Avian and Pandemic Influenza

Dr John J. Jabbour

Medical Epidemiologist, Emerging Diseases, Communicable Diseases Surveillance, Forecasting and Response, WHO/EMRO

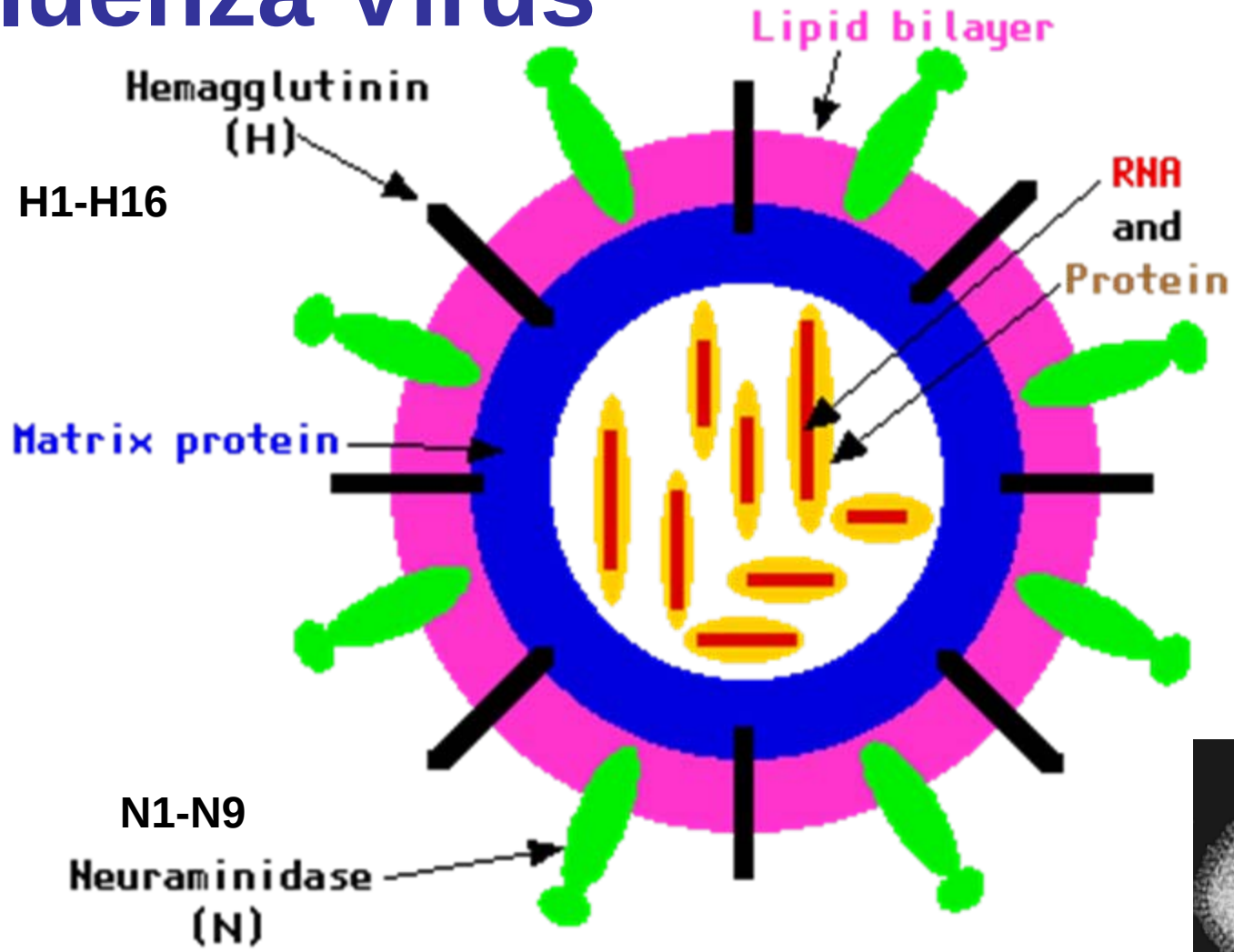
Different Types of Influenza: Different Goals, and Different Strategies

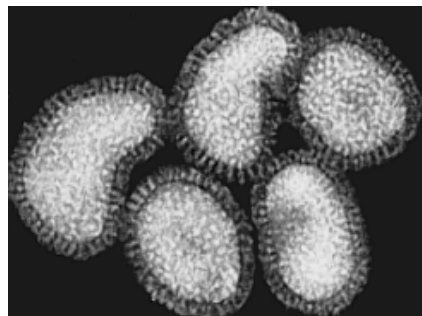
- **Seasonal**
- **Avian**
- **Pandemic**
- **Different phases of pandemic influenza: Different strategies**

What is Avian Influenza?

- Avian influenza is an animal disease that occurs in birds and caused by different subtypes of influenza viruses:
  - There are two patterns of the disease:
    - Highly pathogenic: 100% death of poultry
    - Low pathogenic: mild symptoms
- The current virus is:
  - Highly pathogenic
  - H5N1

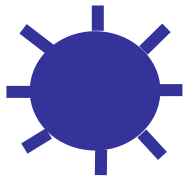
Influenza Virus

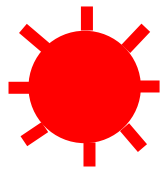




Where are we now?

