



World  
Organisation  
for Animal  
Health  
Founded as OIE

Organisation  
mondiale  
de la santé  
animale  
Fondée en tant qu'OIE

Organización  
Mundial  
de Sanidad  
Animal  
Fundada como OIE



# Importance of early detection to tackle animal health emergencies

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Singapore

**Sub-Regional Workshop on Emergency Management  
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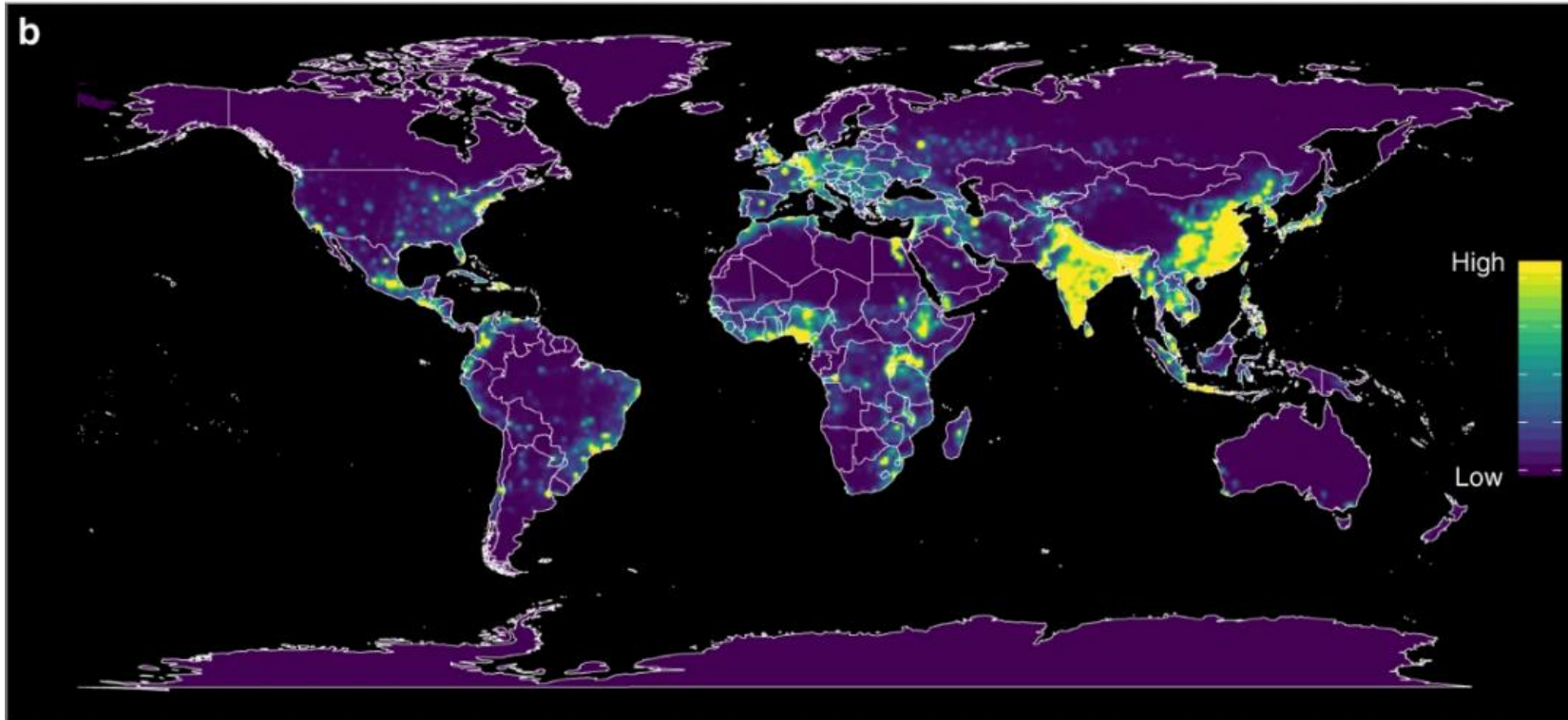


# Our background and what we do

- AVS, a cluster within NParks, is the main touch-point on animal and veterinary matters in Singapore and the first responders for all animal related feedback.
- SFA oversees food safety and food security from farm-to-fork. As the lead agency for food-related matters, SFA's mission is to ensure and secure a supply of safe food for Singapore.



