.
- Provide guidance and training to countries on the application of a containment zone during HPAI outbreaks in an HPAI-free country or zone in accordance with the WOAH TAHC, and the steps needed, including surveillance data and movement control, to self-declare HPAI freedom.
- Conduct economic assessments to demonstrate the financial benefit of additional protection measures to help producers and traders determine the best approach for their system.

Objective 3: Transform poultry value chains to improve resilience to HPAI and other disease threats

The transformation of poultry agrifood systems is taking place in parallel with other major transformations to global and local agrifood systems. These wider transformations are designed to overcome challenges such as environmental degradation and climate shocks to achieve outcomes that include improved production efficiency, safety, nutritional value, climate resilience and biodiversity gains. These transformations are also taking place at a time of economic uncertainty. Many national governments and commercial enterprises are facing difficult budget-related decisions while also needing to simultaneously address multiple challenges. It is therefore crucial that the approaches taken to transform poultry agrifood systems to resist HPAI threats at least complement wider food system actions or, at best, achieve synergistic outcomes.

ASSUMPTIONS	Advances in the development of sustainable and circular bioeconomies will incentivize positive changes in how productivity and profitability are measured within the poultry agrifood industry. Enduring trusting and effective relations between public and private sector partners associated with poultry agrifood systems.
RISKS	The short-term costs and impacts associated with transformation are a barrier to national governments and private sector actors facing economic and food security challenges. Lack of understanding of sector-specific risks among One Health partners.
APPROACH	A One Health systems approach that seeks optimal, synergistic outcomes for HPAI prevention and control, sustainable food and nutrition security and equitable outcomes for producers, consumers, wildlife and the environment. The approach seeks to enhance productivity while ensuring health and environmental outcomes.

Output 3.1: One Health and private–public partnerships, policy and legal frameworks and responsible investments promoted for building safe, resilient and sustainable poultry value chains

To achieve the efficiency, safety and sustainability required of food systems in the twenty-first century, it is essential that key stakeholders[a] work collaboratively to co-design and co-implement the transformation of poultry agrifood systems.

Activities:

- Facilitate the establishment of gender-sensitive and culturally sensitive poultry agrifood system transformation working groups that involve key sectoral and interdisciplinary stakeholders – including small-, medium- and large-scale poultry producers, those raising poultry for cultural or sporting purposes, wildlife ecologists, consumer groups and social scientists – to identify the regional and local drivers of HPAI emergence and spread, and develop feasible, transformative risk management options in the short, medium and long term.
- Promote training and research by One Health teams (including expertise in risk communication, gender, youth, poultry, economics, ecology and public policy) that link the implementation of safe poultry production with facilitating policy environments, efficient utilization of resources and especially feedstuffs to produce healthy and environmentally and economically sustainable poultry products, and promote animal welfare and good mental and physical health among poultry value chain actors.
- Advocate for the adoption and scaling of documented good practices using participatory processes involving all stakeholders to enable the uptake of good practices across all poultry value chains.
- Advocate for appropriate poultry genetics and production systems that contribute to resilient, safe poultry value chains and sustainable food systems by balancing immune function[19] to respond to HPAI vaccination with productivity to promote overall flock health. Ensure HPAI prevention actions also protect key avian genetic stock, including indigenous poultry, that are crucial to preserving genetic diversity and species resilience.
- Support the integration of poultry sector transformation into national sustainable livestock policy development, refinement and implementation. Public–private partnerships are an integral part of this transformation process. Revise or develop policy so that it supports investment in HPAI risk management and sustainable economic development of the poultry sector by facilitating: the adoption of good practices; access to poultry health and production services and food safety advice for producers and other value chain actors; and an enabling business environment.

Output 3.2: Inter- and intraregional and context-specific knowledge sharing on risk management facilitated

Poultry agrifood systems are complex with multiple actors and include diverse production systems that have developed over time in line with local conditions. The challenge of managing the risk of HPAI and other diseases often coincides with other factors that can be environmental, climatic, social and economic, and impact the resilience of the system and its ability to protect flocks and prevent disease. Science-based evidence, experience and lessons learned should be gathered and disseminated to expedite the formulation of risk management solutions to support the sustainable transformation of the poultry sector.

Activities:

- Identify key regional and national stakeholders, including poultry agrifood industry representatives and associations.
- Promote the generation and sharing of: risk assessments; information on the evolution of avian influenza viruses; gender-sensitive behaviour change studies involving those involved in local poultry value chains (e.g., commercial poultry production and smaller-scale traditional activities); and the gendered and sociocultural perspectives of value chain actors in relation to the prevention and control of HPAI and other poultry diseases of importance, especially those that are differential diagnoses for HPAI.
- Facilitate the sharing of case studies that apply a food systems lens to critically assess biological, socioeconomic and political risks associated with pertinent domestic and wild birds and mammals, production systems, landscape ecology, epidemiology and anticipated/documented climate change-related impacts to inform decisions/regulations on where to

[a] Key stakeholders include men and women involved with key poultry value chains at national and global levels, poultry genetics and feed companies, public health officials (infectious disease and human nutrition specialists), animal health and production officials, environmental health officials, circular economy specialists and WTO officials.

locate commercial poultry farms, how to modify practices to reduce negative impacts on local ecosystems and ensure poultry health system effectiveness. Case studies should address issues such as stocking density, geographical location of intensive production units (e.g., away from wetlands where wild birds congregate), animal welfare, resilient value chains, and enabling policies and their implementation.

- Promote the sharing of economically viable approaches and the establishment of good relations between national veterinary authorities and poultry producers by facilitating the development of compensation plans prior to the implementation of HPAI stamping-out responses during outbreaks to safeguard food security and livelihoods.
- Support inclusive, gender-sensitive benefit–cost studies to confirm the economic and food security benefits of taking a systems-based approach to HPAI prevention and control that focuses on strengthening the delivery of poultry health and production services across small-, medium- and large-scale poultry production systems. This should be done in line with the FAO Sustainable Livestock Transformation Initiative, which emphasizes the importance of achieving better production, better nutrition, better environment and better life through full integration of this approach with synergistic rural development policy.

Output 3.3: National strategies for ensuring sustainable, effective public and private veterinary services promoted

The effective and efficient prevention and control of HPAI and zoonotic LPAI are intimately linked with robust, appropriately resourced veterinary health services, especially public and private poultry health services.

