



# ***Pandemic Influenza***

## ***An Overview of the Threat Posed by Avian Influenza (H5N1)***



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## **Introduction to Influenza**

- ☞ Highly contagious respiratory infection**
- ☞ Spread by respiratory droplets (“cough etiquette”) and contact with contaminated materials (hand washing)**

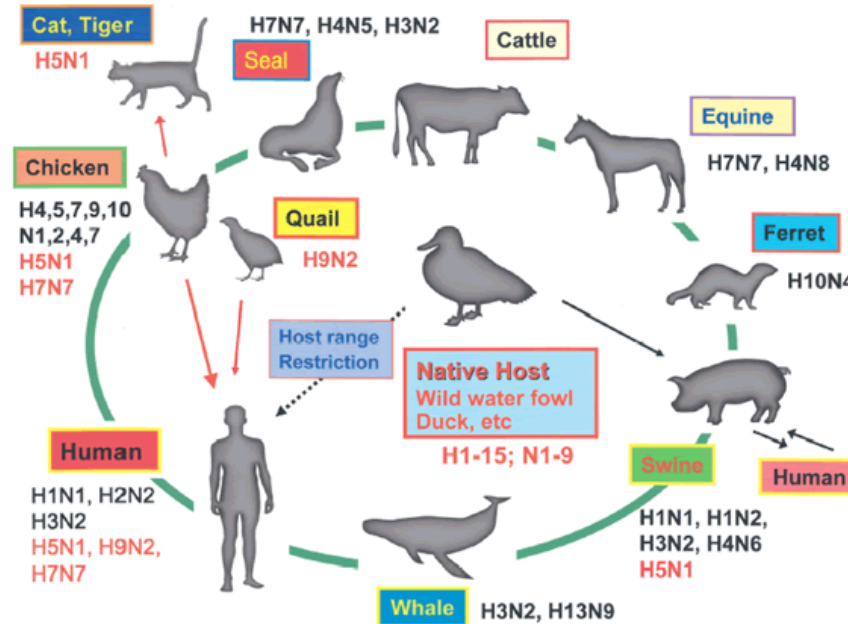


- ☞ Seasonal Influenza in USA, peak activity occurs December-March**
- ☞ Incubation period of 1 to 4 days**
- ☞ Infected people may be contagious 1 day before symptoms and up to 5 days after symptoms begin**

(Abochale & Sitz 2000)