## Zoonotic Emerging Infectious Disease (EID) Heat Map



Heat maps of predicted relative risk distribution of zoonotic emerging infectious disease (EID) events. Estimated risk of event locations after factoring out reporting bias (weighted model output reweighted by population). Allen, T., Murray, K.A., Zambrana-Torrel, C. et al. *Global hotspots and correlates of emerging zoonotic diseases. Nat Commun* 8, 1124 (2017).

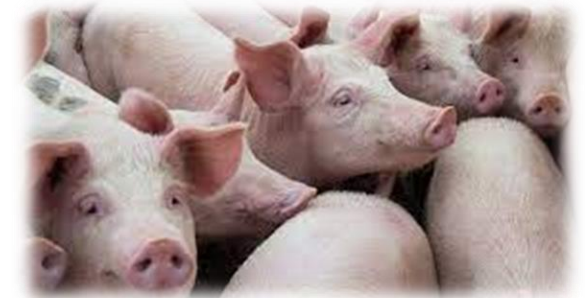
## Historical Examples of EIDs in Singapore

SARS-CoV-2 zoonosis investigation (2019-2021)

H1N1 influenza detected in imported pigs (2009)



## Nipah Outbreak in 1999



Singapore eliminated rabies in 1953

### A Mad Dog in Singapore.

A MAN AND A BOY BITTEN.  
ABOUT 3 o'clock yesterday afternoon a Chinaman and a Chinese boy were attacked in Pekin Street in a vicious manner by a pariah dog suffering from rabies. It appears that the brute first set upon the lad and commenced to bite pieces out of the little fellow's legs. The lad turned round and endeavoured to beat off the dog, but whilst so doing the animal knocked him into the sewer way running by the side of the street, and then sat upon his

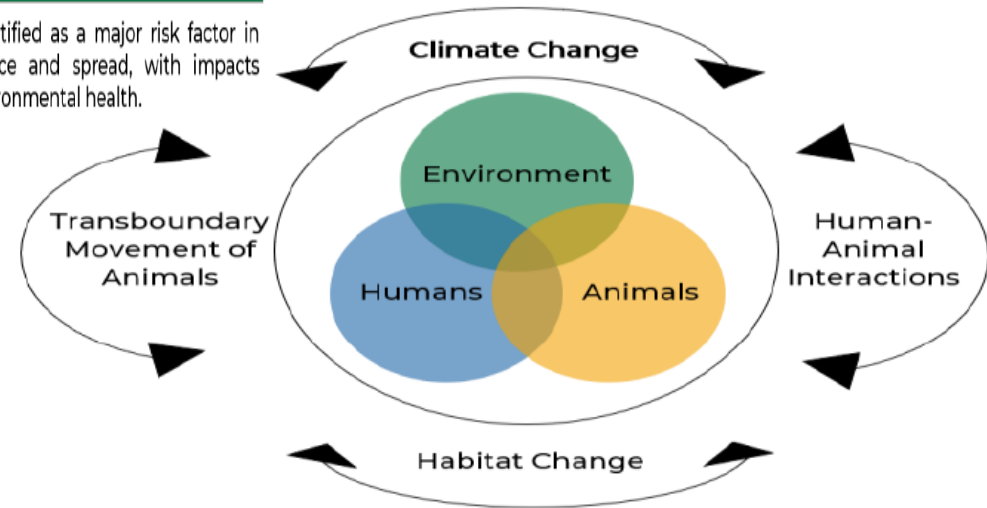
# Singapore context

## Risk drivers for incursions and/or outbreaks:

- Singapore as an international transport hub for trade in animals and animal products
- Singapore is a transit point for migratory wildlife (e.g. birds travelling along the East Asian-Australasian Flyway)
- Higher likelihood of human-animal interactions as they co-exist in the city
- Diseases of importance reside in local wildlife hosts
- Impact on diseases and vectors brought about by climate change

## Shared Disease Risks

Climate change has been identified as a major risk factor in accelerating disease emergence and spread, with impacts across human, animal, and environmental health.