Man to man infection

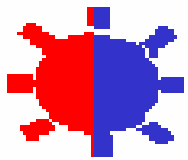




Infects birds mainly occasionally infects man

HUMAN
SEASONAL
INFLUENZA
VIRUS (HI)

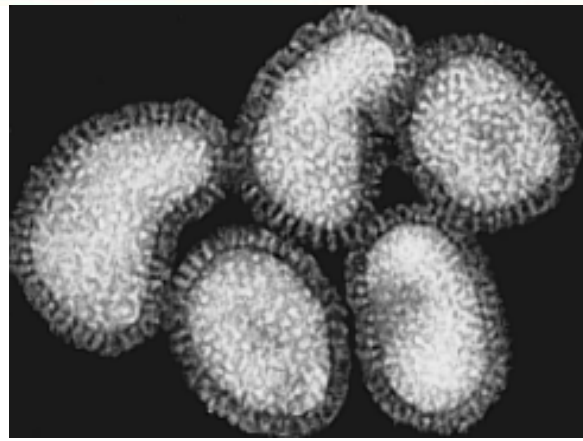
AVIAN
INFLUENZA
VIRUS (AI)



??????????

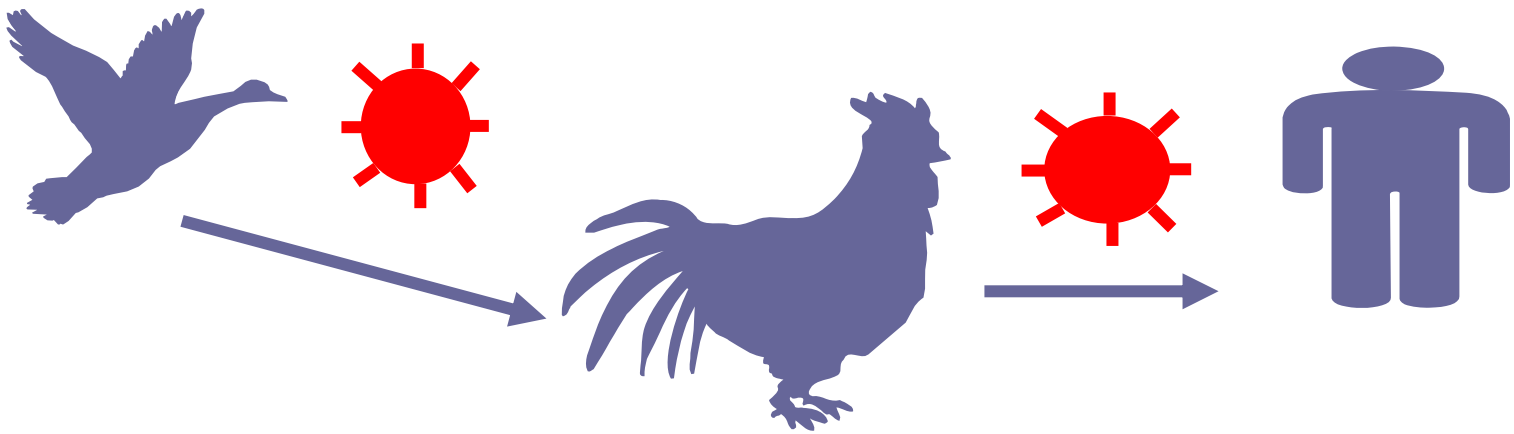