Activities:

- Support use of the WOAH Performance of Veterinary Services (PVS) evaluation and monitoring cycle to assess national veterinary capacity and implementation of recommendations.
- Establish collaborations with academic and vocational training institutions to advocate for and deliver appropriate training and refresher courses for public- and private-sector veterinarians, veterinary paraprofessionals and community animal health workers. Training should support improved knowledge of poultry health and production in support of functional HPAI and LPAI monitoring and surveillance, prevention and response activities and be accompanied by adequate resourcing of personnel so they can fulfil their duties. Consideration should also be given to: providing gender-sensitive and culturally sensitive approaches to poultry health; the importance of making animal health and production services readily accessible in underserved areas; and training in wildlife health in support of effective, risk-based HPAI prevention, surveillance, preparedness and risk management.
- Use existing tools (see Annex 2) to map and evaluate laboratory and surveillance capacity to ensure national and regional veterinary laboratories and their personnel can efficiently and sustainably detect and test for HPAI and zoonotic LPAI (in poultry, livestock, wild birds, wild mammals and companion animals) and differential diagnoses that are strategic national endemic and non-endemic TADs such as Newcastle disease. Achieve timely reporting of confirmed diagnoses of HPAI, zoonotic LPAI and endemic diseases that are clinically compatible with HPAI to relevant poultry producers, animal health field personnel (including community animal health workers and veterinary paraprofessionals) and authorities.
- Perform quality assurance tests on avian influenza vaccines and vaccines employed to prevent endemic poultry diseases clinically compatible with HPAI and monitoring of vaccine cold chains. Support better access to animal health delivery systems across all production systems including, when relevant, the provision of standard compliant HPAI vaccines matching circulating field strains for use in small-scale poultry flocks in LMICs. Encourage and support training for relevant personnel.

Output 3.4: Transformative research such as the development of mass-applied HPAI vaccines and a novel surveillance system to provide an evidence base for policy change encouraged and supported

The Global Strategic Alliances for the Coordination of Research on the Major Infectious Diseases of Animals and Zoonoses (STAR-IDAZ) International Research Consortium has developed a research roadmap that identifies the highest research priorities, the solutions to which would speed up the delivery of improved prevention and control of animal influenzas.[20] These priorities are concentrated in vaccine development, diagnostic and surveillance development tools, and influenza control strategies.

Specific limitations have been identified as major impediments to producing a protective immune response in order to prevent outbreaks or decrease poultry infections, including the lack of agreement on cost-effective, rational surveillance programmes in vaccinated flocks to demonstrate absence of infection. Vaccination has been an effective strategy for preventing infections or increasing the resistance of poultry to HPAI infections and stopping HPAI virus transmission and spread. Efficacious registered H5 vaccines are available and used as both primary and booster vaccines, but most vaccines require individual birds to be caught, handled and injected, which limits field utilization because of manpower limitations and high labour costs in high-income countries. Recombinant vectored vaccines have accelerated primary or priming vaccination by supporting the implementation of biosecure hatcheries and low-cost automation, especially with *in ovo* technologies. In concert, new surveillance methods and protocols need to be developed for improved sensitivity. They must also be cost effective, sustainable, able to identify possible infections in vaccinated flocks, and assure trading partners and customers that products from vaccinated poultry are safe and HPAI free.

Activities:

- Vaccine development: Prioritize research to develop, validate, register and deploy potent vaccines that can be easily applied as primary or booster on-premises or on-farm vaccines through low-cost mass-application technologies that do not require high numbers of personnel such as spray, water or feed delivery. Such vaccines could be live viral or bacterial vectored products, but non-replicating products could be developed with special adjuvant systems to elicit strong humoral and mucosal immunity and be applied though mass-application technologies across all production systems. The private sector has a critical role to play, along with research institutes, in collaborating in development and harmonized efficacy testing, in expanding equivalency in national registration, and in the manufacturing and deployment of new vaccines.
- Diagnostic and surveillance development tools: Develop and validate cost-effective surveillance methods, such as the use of environmental samples for sensitive flock-based virus detection, and create guidelines for confirming lack of infection in vaccinated flocks and reassuring trading partners and consumers that poultry and the products from vaccinated flocks are free from infectious HPAI virus. Such guidelines should include recommendations on sample types collected, the frequency of collection and testing, and the number of samples.
- Provide stewardship on the organization of a fit-for-purpose and economically sustainable HPAI surveillance system considering international standards and building on experiences gained from other domains and new information technologies.
- Influenza control strategies: 1) identify improved cost-effective biosecurity with new tools and optimized and assessed approaches; 2) design vaccination strategies that fit species, age, and production type as well as in varied stages of an outbreak; and 3) develop and deploy education programmes for all those working with poultry along the value chains, especially inclusive of smallholder and family production systems.

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Governance

The governance of the strategy is multi-centric and flexible so that regions can adapt the strategy to their different contexts and epidemiological situations to create operational workplans. The regional governance structure should have the capacity to identify gaps to be addressed, share priorities, coordinate activities among implementing stakeholders to ensure synergies and avoid duplication, share experience and good practices, collect and analyse relevant information for monitoring progress, advocate for political support, mobilize resources, and ensure regional action plans are developed.

Within each of the five regions,[b] regional steering committees (RSCs) are multi-partner GF-TADS governing bodies that are tailored to the specific context of stakeholders involved in priority TAD prevention and control activities. Representatives of the RSCs are from regional organizations, national veterinary services, resource and development partners and, in some regions, representatives from private stakeholders. In addition, certain regions have established specific mechanisms to coordinate matters related to avian influenza in the form of standing groups of experts[c] and networks,[d] which enable members of the RSC to interact with subject matter experts and cover more technical topics. These groups include experts from the wildlife, conservation, environment and public health sectors in addition to agriculture and animal health. Where absent, the establishment of such mechanisms should be considered to ensure dedicated follow-up on avian influenza. Cross links with existing One Health platforms should be established. In addition, regular stakeholder mapping should be supported to identify influential partners to connect and engage with on expected progress of the strategy. GF-TADs regional secretariats, from WOAH and FAO regional offices, support effective collaboration between these various groups.