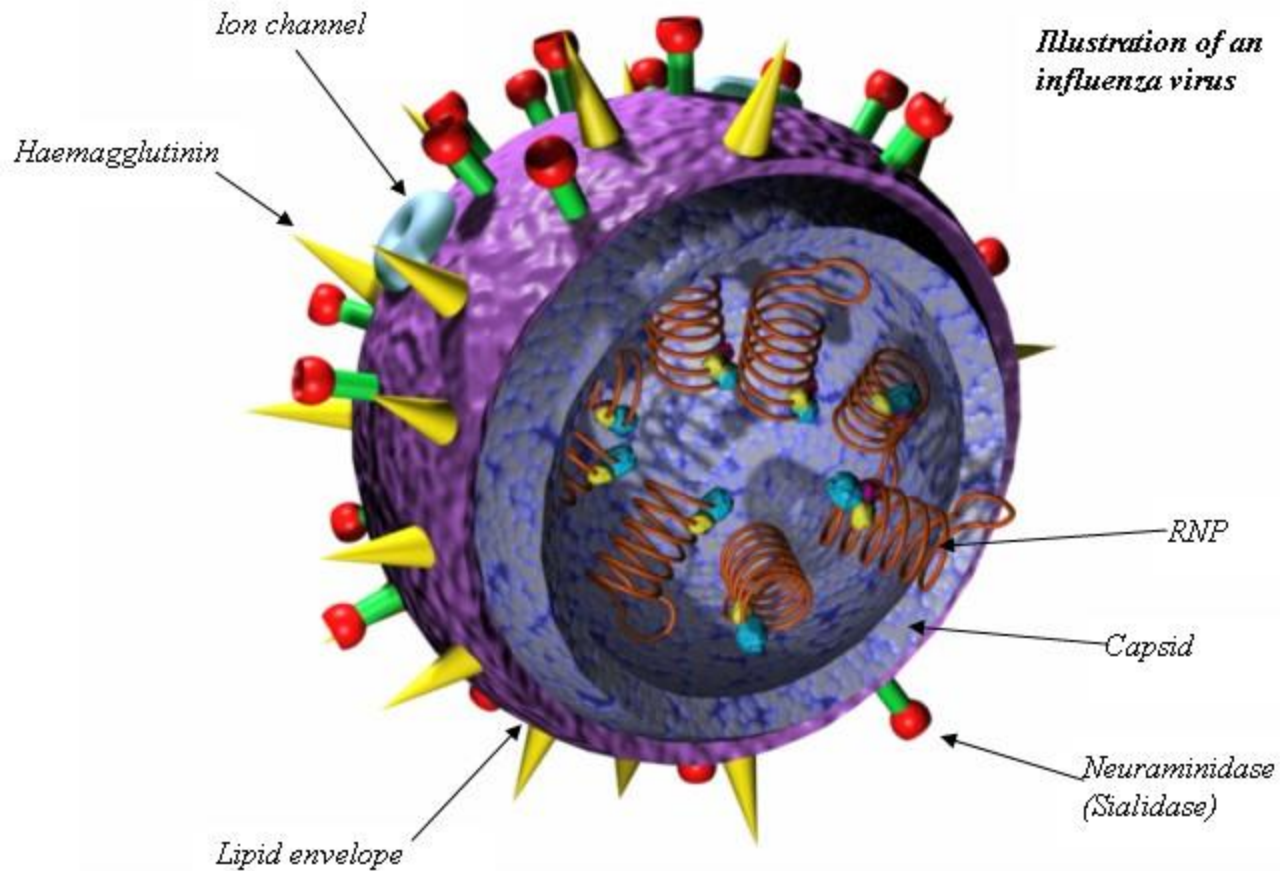
# More About Influenza

- Types A/B/C
- Animal and birds can act as reservoirs of type A strains



- Presumed epidemics dating back to ancient Greece.

# Influenza Virus



<http://www.omedon.co.uk/influenza/influenza/>

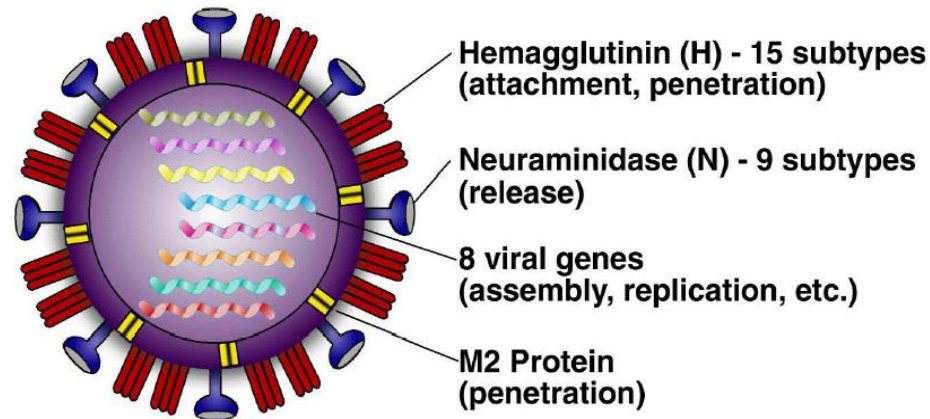
## **Classification System (Name that Strain)**

**Named based on which type, location of first isolation, strain designation, the year of first isolation**

**A/Hongkong/1/68**

**Types A & B further divided based on glycoproteins on the virus surface (H for hemagglutinin and N for neuraminidase)**

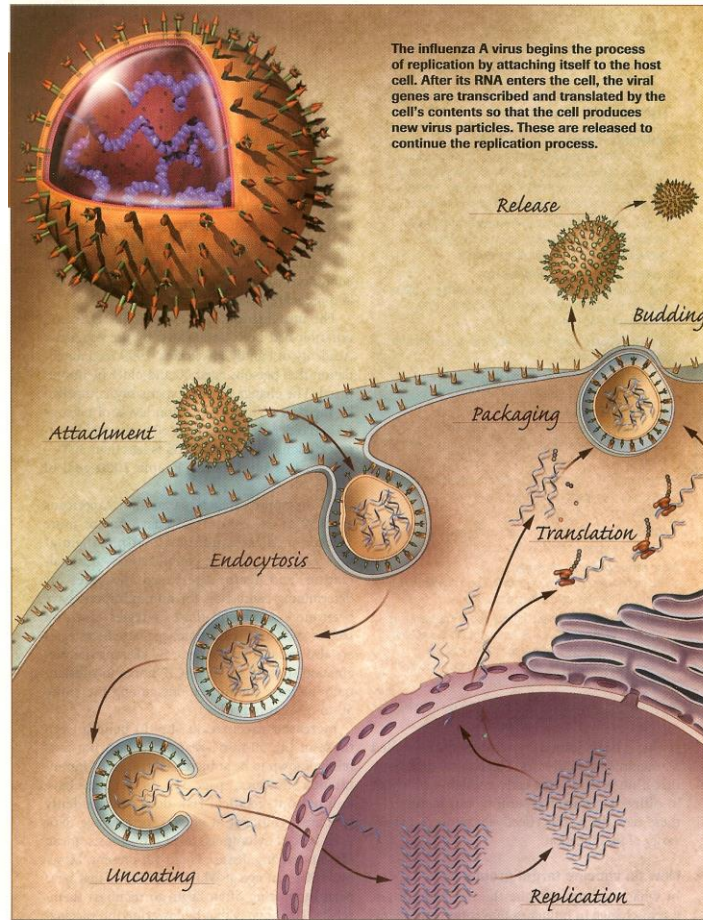
**Currently most human influenza strains involve H1N1\*, H1N2, H3N2**