THIS IS THE SITUATION **NOW**

From Birds to Human



Migratory water birds

Domestic birds

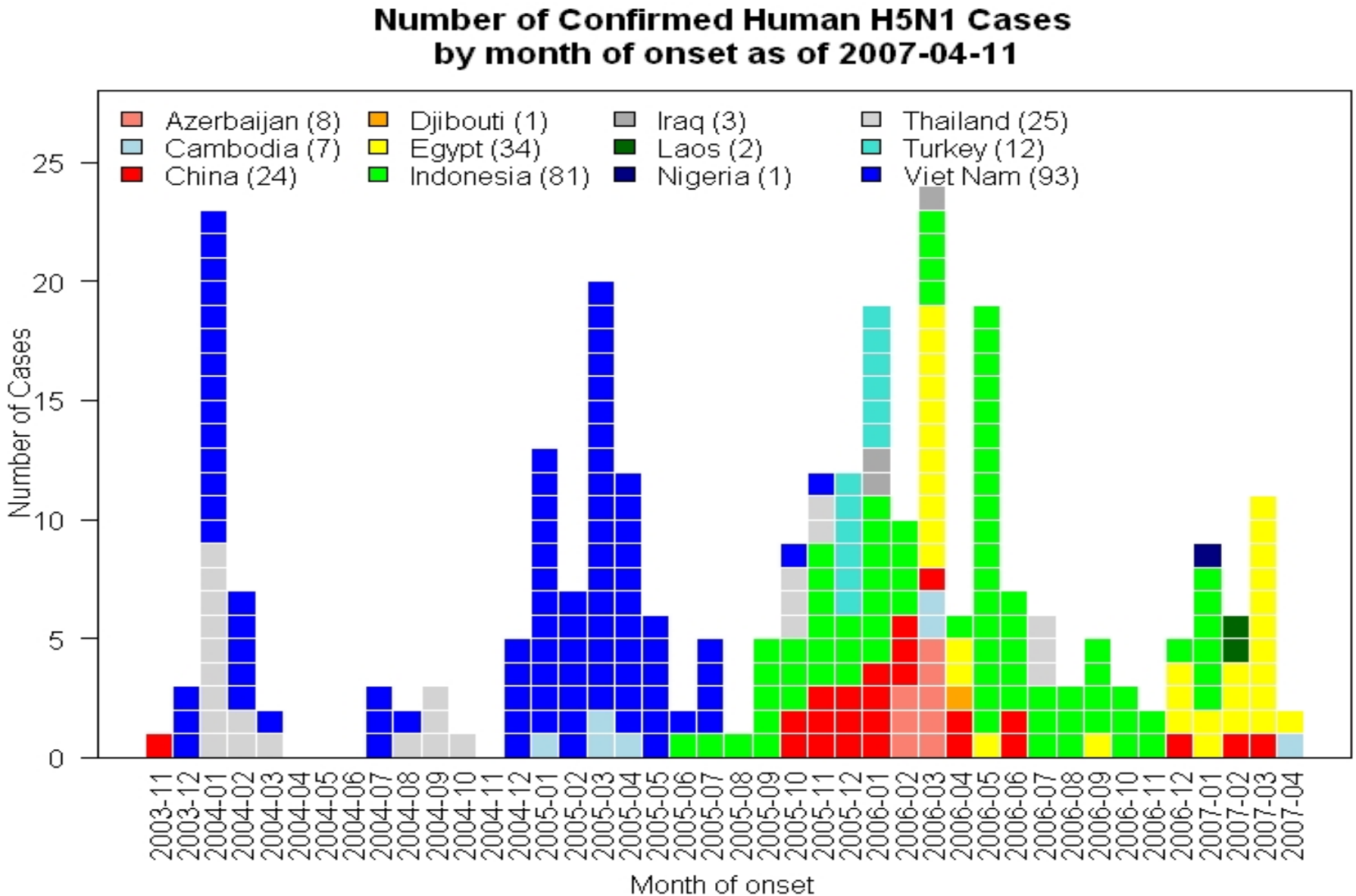


Source: WHO/WPRO

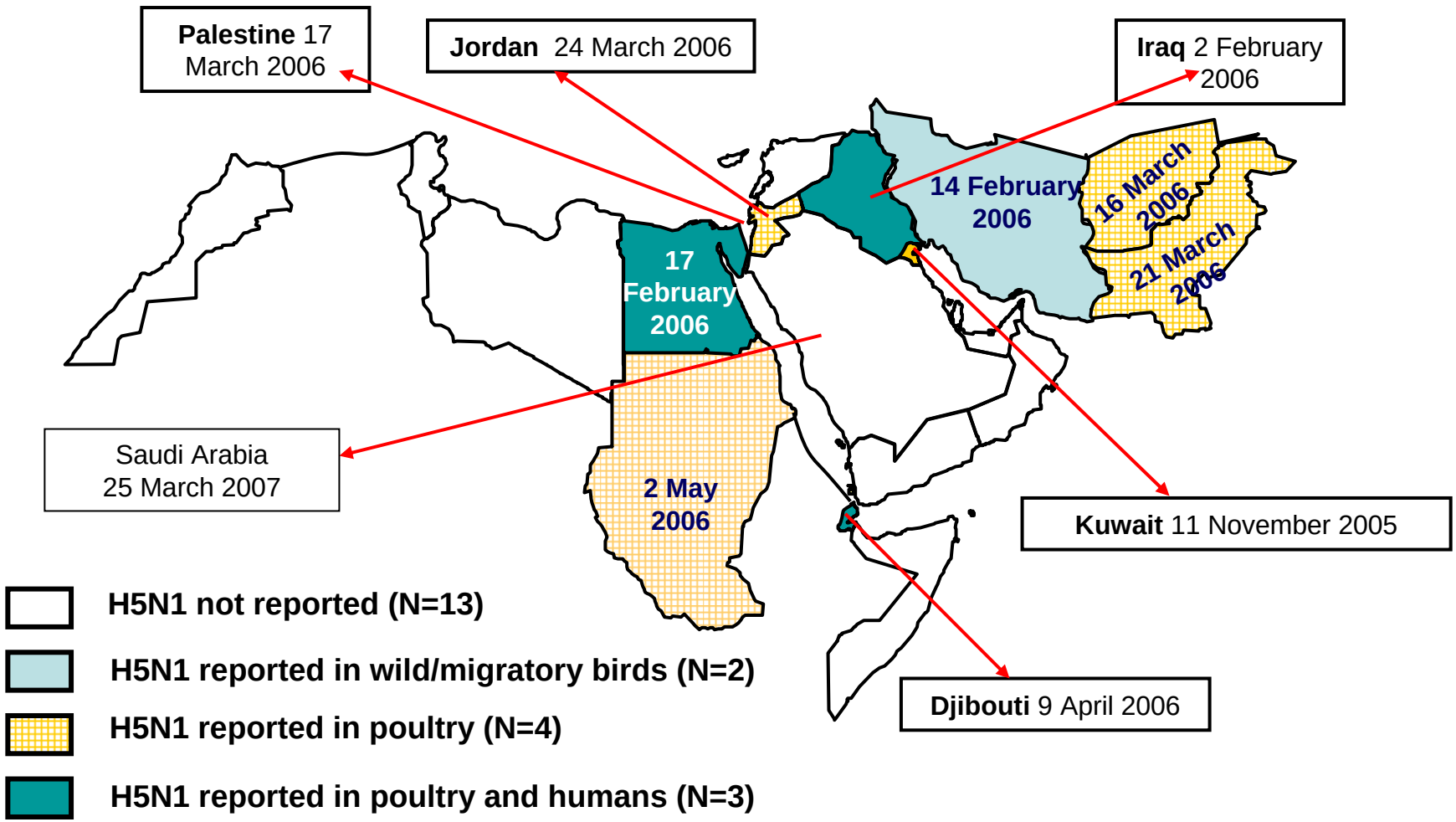
Number of Confirmed Human Cases of Avian Influenza A/(H5N1) Reported to WHO