At the global level, governance of the strategy can consolidate its implementation across the five regions, including exchanges on priorities, successes and challenges. Global governance should facilitate sharing of globally significant scientific and technical inputs. It should also identify common gaps to be addressed and relevant activities to be conducted among partners implementing at the global level, advocate for political support and resource mobilization, and ensure that relevant information required for monitoring progress is consolidated and analysed.

The GF-TADs Global Steering Committee (GSC) includes representatives from the RSCs, partner organizations, including WHO and UNEP,[e] resource partners and representatives from private stakeholder organizations. This mechanism makes it possible to report progress and discuss and endorse high-level recommendations on the GF-TADs coordination mechanism. In order to review progress and specific recommendations on the implementation of the global HPAI strategy among dedicated partners, a HPAI global advisory committee (GAC) will be established. It will include relevant members of the GSC and specific scientific, technical and institutional partners, including OFFLU, WHO (the WHO Global Influenza Surveillance and Response System [GISRS] and Global Influenza Programme [GIP]), and representatives from relevant WOAH and FAO reference laboratories and collaborating centres. The GAC will meet virtually or in person when feasible, pending resource availability.

To follow up on technical-level implementation of the strategy and facilitate coordination at the global level and between regions, a FAO/WOAH joint working group should be established. The working group will report to the GF-TADs management committee composed of FAO and WOAH senior management. The GF-TADs Global Secretariat from FAO and WOAH headquarters will support these mechanisms.

OFFLU will play the central role in providing expert technical input, leadership in scientific collaboration, global surveillance, technical knowledge dissemination and knowledge translation.

[b] Africa, the Americas, Asia and the Pacific, Europe and Near East.

[c] In the Americas and Europe.

[d] In Asia and the Pacific.

[e] From 2024.

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Monitoring, evaluation and learning plan

The Monitoring, evaluation and learning (MEL) plan for the revised global strategy is anchored by the theory of change to track progress towards the expected outcomes and the impact of programme activities.

High-level indicators for this strategy are listed in Table 1 along with a general timeline for completion (Figure 2). Furthermore, each level from global to national will require a logical framework, including regional and national indicators, to guide MEL activities. It is important to provide support to MEL personnel to ensure that data collection is coordinated and is of the type and quality that can provide an assessment of conclusions about effectiveness and impact.

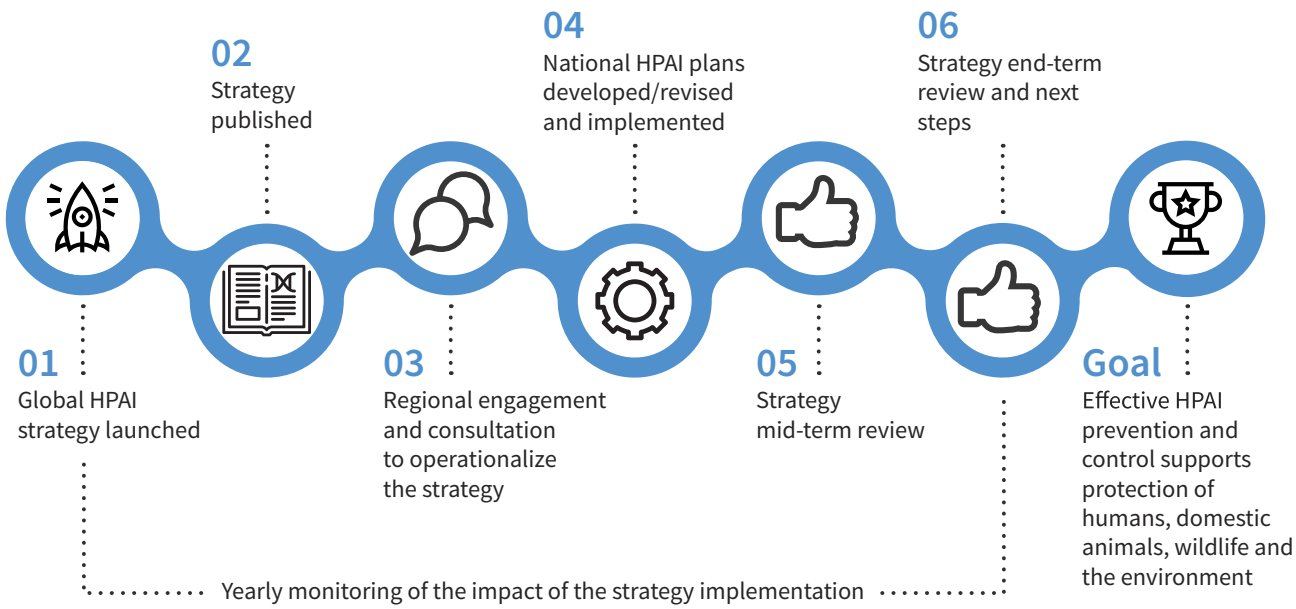
The overall MEL approach and implementation will be managed by key global and regional governance bodies under GF-TADs. Data sources will include: 1) epidemiological surveillance data; 2) socioeconomic data such as surveys and interviews; 3) project records that document meetings, workshops, agreements and memoranda; and 4) assessments from meetings, training workshops and others, as appropriate for the finalized list of indicators.

The strategy will be monitored at the global, regional and national levels, and progress assessed in relation to the outputs for each objective. During the initial implementation phase, regional and national MEL frameworks will be developed with support from GF-TADs. Following this phase, strategy indicators, milestones and their timelines will be identified to support the MEL system of the strategy, so that all information relating to activities implemented, results achieved and challenges encountered can be recorded, analysed and reported in a timely manner.

TABLE 1. High-level objective outcomes and indicators supporting development and implementation of regional and national MEL frameworks and expected 2033 achievements

Objectives	High-level indicators
Objective 1: **Prevent HPAI epizootics, panzootics and negative impacts on human health and ecosystems through multisectoral early detection and control.**	Early HPAI detection and control plan/strategy in place at the national level
	Timely control of HPAI in domestic animals leading to successful elimination of HPAI virus in outbreak areas
	Reduced incidence of HPAI outbreaks through efficient disease intelligence and reporting
Objective 2: **Protect poultry value chains, livelihoods, trade and the health of humans, animals and ecosystems from the negative impacts of HPAI**	Reduced number of influenza A (H5N1) human cases reported to WHO
	Reduced cases of HPAI infections in wild animals reported to WOAH
	Reduced impact of HPAI on global poultry trade
Objective 3: **Transform poultry value chains to improve resilience to HPAI and other disease threats**	Productivity of poultry industry production systems adapted to resist HPAI burden, improved or maintained across all production systems as demonstrated by an overall decline in HPAI reports by 2033
Implementation indicator	National strategic plans updated to reflect prevention, protection and transformation approach

FIGURE 2. Overview of actions supporting strategy implementation



Source: FAO, WOAH. 2024. *Global Strategy for the Prevention and Control of Highly Pathogenic Avian Influenza (2024–2033)*. In brief. Rome, FAO.