**(Abochale & Sitz 2000)**

**\*causal agent of 1918 Pandemic**

# Influenza Virus in Host Cell





## Signs & Symptoms of Seasonal Influenza

- **Comes on abruptly and hits hard**
- **Sudden onset of shaking chills, headache, muscle aches, back pain, heaviness of the eyes, general malaise**
- **Fever rises ( $>100.4^{\circ}\text{F} / 38^{\circ}\text{C}$ ), stuffy or runny nose, sore throat, dry cough, hoarse voice, chest pain**
- **Exhaustion (bed rest)**
- **Missed school/work**
- **Complications**





## Prevention/Prophylaxis of Seasonal Influenza (Biological)

- ☞ **Vaccine is given October-December to protect against seasonal influenza or limit its clinical expression**
  - **Composition determined by prediction based on previous year's strain**
  - **Once vaccinated, your body builds up antibodies to the strains in the vaccine**
  - **Takes 2 weeks to become effective**

**The shot form is a killed virus vaccine and cannot cause influenza**



**FluMist® is nasal form of live weakened virus vaccine.**



- ☞ **Chemoprophylaxis uses antiviral medications to prevent influenza in people with close contact with infected persons**
  - **Can be given for 2 weeks until vaccine becomes effective**
  - **Can be given for the duration of an epidemic in high risk patients. Older drugs may no longer be effective for this purpose**
  - **Newer drugs are expensive and not approved for children**



## Treatment

### ☞ Supportive Treatment:

- **Supportive treatment includes fever reducers, pain relievers, cough/cold medicines, fluids**
- **People with serious respiratory compromise will need hospitalization and possible ventilator support**

### ☞ Antiviral Medications

- **Newer meds are neuraminidase inhibitors which reduce virus replication. Zanamivir (Relenza) & Oseltamivir (Tamiflu)**
- **Are not “cures”, shorten course and lessen severity**
- **Must be started within 24 to 36 hours to have beneficial effect**
- **May not prevent serious complications**





# Avian Influenza

- **First identified in 1878: “fowl plague”**
- **Always influenza A**
- **All 15 HA and all 9 NA subtypes have been isolated from birds**
- **Highly Pathogenic Avian Influenza [HPAI] v. Low Pathogenic Avian Influenza [LPAI]**
- **HPAI (H5N1) first identified in Scottish chickens, 1959**