As of 11 April 2007

- 12 countries affected
- 291 WHO confirmed human H5N1 cases
- 172 deaths
  (Case fatality = 59 %)


Number of Confirmed Human H5N1 Cases
by month of onset as of 2007-04-11
Azerbaijan (8)
Cambodia (7)
China (24)
Djibouti (1)
Egypt (34)
Indonesia (81)
Iraq (3)
Laos (2)
Nigeria (1)
Thailand (25)
Turkey (12)
Viet Nam (93)
Number of Cases
0
5
10
15
20
25
2003-11
2003-12
2004-01
2004-02
2004-03
2004-04
2004-05
2004-06
2004-07
2004-08
2004-09
2004-10
2004-11
2004-12
2005-01
2005-02
2005-03
2005-04
2005-05
2005-06
2005-07
2005-08
2005-09
2005-10
2005-11
2005-12
2006-01
2006-02
2006-03
2006-04
2006-05
2006-06
2006-07
2006-08
2006-09
2006-10
2006-11
2006-12
2007-01
2007-02
2007-03
2007-04
Month of onset

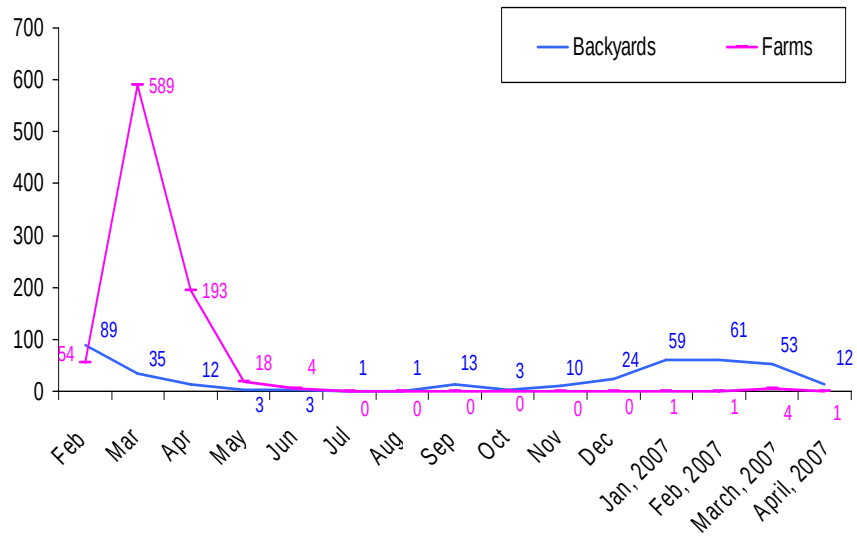
Outbreaks of avian influenza in the Region, November 2005–2007



Outbreak of avian influenza in Egypt

- **Started in February 06**
  - **22 Governorates affected**
- **Full transparency**
- **High-level intersectoral task force**
- **National preparedness plan in place**
- **Severe economic losses in poultry industry**

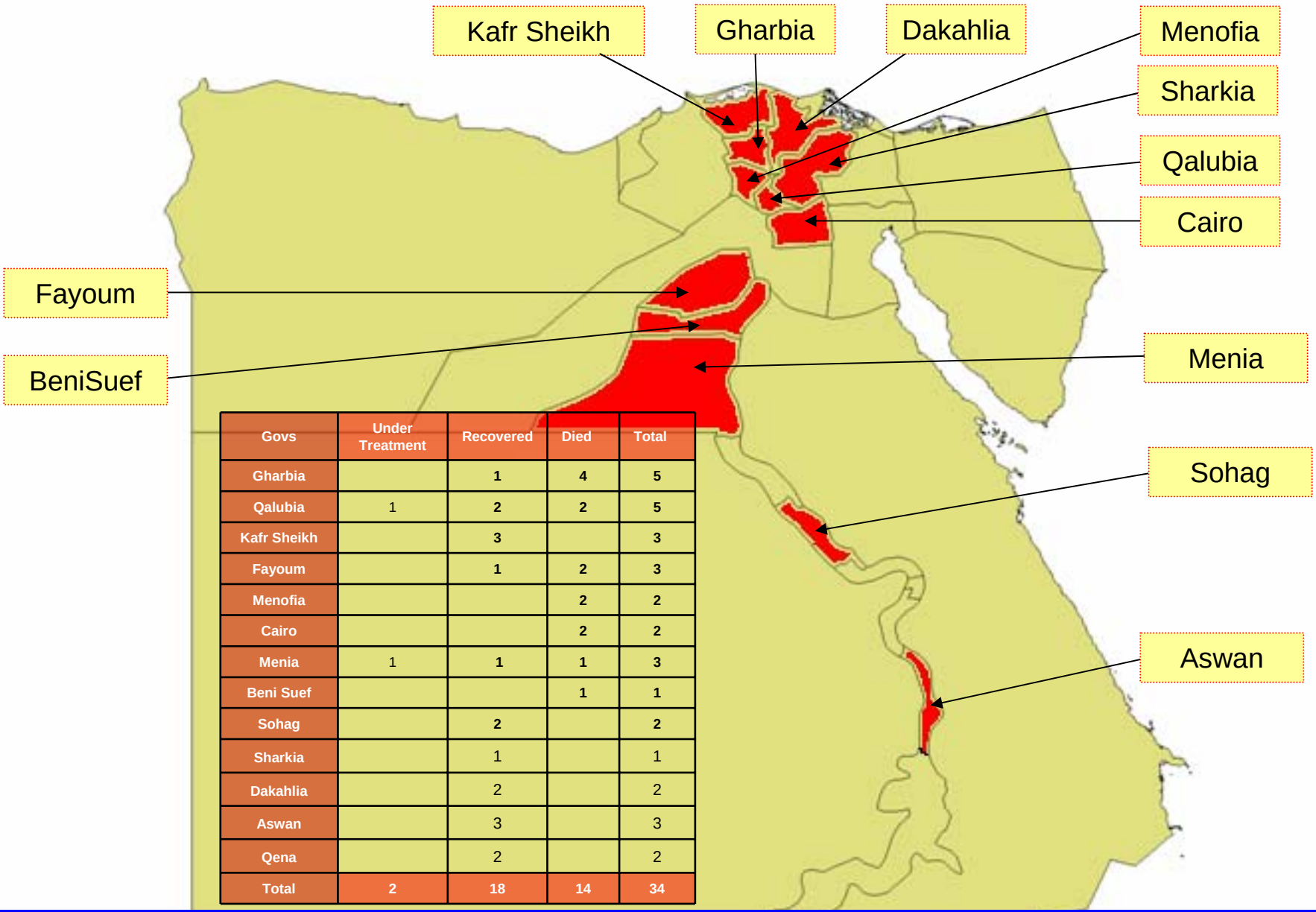
Number of Infected Foci Distributed by Breading Type, (Feb. 17,2006 – April 08, 2007)



