

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

# **Avian Influenza in Egypt**

**By**

**Professor Dr Mohamed H. H. Awaad**

*Former Chairman of the Poultry Diseases Department*

*Faculty of Veterinary Medicine, Cairo University*

**Phylogenetic  
Analysis of the  
AI Virus in  
Egypt**

✱ Since 1996/1997, **H5N1**  
subtype (**A/H5N1**)  
differentiated into 10  
phylogenetic clades  
(designated clades **0 to 9**)  
based on the sequence  
homology of the HA gene.

Phylogenetic analysis of 1<sup>st</sup> record  
Egyptian **H5N1** belonged to clade  
2.2.1.

In 2008, **H5N1** clade 2.2.1.1 was  
recorded in vaccinated chickens  
*(due to the continuous evolution of*  
*viruses).*

In 2014, a new cluster **H5N1** 2.2.1.2 appeared (*as a result of the continuous circulation of the virus in the field*).

In 2016, a newly circulated **HPAI** subtype **H5N8** clade 2.3.4.4 was isolated from migratory birds in Egypt.

In March 2019, lineage  
clade 2.3.4.4

(**H5N2 HPAI Vs.**) has  
been isolated from  
Egypt

# Summary

## ***HPAI H5N1***

- 2006-2008:** → Subclade 2.2.1 a.  
**2008-2011:** → Subclade 2.2.1.1b.  
**2011-2014:** → Subclade) 2.2.1.2c  
**2016-2017:** → Subclade 2.2.1.2 d.

## ***HPAI H5N8***

*(Isolated from migratory birds & ducks)*

- 2016:** → Subclade 2.3.4.4

## ***HPAI H5N2***

- 2019:** → Subclade 2.3.4.4

- 2016:** → ***LP AI H9N2***

*(Recorded combined with IB or ND)*

**H9N2** is endemic in poultry across several Eastern Mediterranean countries (*including Lebanon, Jordan, Egypt, Tunisia, Saudi Arabia, and the UAE*). **H5N2** clade 2.3.4.4 viruses have undergone genetic reassortment with **H5N1** viruses and local **H9N2** subtypes.

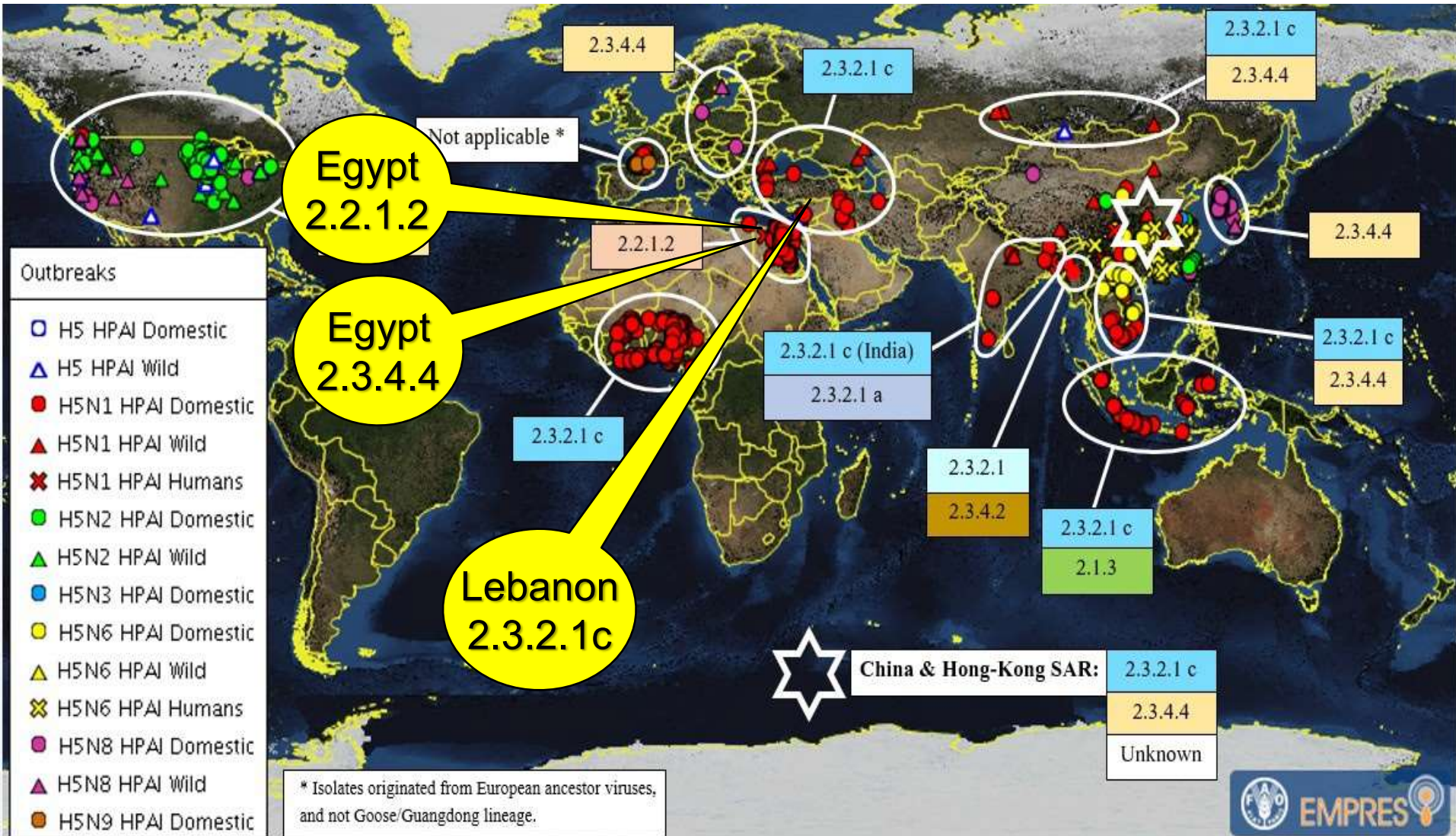
This raises public health concerns,  
as **H9N2** can potentially infect humans because it can cross the species barrier.