Conclusion

The evolution and spread of the 2.3.4.4b clade of HPAI has had devastatingly negative impacts on poultry, other domestic animals, wildlife health, food security and rural economies, and challenges the sustainability of poultry production and value chains, including supply and trading networks. It has also resulted in mass die-offs of wild bird and mammal populations, threatening ecosystems and posing major challenges for wildlife and conservation authorities. The virus has shown the ability to infect mammalian species including domestic pets, livestock, several farmed fur animals and humans. The propensity of avian influenza viruses to mutate and reassort genes with other influenza A viruses poses a pandemic threat. These events have demonstrated the need for a sustained global strategy to tackle HPAI in the short, medium and long term.

The solution will require coordinated action and holistic approaches to effect lasting change.

Inclusive efforts at the global, regional, national and local levels are needed to detect the virus and infections through effective surveillance programmes; to understand viral ecology and epidemiology in agricultural and natural systems to lead to more effective preventative strategies; to improve biosecurity processes to prevent infection, circulation, spread and spillover events; to reduce poultry susceptibility though increased vaccine usage; to protect poultry value chains from outbreaks and longstanding endemic infections; and to transform existing agrifood systems to be more sustainable, resilient, stakeholder-conscious, and mutually beneficial to all involved and the ecosystems that support them. Better consideration of the global and local contexts in which HPAI viruses are maintained, transmitted and spread will be essential. By ensuring a One Health approach and building meaningful public-private partnerships, the impacts of HPAI should be substantially reduced in the future.

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Annex 1: Glossary

Term	Definition
Agrifood systems	The entire range of actors and interlinked activities that add value in agricultural production and related off-farm activities such as food storage, aggregation, post-harvest handling, transportation, processing, distribution, marketing, disposal and consumption.
Bioeconomy	The production, utilization, conservation, and regeneration of biological resources, including related knowledge, science, technology and innovation, to provide sustainable solutions (information, products, processes and services) within and across all economic sectors and enable a transformation to a sustainable economy.[1]
Biosecurity	WOAH Terrestrial Code defines biosecurity as a set of management and physical measures designed to reduce the risk of introduction, establishment and spread of animal diseases, infections or infestations to, from and within an animal population. FAO emphasizes that biosecurity is a strategic and integrated approach to analysing and managing risks to human, animal and plant life and health, and associated risks to the environment. It is a holistic concept that encompasses health policy, regulation and practices to protect agriculture food and the environment from biological risks.
Circular economy	To maintain the value of products, materials and resources for as long as possible by returning them into the product cycle at the end of their use, while minimizing the generation of waste.
Clade	Categorization of the haemagglutinin gene of the Gs/GD Eurasian lineage HPAI viruses based on molecular analysis. The mutation of the haemagglutinin (i.e. drift) since 1996 has resulted in genetically divergent groups of virus strains termed clades such as 2.3.4.4b, 2.3.4.4c, 2.3.2.1a, 2.2.1.1, etc.
Cold chain	A system for storing and transporting vaccines at recommended temperatures from the point of manufacture to the point of use.
Disease	A pathological condition of a part, organ or system of an organism resulting from infection, genetic defect, stress, toxin, etc. that is characterized by an identifiable group of signs.
Early detection systems	A system for the timely detection and identification of an incursion or emergence of diseases or infections in a country, zone or compartment. An early detection system should be under the control of the veterinary services and should include the following characteristics: • representative coverage of target animal populations by field services; • ability to undertake effective disease investigation and reporting; • access to laboratories capable of diagnosing and differentiating relevant diseases; • a training programme for veterinarians, veterinary paraprofessionals, livestock owners/keepers and others involved in handling animals for detecting and reporting unusual animal health incidents; • private veterinarians have a legal obligation to report to the veterinary authority; • a national chain of command.
Ecosystem	A dynamic complex of plant, animal and microorganism communities and their abiotic environment interacting as a functional unit.
Emerging disease	A new occurrence in an animal of a disease, infection or infestation, causing a significant impact on animal or public health resulting from: a) change of a known pathogenic agent or its spread to a new geographic area or species; or b) a previously unrecognised pathogenic agent or disease diagnosed for the first time.
Endemic	The continuing presence of disease in a population or defined area at a rate of occurrence that does not change significantly over a period of time.[f]
Enzootic	The continuing presence of disease in an animal population or defined area at a rate of occurrence that does not change significantly over a period of time.
Epidemic	A rapid increase in the level of disease in a population.
Epizootic	An outbreak of disease in an animal population.

[f] Strictly speaking, "endemic" refers to disease in human populations, while "enzootic" refers to disease in animal populations. However, in practice, both terms are used to describe the occurrence of disease in animal populations.