Positive H5N1 Human Cases in Egypt

- Total Positive Cases 34
  - ✓ 14 Deaths
  - ✓ 18 Recovered
  - ✓ 2 Under Treatment
- Distribution by Gender :
  - ✓ 11 Males
  - ✓ 23 Females
- Place of Infection:
  - ✓ 2 Cases Farm workers
  - ✓ 31 Cases Backyard Owners
  - ✓ 1 from live market poultry

Confirmed H5N1 Human Cases , 2006-2007- Distributed by Governorates



Govs	Under Treatment	Recovered	Died	Total
Gharbia		1	4	5
Qalubia	1	2	2	5
Kafr Sheikh		3		3
Fayoum		1	2	3
Menofia			2	2
Cairo			2	2
Menia	1	1	1	3
Beni Suef			1	1
Sohag		2		2
Sharkia		1		1
Dakahlia		2		2
Aswan		3		3
Qena		2		2
Total	2	18	14	34

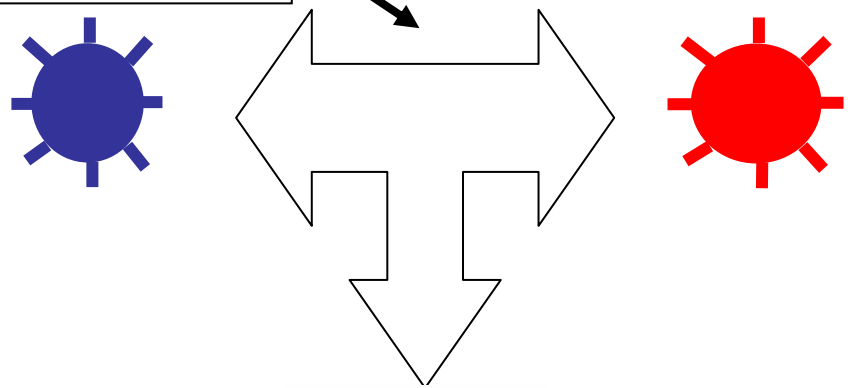
Total Admitted, Suspected Human cases for H5N1, Egypt, 17 Feb 2006 – 8 April 2007

Date	Suspected cases	Confirmed cases
Year 2006	1991	18
January 2007	227	1
February 2007	318	4
March 2007	382	9
April 2007	78	2
Total	2996	34


CAT
BIRD
KOKO
CAT

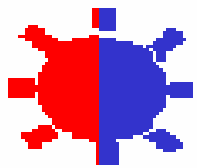
SO WHAT ARE WE SO AFRAID OF?

Exchange of genetic material, combining AI aggressive behaviour and HI man to man transmission capacity……