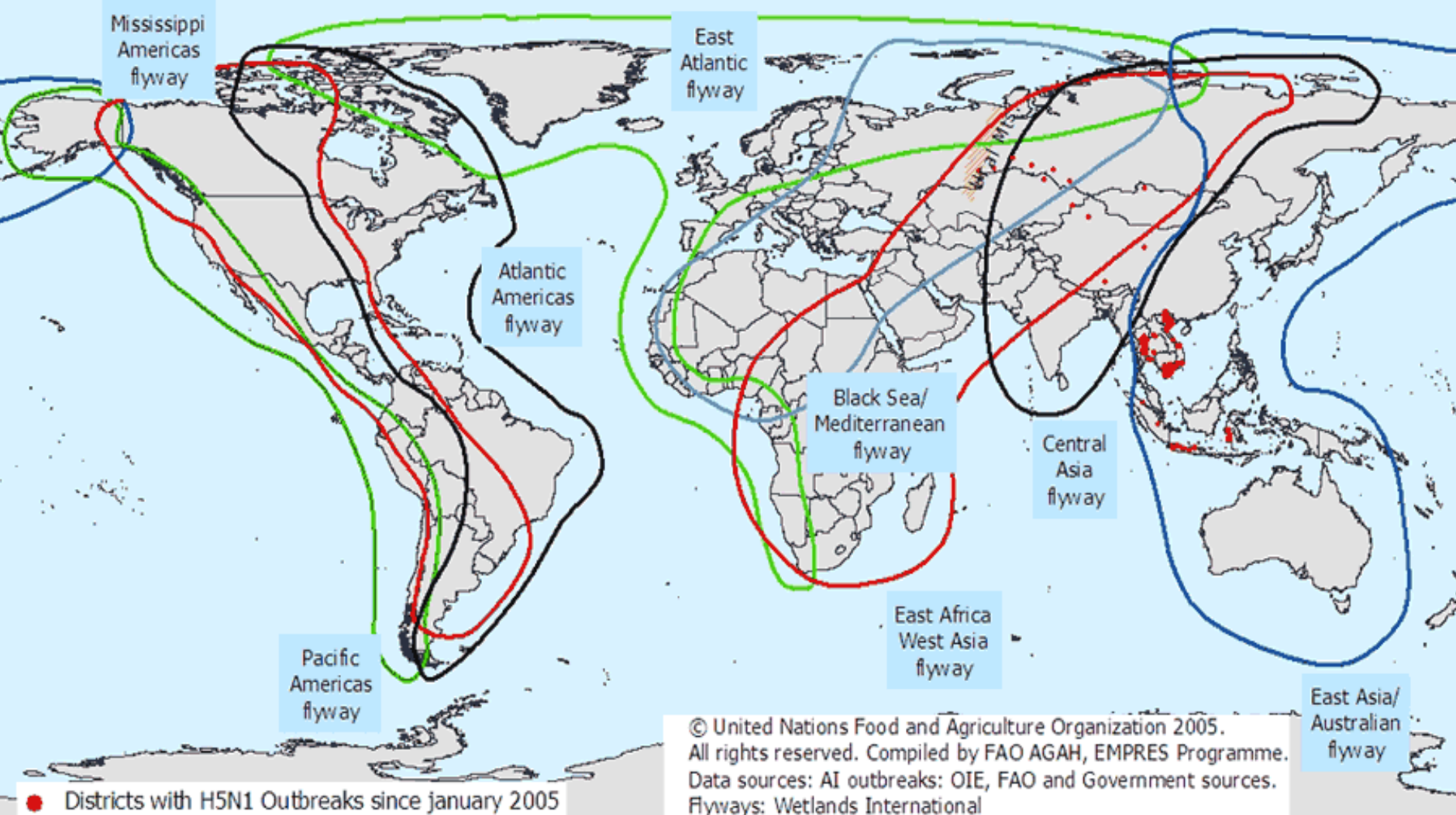
# Characteristics of H5N1

- ***Virulence factors that enhance replication and counteract host immune response***
- ***Ability to expand host range in both birds and mammals (cats, humans)***
- ***Genetic changes to virus over time that have enhanced its ability to persist in the environment***