Term	Definition
Fomites	Inanimate objects such as boots, clothing, equipment, instruments, vaccination needles, vehicles, crates or packaging that can transmit an infectious agent to a new host mechanically. Fomites become contaminated but do not become infected.
H5N1	The haemagglutinin and neuraminidase subtype of the influenza A virus. H5 stands for the fifth of 16 subtypes of the protein haemagglutinin and N1 stands for the first of nine subtypes of the protein neuraminidase that are found on the surface of the virus. H5N1 subtypes can be HPAI or LPAI and from different virus lineages. The current 2.3.4.4b clade is primarily caused by H5N1 subtype influenza A virus.
High pathogenicity avian influenza	High pathogenicity avian influenza viruses cause severe disease and high mortality in infected poultry. Only some avian influenza A(H5) and A(H7) viruses are classified as HPAI viruses, while most A(H5) and A(H7) viruses circulating among birds are LPAI viruses.
Infection	The entry and development or multiplication of a pathogenic agent in the body of humans or animals.
Influenza	**Influenza**, commonly referred to as the **flu**, is an infectious disease caused by RNA viruses that affects birds and mammals. The three main types are: • type A: infects multiple species; • type B: infects humans only; • type C: infects humans and swine; and • type D: infects cattle and pigs.
International trade	Importation, exportation and transit of commodities.
Low pathogenicity avian influenza	LPAI viruses cause either no signs of disease or mild disease in chickens or poultry (such as ruffled feathers and a drop in egg production). Most avian influenza A viruses are of low pathogenicity and cause few signs of disease in infected wild birds. In poultry, some H5 and H7 low-pathogenicity viruses can mutate into high pathogenicity avian influenza viruses.
Movement control	Restrictions placed on the movement (shipping, sale and transportation) of animals, animal products, people and other items to prevent the spread of disease.
Mutation	A change in a gene or a chromosome of an organism that results in the creation of new heritable characteristics or traits.
One Health (One Health High-Level Expert Panel [OHHLEP] definition)	One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems. It recognizes the health of humans, domestic and wild animals, plants and the wider environment (including ecosystems) are closely linked and interdependent. The approach mobilizes multiple sectors, disciplines and communities at varying levels of society to work together to foster well-being and tackle threats to health and ecosystems, while addressing the collective need for healthy food, water, energy and air, taking action on climate change and contributing to sustainable development.
Outbreak (of disease or infection)	The occurrence of one or more cases in an epidemiological unit.
Panzootic	An outbreak of disease in an animal population affecting a large number of animals at the same time within a particular region or geographic area, usually with minimal control of the spread.
Pathogen	An agent that causes disease, especially a living microorganism such as a virus, bacterium or fungus.
Pathogenic	Capable of causing disease.
Pathogenicity	The disease-producing capacity of a pathogen. The degree to which a pathogen debilitates its host.
Poultry	All domesticated birds used for the production of meat or eggs for consumption, for the production of other commercial products, for restocking, supplies of game, or for breeding these categories of birds.
Quarantine	The act of restricting access to animals or premises by imposing **isolation**, **biosecurity** or movement restriction measures, or a combination thereof. Quarantine activities may be voluntary or may be imposed by legal authorities in the event of an **outbreak** or suspected outbreak.
Reassortment	The fragmentation and reassembly of the genetic material of two similar viruses infecting the same cell. During reassembly, genetic material may be exchanged between the viruses.
Risk	The likelihood of the occurrence and the likely magnitude of the biological and economic consequences of an adverse event or effect to animal or human health.
Risk analysis	The process composed of hazard identification, risk assessment, risk management and risk communication.
Risk assessment	The evaluation of the likelihood and the biological and economic consequences of entry, establishment and spread of a hazard.
Risk communication	The interactive transmission and exchange of information and opinions throughout the risk analysis process concerning risk, risk-related factors and risk perceptions among risk assessors, risk managers, risk communicators, the general public and other interested parties.

Term	Definition
Stamping out	A disease eradication strategy based on the quarantine and slaughter of all susceptible animals that are infected or exposed to the disease.
Stamping-out policy	A policy designed to eliminate an outbreak by carrying out under the authority of the veterinary authority the following: a. the killing of the animals that are affected and those suspected of being affected in the head or flock and, where appropriate, those in other herds or flocks that have been exposed to infection by direct animal-to-animal contact, or by indirect contact with the causal pathogenic agent; animals should be killed in accordance with with chapter 7.6. of the WOAH Terrestrial Animal Health Code (TAHC); b. the disposal of carcasses and, where relevant, animal products by rendering, burning or burial, or by any other method described in chapter 4.12. of the TAHC; and c. the cleansing and disinfection of establishments through procedures defined in chapter 4.13 of the TAHC.
Surveillance	The systematic ongoing collection, collation and analysis of information related to animal health and the timely dissemination of information so that action can be taken.
Susceptible animals	Animals that can be infected with a particular disease.
Transmission	The process by which a pathogen passes from a source of infection to a new host. There are two major types: horizontal and vertical transmission.
Vaccination	Means the administration of a vaccine, in accordance with the manufacturer's instructions and the Terrestrial Manual, when relevant, with the intention of inducing immunity in an animal or group of animals against one or more pathogenic agents.
Vaccine	Includes all products designed to stimulate active immunization of animals against a specific pathogen.
Veterinary services	The combination of governmental and non-governmental individuals that perform activities to implement the standard of the WOAH Terrestrial Code.
Wildlife	Feral animals, captive wild animals and wild animals.
Zone	A part of a country defined by the veterinary authority, containing an animal population or subpopulation with a specific animal health status with respect to an infection or infestation for the purposes of international trade or disease prevention or control.
Zoonosis	Any disease or infection that is naturally transmissible from vertebrate animals to humans.

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Annex 2: Guidelines and tools

The list below is current as of June 2024. All guidelines and tools, including revised and new materials, will be added to the GF-TADS website as they become available at https://www.gf-tads.org/hpai/hpai/en/