Antigenic Drift: Point mutations leading to minor antigenic changes to H gene

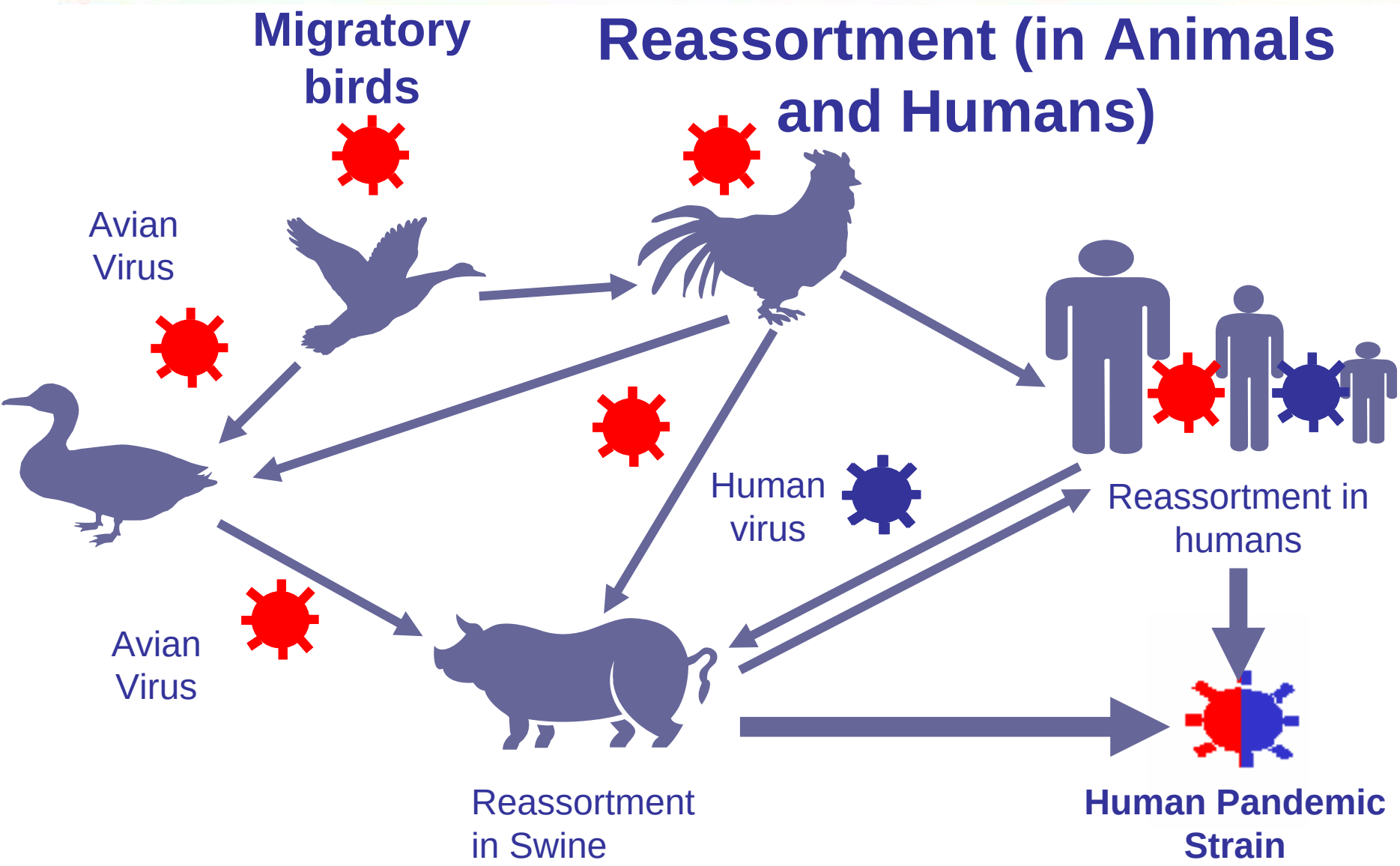
Creating an aggressive man to man transmissible virus



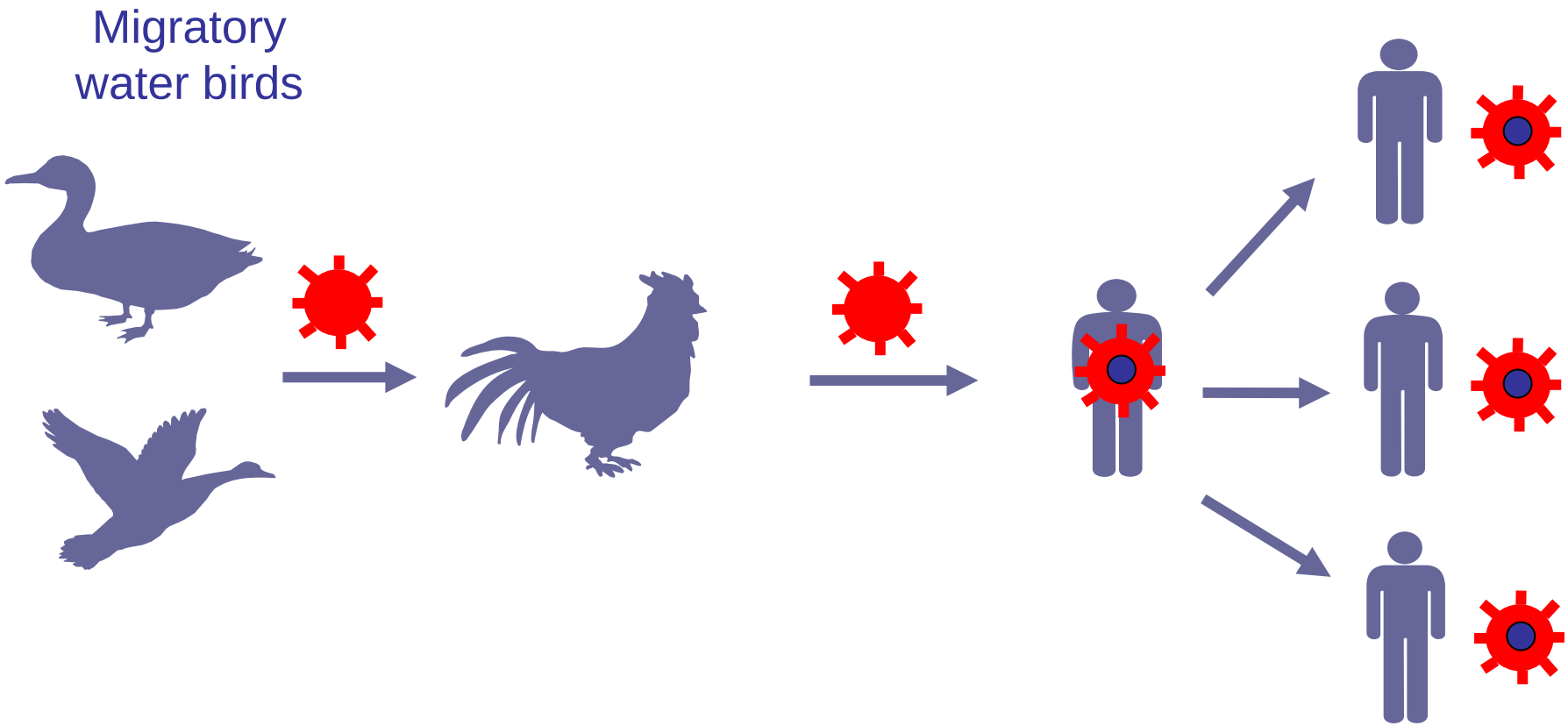
PANDEMIC AVIAN INFLUENZA VIRUS (PI)