## Animal Health Landscape in Singapore





# Animal & Zoonotic Diseases in the region



## Death due to rabies reported in Petaling, Selangor

Bernama - April 10, 2022 12:41 PM

## African Horse Sickness Strikes Malaysia

As Thailand's horse industry is starting to recover from its AHS outbreak, with thousands of horses vaccinated, the neighboring country of Malaysia is addressing its first cases of the disease.



Lion at Singapore Zoo tests positive for COVID-19; five lions now infected

## THE STRAITS TIMES

Wild boar carcasses in more parts of Singapore test positive for African swine fever



## DVSS: Samples from pigs that died in Ng Ngungun confirmed positive for African Swine Fever

BY PETER BOON ON APRIL 16, 2022, SATURDAY AT 2:15 PM

SARAWAK



## Lumpy Skin Disease confirmed in Sumatra, raising alert for Australia

Dr Ross Ainsworth, 03/03/2022



Singapore has seen its first case of

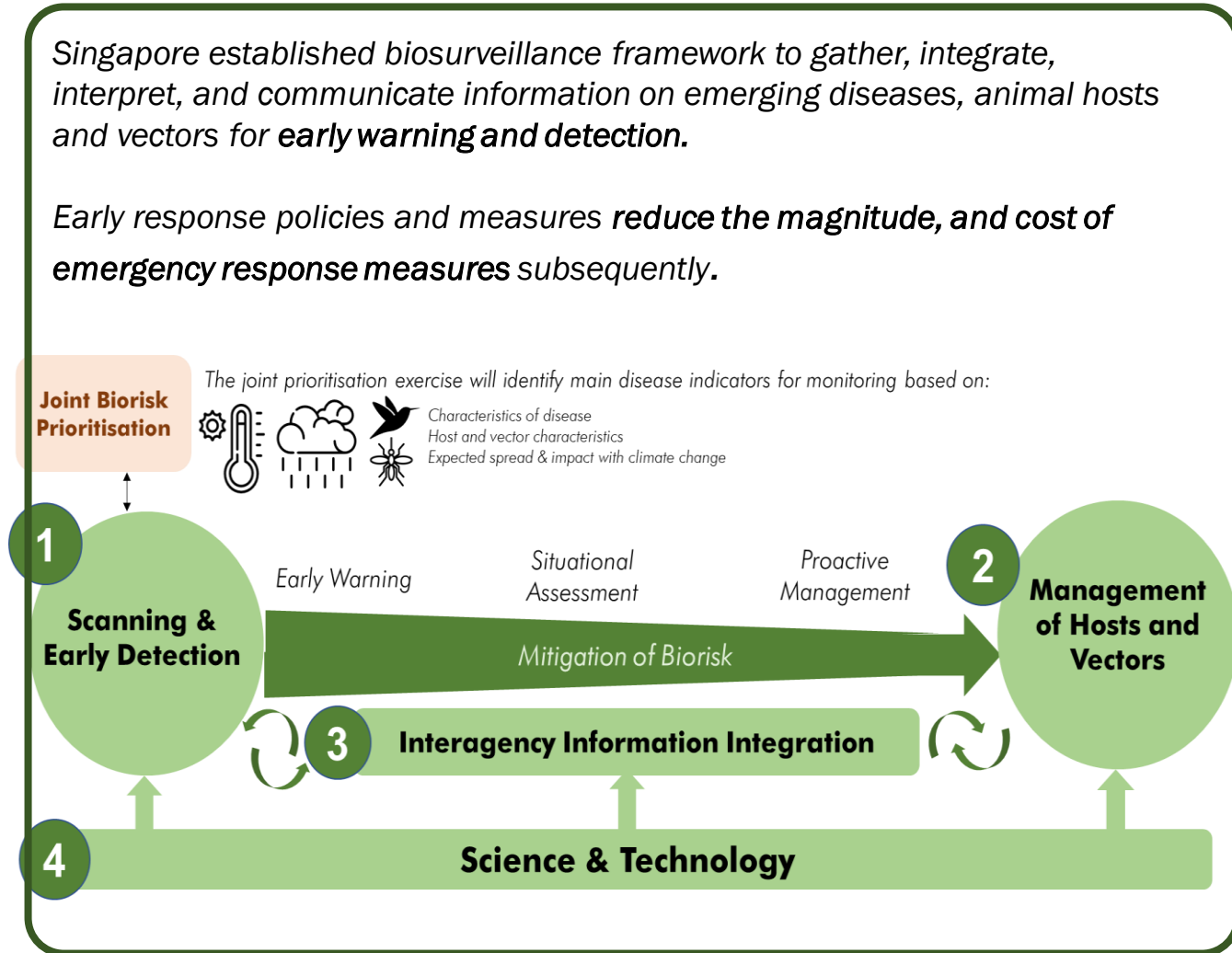
- Lumpy Skin Disease (LSD) in March 2022
- African Swine Fever (ASF) in wild boar in February 2023
- ASF detection in imported live pigs from Pulau Bulan, Indonesia in Apr 2023
- Infection with tilapia lake virus (TILV) detection in 2024