Guidelines or tools	Source	Access link
Biosecurity		
Progressive Management Pathway for Terrestrial Animal Biosecurity (FAO-PMP-TAB)	FAO, 2022	https://openknowledge.fao.org/handle/20.500.14283/cc5771en
Africa Sustainable Livestock 2050: Livestock biosecurity from a business perspective	FAO, 2022	https://doi.org/10.4060/cc0429en
Biosecurity for highly pathogenic avian influenza	FAO, 2008	https://openknowledge.fao.org/handle/20.500.14283/i0359e
Biosecurity guide for live poultry markets	FAO, 2015	https://openknowledge.fao.org/handle/20.500.14283/i5029e
Official training on the NPIP program standards biosecurity principles	NPIP, 2020	https://www.poultryimprovement.org/documents/Biosecurity-Principles-and-Audit-Guidelines-2017-2020.pdf
NPIP program standards biosecurity principles audit form	NPIP, 2018	https://www.poultryimprovement.org/documents/AuditForm-2018BiosecurityPrinciples.pdf
Poultry biosecurity	ISU, 2023	https://poultrybiosecurity.org/
Emergency management		
FAO Good emergency management practice: The essentials	FAO, 2021	https://doi.org/10.4060/cb3833en
Sendai Framework for Disaster Risk Reduction 2015–2030	United Nations Office for Disaster Risk Reduction (UNDRR), 2014	https://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf
Epidemiology		
Ecological divergence of wild birds drives avian influenza spillover and global spread	Hill *et al.*, 2022	https://doi.org/10.1371/journal.ppat.1010062
Epidemiology of avian influenza in agricultural and other man-made systems	Sims *et al.*, 2017	https://onlinelibrary.wiley.com/doi/abs/10.1002/9781118924341.ch12
Global surveillance for influenza a viral diversity in wild birds: A concept & discussion paper	OFFLU, 2016	Wildlife Technical Activity output (not on web)
Laboratory diagnosis		
3.3.4. Avian influenza (including infection with high pathogenicity avian influenza viruses) (version adopted in May 2021)	WOAH, 2021	https://www.woah.org/fileadmin/Home/eng/Health_standards/tahm/3.03.04_AI.pdf
Animal influenza virus. Methods and protocols	Spackman *et al.*, 2020	https://link.springer.com/book/10.1007/978-1-0716-0346-8
Epidemiology-driven approaches to surveillance in HPAI-vaccinated poultry flocks aiming to demonstrate freedom from circulating HPAIV	Harder *et al.*, 2023	https://doi.org/10.1016/j.biologicals.2023.101694
Wild bird highly pathogenic avian influenza surveillance	FAO, 2006	https://openknowledge.fao.org/handle/20.500.14283/a0960e
One Health		
A guide to implementing the One Health Joint Plan of Action at national level	Quadripartite, 2023	https://openknowledge.fao.org/handle/20.500.14283/cc7916en
A tripartite guide to addressing zoonotic diseases in countries	Tripartite, 2019	https://www.who.int/initiatives/tripartite-zoonosis-guide

Guidelines or tools	Source	Access link
Handbook for the assessment of capacities at the human–animal interface, second ed.	WHO, WOAH 2017	https://iris.who.int/handle/10665/254552
One Health Joint Plan of Action	Quadripartite, 2022	https://doi.org/10.4060/cc2289en
One Health: A new definition for a sustainable and healthy future	One Health High-Level Expert Panel (OHHLEP), Adisasmito *et al.*, 2022	https://journals.plos.org/plospathogens/article?id=10.1371/journal.ppat.1010537
One Health approach can prevent the next pandemic	World Bank, 2022	https://www.worldbank.org/en/news/feature/2022/10/24/one-health-approach-can-prevent-the-next-pandemic
One Health theory of change	OHHLEP, 2022	https://www.who.int/publications/m/item/one-health-theory-of-change
Navigating the Tripartite Zoonoses Guide (TGZ): A training for advocates and implementers	Tripartite, 2020	https://openwho.org/courses/tripartite-zoonoses-guide
Prevention of zoonotic spillover: From relying on response to reducing risk at source	OHHLEP, 2023	https://www.who.int/publications/m/item/prevention-of-zoonotic-spillover
TGZ: Multisectoral coordination mechanism operational tool	Tripartite, 2022	https://www.who.int/initiatives/tripartite-zoonosis-guide/multisectoral-coordination-mechanism-operational-tool
TGZ: Surveillance and information sharing operational tool	Tripartite, 2022	https://www.who.int/initiatives/tripartite-zoonosis-guide/surveillance-and-information-sharing-operational-tool
Policy		
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Preparing for highly pathogenic avian influenza	FAO, 2009	https://openknowledge.fao.org/handle/20.500.14283/i0808e
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Risk communication		
Guidance note: Risk communication and community engagement: Coronavirus disease 2019 (COVID-19) pandemic.	FAO, 2020	https://doi.org/10.4060/cb0526en
Planning risk communication on foot-and-mouth disease: Guide	FAO and EuFMD, 2021	https://openknowledge.fao.org/handle/20.500.14283/cb5473en
Communicating risk in public health emergencies: A WHO guideline for emergency risk communication (ERC) policy and practice	WHO, 2017	https://iris.who.int/bitstream/handle/10665/259807/9789241550208-eng.pdf
WHO outbreak communication planning guide	WHO, 2008	https://iris.who.int/bitstream/handle/10665/44014/9789241597449_eng.pdf
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Guidelines or tools	Source	Access link
Scientific Task Force on Avian Influenza and Wild Birds statement on: H5N1 High pathogenicity avian influenza in wild birds - Unprecedented conservation impacts and urgent needs	CMS & FAO, 2023	https://www.cms.int/sites/default/files/publication/avian_influenza_2023_aug.pdf
Surveillance		
Informing resilience building: FAO's Surveillance Evaluation Tool (SET) Biothreat Detection Module will help assess national capacities to detect agro-terrorism and agro-crime	Gioia *et al.*, 2021	https://openknowledge.fao.org/handle/20.500.14283/cb6523en
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Chapter 4.18. Vaccination	WOAH, 2018	https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/?id=169&L=1&htmfile=chapitre_vaccination.htm
Chapter 18. Avian influenza	Swayne and Sims, 2021	In: Metwally, S., El Idrissi, M., Viljoen, G., eds. Veterinary Vaccines: Principles and Applications. Chichester, United Kingdom, Wiley-Blackwell. https://www.wiley.com/en-us/Veterinary+Vaccines%3A+Principles+and+Applications-p-9781119505952Veterinary+Vaccines%3A+Principles+and+Applications-p-9781119505952
Development and application of a vaccination planning tool for avian influenza	Castellan *et al.*, 2014	Avian Diseases, 58(03): 437–452.
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Veterinary cold chain manual: Ensuring effective vaccines	Young, *et al.*, 2015	English: https://www.aciar.gov.au/publication/books-and-manuals/mn165a-veterinary-cold-chain-manual French: https://kyeemafoundation.org/wp-content/uploads/2016/09/MANUEL-DE-LA-CHAÎNE-DU-FROID-VÉTÉRINAIRE.pdf
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3.3.4. Avian influenza (including infection with high pathogenicity avian influenza viruses) (version adopted in May 2021)	WOAH, 2021	https://www.woah.org/fileadmin/Home/eng/Health_standards/tahm/3.03.04_AI.pdf
18. Avian influenza	Swayne and Sims, 2021	In: Metwally, S., El Idrissi, M., Viljoen, G., eds. Veterinary Vaccines: Principles and Applications. Chichester, United Kingdom, Wiley-Blackwell. https://www.wiley.com/en-us/Veterinary+Vaccines%3A+Principles+and+Applications-p-9781119505952Veterinary+Vaccines%3A+Principles+and+Applications-p-9781119505952