In 2016, **H5N1**

Subclade 2.3.2.1c was  
isolated in Lebanon.

# Distribution of H5 Subtypes and clades (in boxes) worldwide distribution



**Then, Different  
Clades of  
HPAI (H5N1) are  
circulating in &  
near Egypt!**

Continuous evolution of

**HPAI (H5N1)** virus in Egypt

*(With the introduction of the **H5N8** virus  
from migratory birds and ducks)*

+ Presence of recently isolated new  
clades in neighbouring areas



Leads To

**Predicting the Virulence  
Manner of These Viruses.**



To effectively combat the ongoing spread of the virus in Egypt, continuous monitoring of circulating viruses and antigenic characterisation for vaccine development are crucial.

Additionally, adopting strong farming practices and biosecurity measures is essential to protect our communities.

**Avian  
Influenza  
Vaccines**

# Vaccination achieved better control over the disease:



To

- ✱ Protect public health.
- ✱ Safeguard the economic interests of commercial poultry producers from the threat of **H5N1**.

# Vaccination

was the main tool  
implemented in  
Egypt since 2007 to  
control AI **H5N1**.

# ✳️ **Inactivated AI Vaccines**

## **1. Homologous Vaccines:**

Representing antigenic sites of “variant” (clade 2.2.1) **H5N1**, recognised by HI (**R5 and EGYvar**), induced protection against “classic” and “variant” **H5N1**.

## **2. Heterologous Vaccines:**

Induced protection against “classic” (2.2 proper) but not “variant” (clade 2.2.1) **H5N2**. (Differentiation of Infected from Vaccinated Animals “DIVA”).

# ✱ **Recombinant AI Vaccines:**

[Expressed in Live Vector fowl pox (rFPV), ILT, Lasota viruses, Duck Enteritis virus (rDVE), rd-Adenovirus, Herpesvirus Turkey (rHVT), *att-Salmonella* Typhimurium, rd-Venezuelan *Equine Encephalitis* virus].

Since late 2013, different subtypes of the clade 2.3.4.4 “**H5**” viruses, including **H5N1, H5N2, H5N6, and H5N8**, have caused vast disease outbreaks in poultry in Asia, Europe, North America, and **Egypt**.

✱ Reassortant bivalent  
inactivated vaccines for  
avian influenza,  
produced by **QYH**  
**Company in China**  
(Re-8 and Re-6).

**H5N1** inactivated vaccine

**Re-8** was prepared by

using:

**A seed virus**

*(contains HA and  
NA genes from  
the clade*

*2.3.4.4 virus).*

**Plus**

**Six internal  
genes from a  
high-growth  
virus**

*[A/PuertoRico/8/1934  
(H1N1)].*

**Re-6**, which contains HA and NA genes from a clade 2.3.2.1 **H5N1** virus, was prepared.

Its efficacy has been evaluated against 6 clade **H5** viruses.

# **The Effect of Reassortant Bivalent Avian Influenza Inactivated Vaccine produced by QYH company:**

1. The vaccinated chickens with Re-6 or Re-8 are completely protected (no disease signs, virus shedding, or death) from the challenge with the same clade virus.
2. The Re-6 or Re-8 vaccines provide part protection from the challenge with different clade strains.

**✱ Reverse Genetic  
Generated AIV seed  
strains Vaccine:  
(Re-6 strain + Re-8  
strain Vaccine ).**

# Importance of

## Re-6 strain + Re-8 strain vaccine

✱ **More focused on specific**

**geographic needs** (as H5N1 HPAI became more geographically isolated).

✱ **Covers the continuous evolution of H5N1 HPAI into different genetic subclades or antigenic subgroups.**

✱ The protective rate of the Re-6+Re-8 vaccine produced by QYH ranges from 94 to 100% in different kinds of commercial farms.

*Thank*

*You*