# Importance of Early Disease Detection for Control of Animal and Zoonotic Diseases

## Advantages of early detection:

- Early intervention to minimize the impact on animal health [severity of disease].
- More time to manage the impact on affected animal population [spread of disease].
- Less costly – minimize use of medications/chemical treatments, depopulation.
- Prevent spread to other sectors (One Health), regions or countries.
- Facilitate control/eradication of disease.

Early detection facilitates effective prevention and control of the spread of diseases. It also facilitates coordination with other sectors (One Health) and countries.



# Importance of Early Animal Disease Detection

Early detection facilitates effective prevention and control of the spread of diseases i.e. ASF ensure a resilient supply of safe food

**We adopt a multi-pronged approach to ensure Singapore has a supply of safe food.**



#### Grow Local

- Helps mitigate our reliance on imports and serves as a buffer during supply disruptions to import sources
- Transform agri-food industry into one that is highly productive, employing climate-resilient and sustainable technologies



#### Diversify Import Sources

- Reduces risk of over-reliance on any one supply source



#### Grow Overseas

- Support our companies to expand and grow overseas to build their capabilities and open up new markets for commercial viability

**SFA's '30 by 30' Vision aims to build capabilities & capacity to produce 30% of our nutritional needs by 2030.**

#### Why local production?

- Buffers impact of **major overseas food supply disruption**
- **Mitigates impact of climate change and resource constraints** with environment-controlled highly productive technologies
- **Close the production loop in the long run.** Invest in R&D to drive innovations that enable us to strengthen food production capabilities and reduce our reliance on external agri-input sources

HPB's My Healthy Plate as a guide





# Singapore's context – early scanning, risk assessment and emergency preparedness

- Emergency preparedness commitment to deal with zoonoses by inter-sectoral agencies via One Health Framework since 2012
- One Health agencies i.e. Ministry of Health, National Environment Agency, National Parks Board, Singapore Food Agency and PUB, Singapore Water Agency recognized the importance of cross sectoral working relations to safeguard public health.
- To pre-empt risk, the agencies conducted intelligence scans and joint risk assessments of emerging disease threats i.e. avian influenza
- In 2023, NParks conducted a workshop with One Health agencies to prioritise zoonotic diseases of greatest concern for Singapore for prevention and control.
- Conducted joint one health disease investigation for leptospirosis and joint simulation exercises i.e. African Swine Fever and avian influenza.



## Our Story: One Health in Singapore

Established in 2012 and guided by the inter-agency One Health Co-ordinating Committee (OHCC), Singapore's One Health Framework aims to build a transdisciplinary multi-agency workgroup that can integrate One Health efforts across human, animal, water and environment health sectors. The ultimate goal is to learn, prevent, prepare, and respond to cross-sectoral public health threats using an integrated and collaborative One Health approach. The One Health framework comprises five agencies in Singapore - the Ministry of Health (MOH), the National Environment Agency (NEA), the National Parks Board (NParks), the Singapore Food Agency (SFA) and PUB, Singapore's National Water Agency.

Since then, the One Health agencies have made significant progress in developing joint response protocols for priority diseases, training and capacity building, risk communications and implementing surveillance programmes. The framework was instrumental in bringing local outbreaks of vector-borne and food-borne diseases under control (e.g. Zika virus infection, and invasive

Issue 1: November 2022

**In This Issue:**

1. Monkeypox Multi-country Outbreak
2. Special Feature: Epidemic Intelligence from Open Sources (EIOS) Workshop for One Health Agencies

<https://www.moh.gov.sg/resources-statistics/reports/situational-and-risk-assessment-report-for-one-health-hazards>

## ONE HEALTH ONE HEALTH ZOOONOTIC DISEASE PRIORITIZATION WORKSHOP Singapore • 19 to 21 April 2023



The One Health Zoonotic Disease Prioritisation (OHZDP) Process uses a mixed methods prioritisation process developed by the U.S. Centers for Disease Control and Prevention's (CDC) One Health Office.