Guidelines or tools	Source	Access link
Vaccination of poultry against highly pathogenic avian influenza – part 1. Available vaccines and vaccination strategies	European Food and Safety Authority (EFSA), 2023	https://efsa.onlinelibrary.wiley.com/doi/10.2903/j.efsa.2023.8271
Vaccination of poultry against highly pathogenic avian influenza – Part 2. Surveillance and mitigation measures	EFSA, 2024	https://www.efsa.europa.eu/en/efsajournal/pub/8755
FAO Virtual Learning Centers vaccine stewardship in prevention and control of highly pathogenic avian influenza	FAO Virtual Learning Centers (VLC), 2024	https://www.fao.org/animal-health/news-events/news/detail/empowering-veterinary-professionals-globally-to-combat-highly-pathogenic-avian-influenza/en
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A value chain approach to animal diseases risk management	FAO, 2011	https://openknowledge.fao.org/handle/20.500.14283/i2198e
Designing and implementing livestock value chain studies – A practical aid for Highly Pathogenic and Emerging Disease (HPED) control	FAO, 2012	https://openknowledge.fao.org/handle/20.500.14283/i2583e
Toolkit for value chain analysis and market development integrating climate resilience and gender responsiveness	FAO, UNDP, 2020	https://doi.org/10.4060/cb0699en

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Annex 3: Virological scope of the strategy

The impetus to develop the Global Strategy for the Prevention and Control of High Pathogenicity Avian Influenza (2024–2033) resulted from the panzootic of the 2.3.4.4b and related clades of the Gs/GD Eurasian lineage, which were at the time of writing circulating in Asia, Africa, Europe, North and South America, and Antarctica.[1] These viruses have had an unprecedented and profound impact on poultry, wild birds and mammals, public health and the environment, making it a genuine One Health crisis across veterinary, environmental and public health. Such viruses are predominantly H5N1 and H5N6 subtypes, but they have experienced continual reassortment in wild aquatic birds, swapping gene segments with low pathogenicity avian influenza (LPAI) viruses to produce diverse virus genotypes containing different neuraminidase (e.g., from N2 to N9) or internal gene segments, or both, such as reported in the United States of America with LPAI viruses from wild waterfowl and in Europe with H13 LPAI viruses from gulls in 2022.[2,3] These H5Nx viruses are not a single genotype, but contain the 2.3.4.4b and, to a lesser extent, 2.3.2.1c or other Gs/GD H5 hemagglutinin gene segment and may vary in one or more of the other seven gene segments. Such reassortant viruses have resulted in a change in the biology, ecology and epidemiology of HPAI including production of infections in over 489 species of wild, captive and domestic birds; transcontinental spread of the viruses along wild aquatic bird migration routes and pathways; massive die-offs in some seabird species, sea lions, and harbour and elephant seals; a change from farm-to-farm spread of the virus as the entry point to predominantly direct exposure to infected wild birds or indirect exposure to contaminated environments though human activity. This necessitates a holistic, One Health approach to solve this unique global veterinary, environmental and public health crisis.

The principles of this Global Strategy for the Prevention and Control of High Pathogenicity Aavian Influenza have different levels of application to the control of different avian influenza categories (Table 3.1), which are as follows:

1. fully applicable to 2.3.4.4b and other clades of the Gs/GD Eurasian lineage HPAI;
2. H7N9 Eurasian and H7N3 North American lineages of HPAI that are entrenched in poultry with a limited geographic distribution and not spread by migratory aquatic birds;
3. emergent H5 and H7 HPAI that have arisen and may in the future arise anywhere on the globe from the mutation of the H5 or H7 hemagglutinin gene of a LPAI while circulating to become an HPAI virus;
4. LPAI that are notifiable to WOAH under two specific situations;[4] and
5. all other LPAI.

In addition, the principles of this global strategy can be used to mitigate and control other TADs, such as Newcastle disease in poultry and other avian species. Improved poultry biosecurity and vaccination will also contribute to reduced antimicrobial use.

Low pathogenicity Eurasian lineage avian influenza A(H7N9) viruses emerged as a severe cause of zoonotic disease in humans in China in 2013 after becoming established in domestic chickens. By 2017, high pathogenicity strains of this virus had emerged in chickens. Since compulsory vaccination was introduced against these viruses in 2017, LPAI viruses of this subtype are no longer detected, but HPAI A(H7N9) viruses have persisted and are detected on occasions mainly in live poultry markets.

High pathogenicity North American lineage H7N3 emerged in 2012 in Mexico, and has also been found in Guatemala. They have been contained through use of vaccines and biosecurity measures but still cause occasional disease outbreaks.

They have a more limited ecology than the H5N1 Gs/GD HPAI viruses as they have not been recognized as causing infections in wild aquatic birds nor been distributed along their migratory pathways, In addition, they have not produced infections in wild and domestic mammals. The H7N9 HPAI, along with its H7N9 LPAI predecessor, has produced significant sporadic human infections with 1 568 laboratory-confirmed human infections including 616 fatal cases.[5] These two entrenched HPAI virus lineages are appropriate for consideration in the Global Strategy for the Prevention and Control of High Pathogenicity Avian Influenza (2024–2033), specifically the preventative strategy of vaccination, the practice of exclusionary biosecurity, detection through surveillance in poultry, stamping out of infected flocks, and the development of coordinated control programmes at the regional and national levels.

Most HPAI outbreaks have resulted from H5 and H7 LPAI viruses being introduced from wild aquatic birds into poultry, adapting to terrestrial poultry and mutating at the proteolytic cleavage site of the hemagglutinin to become emergent H5 and H7 HPAI viruses. These emergent HPAI viruses have classically been managed at

the national, state or provincial level through identification of infected flocks by passive or active surveillance or both, implementation of movement controls, and stamping out with achievement of eradication within one month to several years. The prevention and control strategy for emergent HPAI viruses should include the practice of exclusionary biosecurity, the detection of infections through surveillance in poultry, stamping out of infected flocks, and the development of coordinated control programmes at the national or subnational level. In prolonged outbreaks with emergent HPAI, preventative vaccination will reduce the number of premises affected and reduce the time to eradication. Additional resources for monitoring of H5 and H7 LPAI viruses in wild birds and poultry provide a way to identify the precursor LPAI viruses in infected wild birds in a specific geographic area, alert producers to an increased risk of H5 and H7 LPAI introduction into their flocks and enhance biosecurity to reduce the risk of such an introduction. Such monitoring activities can be synchronized with ongoing HPAI surveillance programmes.