# H5N1 outbreaks in 2005 and major flyways of migratory birds

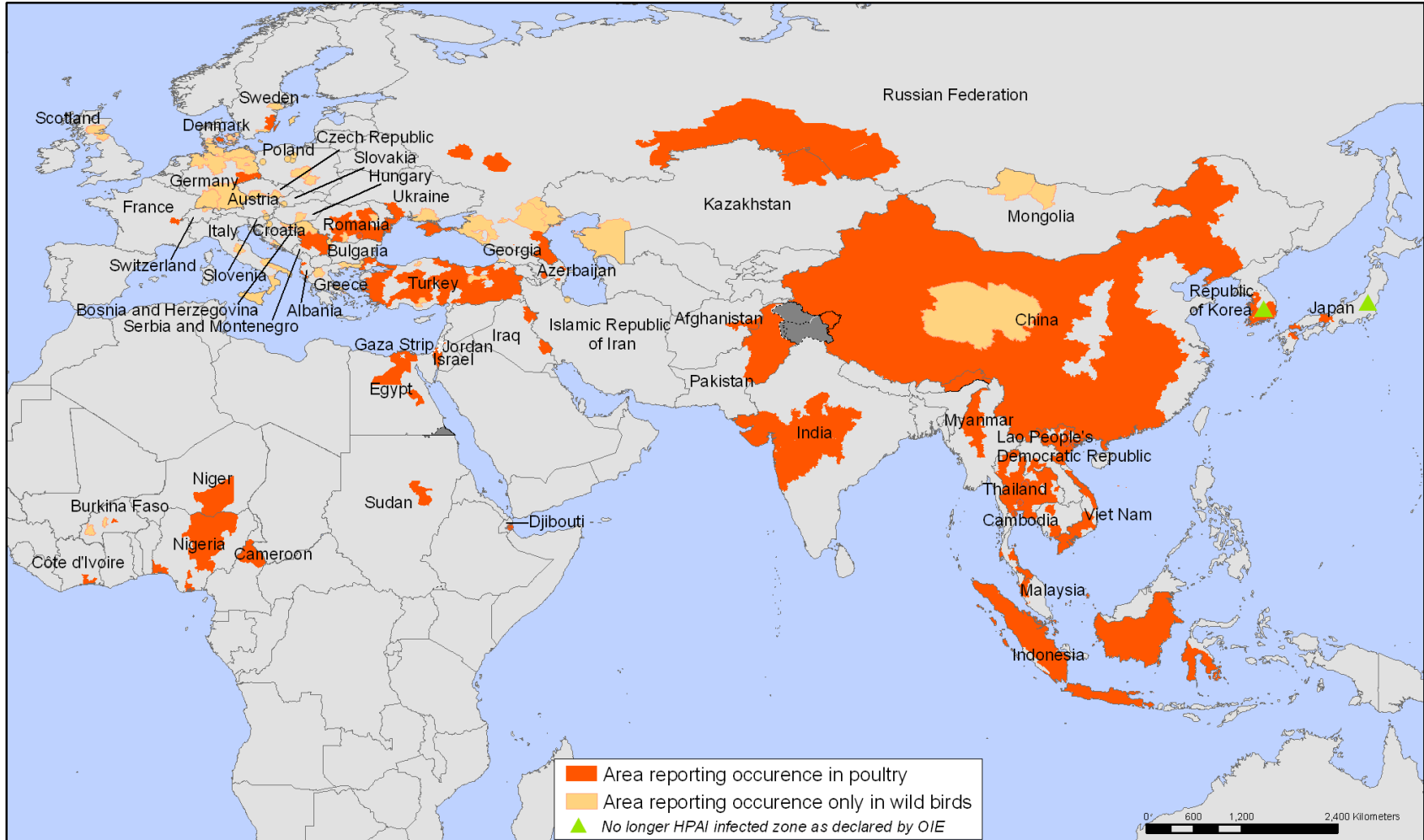
Situation on 30 August 2005





Areas reporting confirmed occurrence of H5N1 avian influenza in poultry and wild birds since 2003

Status as of 9 June 2006  
Latest available update



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The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Organisation for Animal Health (OIE) and national governments

Map Production: Public Health Mapping and GIS

Communicable Diseases (CDS) World Health Organization



## Q: *What is a Pandemic?*

**A:** *an epidemic that is widespread and affects a whole region, continent, or entire world*





# ***Pandemic Influenza***

## ***Recipe for a pandemic:***

- 1. A novel influenza A virus***
- 2. Replicates and causes illness in humans***
- 3. Passes easily from person to person***



*electron micrograph of actual H5N1 virus*  
<http://www.bbc.co.uk/radio4/science/media/H5N1.jpg>

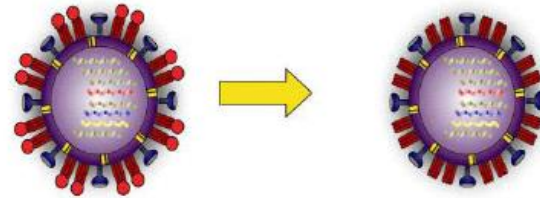


*Photograph from 1918 Pandemic Flu*

## Where Pandemics Come From

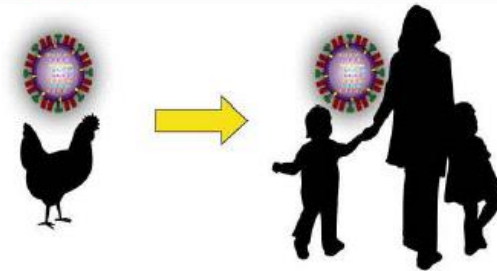
# Emergence of New Human Influenza Subtypes