### Top 5 One Health zoonoses of priority

- Avian Influenza
- Coronavirus disease (COVID-19)
- Salmonellosis (non-typhoidal)
- Yellow Fever
- Leptospirosis

### 10 other zoonoses to be monitored closely

Categories (Main transmission route)	Zoonotic diseases
Animal Borne Diseases	<ul style="list-style-type: none"> <li>• Nipah virus</li> <li>• Rabies</li> </ul>
Vector Borne (Mosquito) Diseases	<ul style="list-style-type: none"> <li>• Japanese Encephalitis</li> <li>• Dengue Fever</li> <li>• Zika Fever</li> </ul>
Rodent Borne Disease	<ul style="list-style-type: none"> <li>• Hantavirus Disease</li> </ul>
Food Borne Diseases	<ul style="list-style-type: none"> <li>• Campylobacteriosis</li> <li>• Hepatitis E</li> </ul>
Droplet Borne Diseases	<ul style="list-style-type: none"> <li>• Severe Acute Respiratory Syndrome (SARS)</li> <li>• Middle Eastern Respiratory Syndrome (MERS)</li> </ul>



# Singapore is free of major diseases

- Avian influenza

- HPAI and H5/H7 LPAI have never been reported

- Rabies

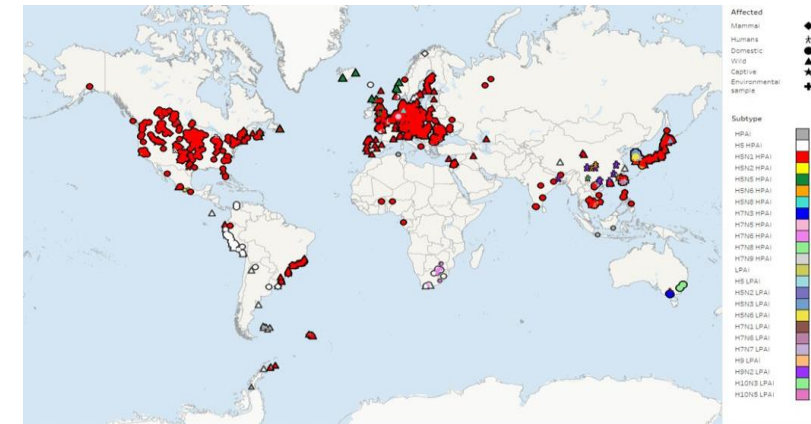
- Free since 1953

- African Horse Sickness

- Never been reported

- Foot and Mouth Disease

- Free without vaccination, last occurrence in 1935



Global Distribution of Avian Influenza Virus with Zoonotic Potential Observed since 1 Oct 2023, Source: FAO, 29 July 2024



# Response Measures to Disease Outbreak

- Movement control
- Depopulation of affected poultry farms
- Disinfection of infected premise after depopulation
- Enhanced surveillance
- Emergency vaccination



# National Prevention and Control for Animal/Zoonotic Diseases (1)

Measures	Y/N	Description
1. Programme to control or eradicate disease	Y	Surveillance and contingency plans for zoonotic disease e.g. HPAI
2. Veterinary legislation	Y	Avian diseases including HPAI are legally notifiable. Legislation in place to carry out disease control measures such as culling.
3. Emergency preparedness and response plans	Y	Contingency plans in place for HPAI, exercises carried out periodically.
4. Disease surveillance	Y	Active and passive surveillance
5. Disease reporting	Y	See point 2.
6. Detection and management of cases	Y	See point 4-5. Investigation and lab capabilities present.
7. Measures to prevent introduction or spread of disease	Y	See points 1-6.
8. Vaccination	Y	Vaccination done in poultry for NDV and other production disease.
9. Measures to protect public health	Y	See points 1-6.
10. Communication and collaboration among all competent authorities	Y	Collaboration among One Health agencies, joint exercises and workshops conducted.
11. Awareness programme for relevant stakeholders	Y	Circulars and regular engagement with key stakeholders.