Globally, LPAI viruses that 1) cause a sudden and unexpected increase in virulence for poultry such as the recent H3N1 LPAI in Belgium and the Netherlands;[6] or 2) have a proven natural transmission to humans associated with severe consequences, such as H10N8 LPAI that caused fatal human infections in China,[7] are notifiable to WOAH.[4] The LPAI viruses that do not meet either of the two criteria are not notifiable to WOAH but may be notifiable to the national veterinary authority and subject to national, state, provincial or company control plans or actions. The LPAI viruses can be detected in a risked-based national monitoring programme that is parallel to a national HPAI surveillance programme, because the initial steps for LPAI and HPAI identification are the same. The virological and serological laboratory systems would use the same biological samples and the same screening tests to detect the level of a type-A avian influenza virus and, if positive, further testing would then be conducted to determine, virologically or serologically, the hemagglutinin subtype (H5 and H7 as possible HPAI) and the pathotype (low or high pathogenicity of the H5 or H7 viruses). Based on a risk assessment and the available resources, the undefined hemagglutinin subtype samples could be tested by specific rRT-PCR, sequencing or HI testing to determine the subtypes of LPAI virus. These resulting datasets can be further analysed for identification and control at the national and regional level. The control programme may use a stamping-out process or controlled marketing. In countries with limited resources, vaccination may be a more appropriate control tool than it has been for HPAI. Biosecurity strengthening must be part of the control programme. Some LPAI viruses such as H9N2 are distributed widely over Asia, Africa and the Near East causing extensive infection in poultry and substantial economic losses to producers. The enhanced biosecurity, preventative vaccination and coordinated control programmes for LPAI will also benefit from the Global Strategy for the Prevention and Control of High Pathogenicity Avian Influenza (2024–2033).

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TABLE A3. Comparison of different components used in avian influenza control programmes for different categories of avian influenza

Avian influenza category	Notifiable to WOAH[g]	Wildlife monitoring and surveillance[h]	Biosecurity[i]	Stamping out[j]	Vaccination[k]	Coordination of prevention and control programmes[l]			Comments
						National	Regional	Global	
1. HPAI: H5Nx 2.3.4.4 and related clades, Gs/GD Eurasian lineage HPAI	Yes	Enhanced	Yes	Yes	Yes[k]	Yes	Yes	Yes	Global ecological and epidemiological changes impacting domestic bird outbreaks; infections, disease and deaths in wild birds and mammals; negative impact on the environment and sporadic human cases.
2. HPAI: H7N9 Eurasian (China) and H7N3 North American lineage (Mexico and Guatemala)	Yes	Baseline	Yes	Yes	Yes[k]	Yes	Yes	-	Nationally or regionally focused and entrenched in poultry or domestic birds or both. No known wildlife role. H7N9 produced sporadic human infections. Poultry vaccination used for food security and protection of public health (H7N9).
3. HPAI: Emergent H5 and H7	Yes	Baseline	Yes	Yes	Not practical	Yes	-	-	State or province-focused poultry and domestic bird, with rapid identification via surveillance and an immediate stamping-out programme to quickly eliminate HPAI from poultry. Range of no-to-minimal wild bird and public health involvement.
4. LPAI: 1) A sudden and unexpected increase in virulence for poultry; and 2) proven natural transmission to humans associated with severe consequences	Yes	Baseline	Yes		Unknown	Yes	-	-	These special situations for LPAI require national review of epidemiology and a control strategy developed based on the national situation.
5. LPAI: Other LPAI (all others not included in above), including H9N2	Option	Baseline	Yes		Entrenched strains	Yes	H9N2		The control strategy is based on subnational and national economic needs, but coordination between countries may be necessary with economically important LPAI such as the H9N2 Eurasian lineage.

[g] Mandatory notification to WOAH per Terrestrial Code chapter 10.4 for avian influenza categories 1-4. Infections by LPAI (avian influenza category 5) in domestic or wild birds can be voluntarily reported (optional) in the WOAH semi-annual report.

[h] Monitoring of avian influenza viruses in wild birds supports early warning systems and should be implemented where possible based on financial and human resource availability. Most critical is surveillance for HPAI viruses in poultry and H5Nx Gs/GD Eurasian lineage in wild birds and mammals. During periods of freedom from HPAI, both passive and active wild bird monitoring should include at a minimum H5 and H7 HPAI and LPAI as determined by a risk assessment. Enhanced monitoring and surveillance should be performed during periods of high risk such as when HPAI is detected in a neighbouring country or countries in poultry or wild birds, or both, and mammals.

[i] Exclusionary biosecurity programmes have broad application in preventing the introduction of avian influenza and other poultry diseases on a farm/premises, and their practice should be standard procedure for all avian influenza categories.

[j] Stamping-out programmes, including movement controls, are critical components of an elimination strategy for all HPAI in poultry and domestic birds. Many countries use controlled marketing for LPAI (avian influenza categories 4 and 5) while others use stamping-out for H5 and H7 LPAI.

[k] Individual countries can make the decision to implement vaccination as a tool as part of a comprehensive control programme. Poultry vaccination has had a strong positive effect in reducing poultry HPAI outbreaks and the number of human cases with panzootic Gs/GD HPAI (avian influenza category 1) and H7N9 HPAI (avian influenza category 2), and in reducing poultry HPAI outbreaks with H7N3 HPAI (avian influenza category 2), but has not been widely used with emergent H5 and H7 HPAI. Vaccination has strong positive impact on reducing LPAI infections in poultry and is used widely against economically important H9N2 Eurasian LPAI, H5N2 North American LPAI and other LPAI entrenched in poultry.

[l] Coordination of prevention and control strategies depends on the geographic extent of the virus and risk of spread, for example the H5Nx Gs/GD Eurasian lineage is global in distribution and requires global coordination for resolution.

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