(**does not exist yet)**

ANTIGENIC SHIFT: THIS WILL LEAD NEW INFLUENZA VIRUS
(Reassortment or adaptive mutation)


Migratory birds
Reassortment (in Animals and Humans)
Avian Virus
Human virus
Reassortment in humans
Avian Virus
Reassortment in Swine
Human Pandemic Strain

Mutation (in humans)

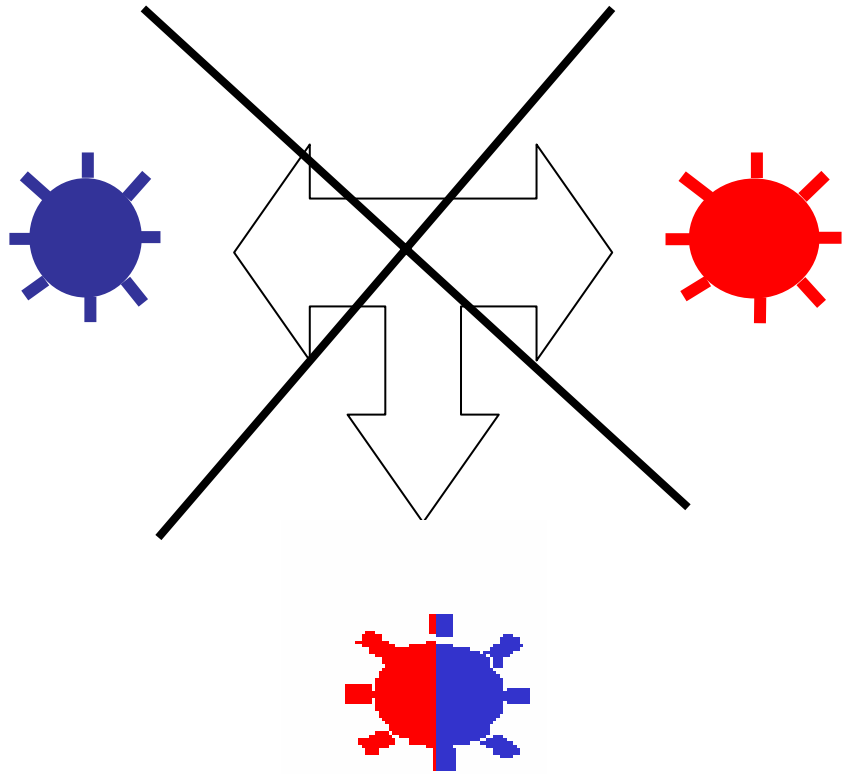


Source: WHO/WPRO

WHAT WE ALL WANT TO DO FIRST-PREVENTION

MINIMISE CONTACT POSSIBILITIES BETWEEN THE TWO VIRUSES

REDUCE CIRCUL OF HI – HYGIENE, VACCINATIONS



REDUCE CIRC OF AI - EARLY DETECTION, CULLING, ISOLATION

Human Pandemic Influenza

Prerequisites for pandemic influenza

A new influenza virus emerges to which the general population has little/no immunity ✓

The new virus must be able to replicate in humans and cause disease ✓

The new virus must be *efficiently* transmitted from one human to another

Phases of pandemic influenza

Inter-pandemic period	*Phase 1*	No new influenza virus detected in humans. If a new influenza virus presents in animals, the risk of human infection is considered to be low
	Phase 2	No human infections, but a circulating animal influenza virus poses a risk to humans
Pandemic alert period	*Phase 3*	Human infection(s) with a new virus, but no (or very infrequent) human-to-human spread
	Phase 4	Small cluster(s) with limited human-to-human transmission but spread is highly localized
	Phase 5	Larger cluster(s) but human-to-human spread still localized
Pandemic period	*Phase 6*	Increased and sustained transmission in general population

History of Human Pandemics

- 1918-1919: “Spanish Flu” [A (H1N1)]
  - 20 to 40 million deaths
- 1957-1958: “Asian Flu” [A (H2N2)]
  - 1 to 2 million deaths
- 1968-69: “Hong Kong Flu” [A (H3N2)]
  - 1 to 2 million deaths