# National Prevention and Control Plan for HPAI

- *Pre-border Checks:*

- Maintaining HPAI free imports through health certificates, source accreditation, zoning and compartmentalization arrangements
- Pre-import inspection at farms
- Horizon scanning – for early detection of overseas disease events



- *Border Inspection:*

- Border checks via inspection all imports of poultry, birds, eggs and avian products at the port of entry
- Working with border authorities to curb smuggling of birds and avian products, at borders and checkpoints
- Sampling and biosurveillance at border



- *Post-border Processes in place: Farm biosecurity, biosurveillance, contingency plans, vaccination*

- Maintenance of farm biosecurity through licensing conditions and regular inspections
- Sampling and biosurveillance of local bird populations, including wild birds and migratory shorebirds
- HPAI contingency plans (e.g. HPAI vaccination)





# Disease Surveillance

- *Local and imported poultry, local and imported ornamental birds, zoological collections, free-roaming wildlife*
- *Risk-based sampling frequency*
  - Lower frequency (monthly or less) during low-risk periods
  - Higher frequency (fortnightly) during high-risk periods (migratory season, Sep to Mar)
- *Targeted surveillance*
  - Dead/Dying poultry or associated with higher mortalities
- *Cloacal, tracheal and environmental swabs*



# Collaboration with Stakeholders

- Compartmentalization and zoning arrangements with source countries
- Regional (e.g. Avian Influenza Group for ASEAN, AIGA) and international mechanisms for coordination HPAI control and prevention
- Regular meeting with local stakeholders (e.g. farmers), One Health government agencies
- Conducting Exercises with industry and stakeholders



Tabletop Exercise with the industry



Tabletop Exercise with the One Health agencies



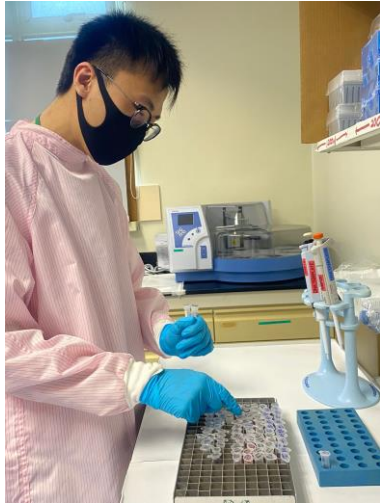
Ground deployment exercise



# Laboratory Capacity

- *Avian influenza*

- VI, PCR (conventional & real-time), sequencing (Sanger & NGS), ELISA



# Challenges in Implementing the National Plan

S/N	Challenges
1	<p>Resource Constraints</p> <ul style="list-style-type: none"><li>Limited resources for implementing comprehensive preventive measures.</li></ul>
2	<p>Compliance and Enforcement</p> <ul style="list-style-type: none"><li>Challenges in ensuring full compliance with preventive measures and enforcing biosecurity protocols across the industry, including in peacetime.</li></ul>
3	<p>Emerging Diseases</p> <ul style="list-style-type: none"><li>Rapidly evolving nature of diseases and the emergence of new pathogens pose challenges in staying ahead of potential threats.</li></ul>
4	<p>Knowledge and Awareness</p> <ul style="list-style-type: none"><li>Varied levels of knowledge and awareness among stakeholders regarding the importance of early detection and implementation of preventive measures.</li></ul>



# Way Forward

S/N	Way Forward
1	<p>Capacity Building with technology</p> <ul style="list-style-type: none"><li>• Provide support and resources for capacity building, especially for smaller farms, to enhance their ability to implement preventive measures effectively with technology.</li></ul>
2	<p>Regulatory Support</p> <ul style="list-style-type: none"><li>• Strengthen regulatory frameworks and enforcement mechanisms to ensure compliance with biosecurity and disease prevention protocols.</li></ul>
3	<p>Research and Surveillance</p> <ul style="list-style-type: none"><li>• Invest in research and surveillance capabilities to monitor and respond to emerging diseases, leveraging advanced technologies and data analysis.</li></ul>
4	<p>Education and Training</p> <ul style="list-style-type: none"><li>• Conduct targeted education and training programs to improve knowledge and awareness of early detection and preventive measures among farmers, veterinarians, and other stakeholders.</li></ul>



# Thank you



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