Pandemic Influenza: Morbidity and Mortality in EMR

- **At an expected attack rate of 35%, it is expected that in the EMR (in millions):**
  - **More than 180 will fall ill**
  - **96 - 168 require medical care**
  - **6.4 - 28.1 need hospitalization**
  - **0.15 - 0.75 may die**
- **Will disrupt economy, social and political life**
- **Level of preparedness influences death toll**

Estimates of Deaths, Hospitalizations and Outpatient Visits in the EMR During Pandemic Influenza

	MINIMIUM				MAXIMUM		
Country	**Deaths**	**Hospitalizations**	**Outpatent visits**		**Deaths**	**Hospitalizations**	**Outpatent visits**
Afghanistan	17,296	106,908	17,575,106		172,916	602,638	35,611,246
Bahrain	183	667	115,551		835	3,118	194,808
Djibouti	176	638	110,445		798	2,981	186,198
Egypt	18,201	66,228	11,470,147		82,876	309,589	19,337,536
Iran (I. R.)	17,179	62,511	10,826,278		78,224	292,211	18,252,039
Iraq	6,455	23,487	4,067,815		29,391	109,793	6,857,937
Jordan	1,398	5,086	880,829		6,364	23,774	1,484,990
Kuwait	650	2,363	409,217		2,957	11,045	689,902
Lebanon	915	3,326	576,018		4,161	15,546	971,109
Libya	1,402	5,102	883,636		6,385	238,150	1,489,723
Morocco	7,672	27,919	4,835,164		34,936	130,506	8,151,610
Oman	734	2,672	462,656		3,343	12,487	779,991
Pakistan	39,171	142,535	24,685,663		178,363	666,287	41,617,593
Palestine (O)	NA	NA	NA		NA	NA	NA
Qatar	152	555	96,134		695	2,595	162,071
Saudi Arabia	6,229	22,666	3,925,441		28,363	105,951	6,617,906
Somalia	2,612	9,500	1,645,448		11,889	44,413	2,774,065
Sudan	8,517	30,992	5,367,531		38,782	144,864	9,049,127
Syria	4,533	16,496	2,856,930		20,642	77,112	4,816,502
Tunisia	2,441	8,882	1,538,225		11,115	41,518	2,593,295
UAE	755	2,749	475,859		3,438	12,844	802,252
Yemen	5,221	18,999	3,290,435		23,774	88,811	5,547,349
Total	**141,892**	**560,281**	**96,094,528**		**740,247**	**2,936,233**	**167,987,249**

Disruption of economic, social and political life during pandemic influenza

Human survival and health

- High illness and death rates
- Over-burdened health facilities
- Impact on persons with chronic disease

Basic services and utilities

- Absenteeism affecting manufacture and services
- Interruption of electricity and water supplies
- Telecommunications overload

Rule of law and governance

- Increased demand for governance and security
- High public anxiety, reduced capacity
- Potential exploitation

Vulnerable livelihoods

- Diminished coping and support mechanisms
- Shortage of basic necessities
- Vulnerability and needs of contained groups

Financial systems and trade

- Trade and commerce disruptions
- Reduced availability of cash
- Interruption of logistics

WHO Global Influenza Preparedness Plan

- **Reduce risks**
  - Avoid emergence of a new virus (FAO, OIE, WHO)
  - Elimination of animal reservoir (FAO, OIE): culling, slaughter and vaccine
  - Protection and immunization of individuals at risk (e.g. cullers)
- **Strengthen surveillance**
  - Animals (FAO and OIE)
  - Humans (diagnostic tests, global reporting)
- **Improve pandemic preparedness**
  - A (H5N1) vaccine development
  - Access to antiviral drugs
  - Implementation of non-pharmaceutical interventions
  - Pandemic plan (national, international)

Main features of the regional strategy I

- **Technical Support to Member States**
  - **Missions; deploy regional support teams; and provide technical guidelines and SOPs in multiple languages**
- **Capacity-building:**
  - **Epi and lab surveillance; national and regional roster of experts**
- **Emphasis on transparency, sharing of information and outbreak communication**
- **Expanding the present network of influenza surveillance**

Main features of the regional strategy II

- **Partnership and social mobilization:**
  - **Coordination with other UN agencies and partners**
  - **Strengthening risk communication and social mobilization (Public messages, Educational material and Addressing the media)**
- **Special measures for pilgrimages and other mass gatherings**

Main features of the regional strategy III

- **Preparedness:**
  - **Ensuring adequate stockpiling of antiviral drugs**
  - **Promotion of use of appropriate non-pharmaceutical interventions**
  - **Supporting vaccine development in the Region**
  - **Supporting operational and epidemiological research**
- **Promoting appropriate infection control practices**

Preparedness at the Regional Office

- A regional strategy supported by a detailed workplan
- Regional Task Force for Avian Influenza and the Preparedness for Human Pandemic Influenza
- Regional Surveillance Advisory Group (SRAG)
- Regional Alert, Surveillance and Detection of Outbreak Network (RASDON)
- Strategic Health Operation Centre (SHOC)

Challenges

- **Insufficient capacity for surveillance and response at country level**
- **Limited access to and availability of medicines (antiviral medicines, vaccine)**
- **Need for coordinated leadership**
- **Confusion between avian influenza and pandemic influenza**

Challenges

- **Only one regional reference laboratory for influenza**
- **Need for timely information in local languages**
- **Resource mobilization, including funding**

NO PANIC!! BUT BE WATCHFUL!!