**Drift (minor mutations)**

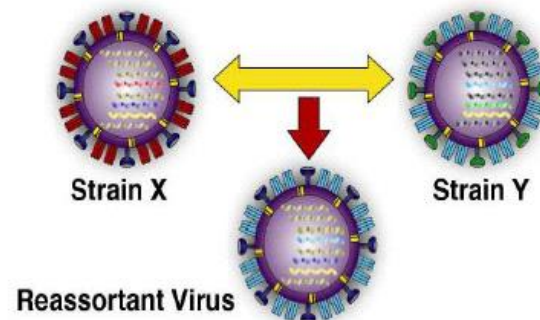


**Shift (major change)**

Jumping Species



Reassortment



# WHO Stages of a Pandemic

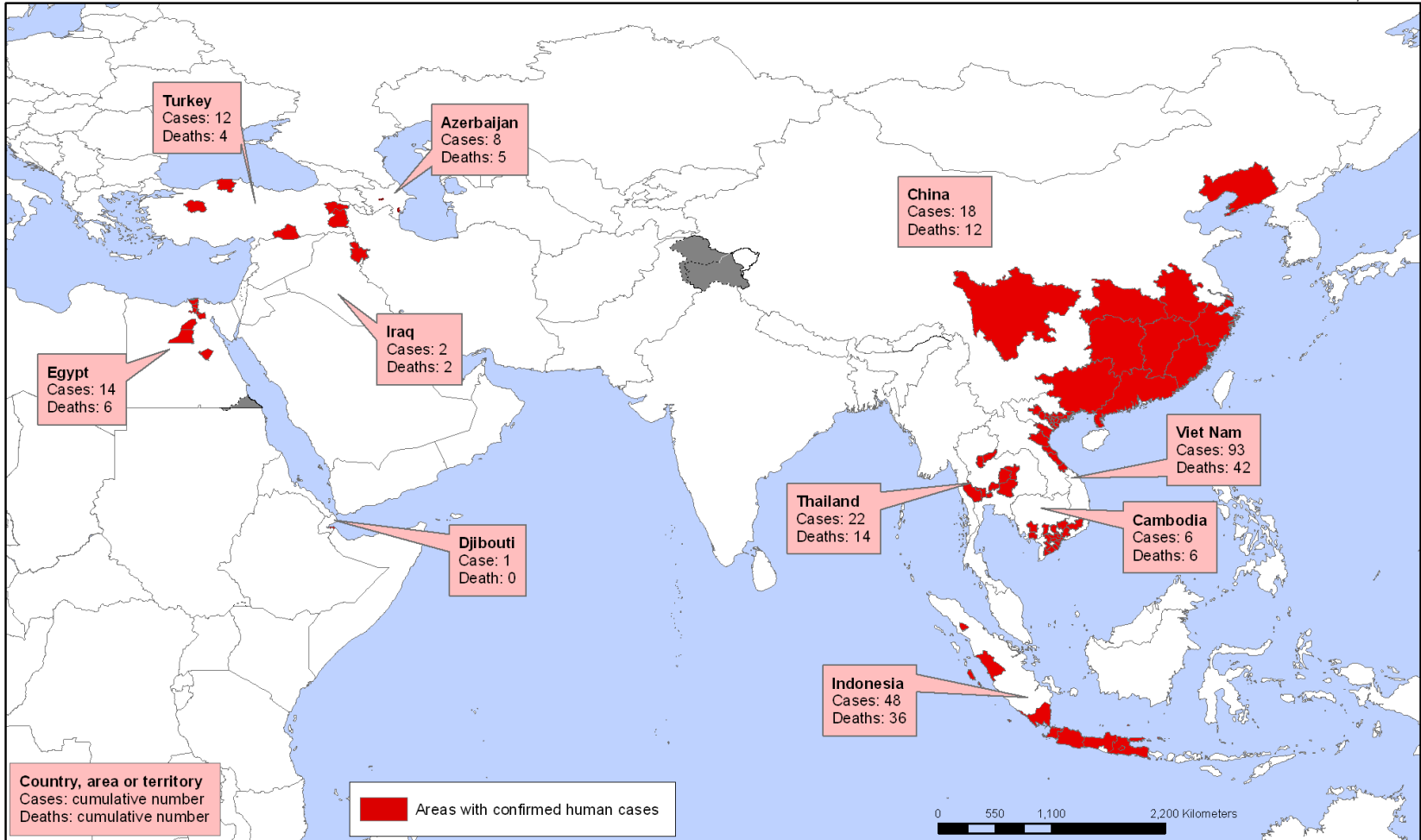


<b>Period</b>	<b>Phase</b>	<b>Description</b>
<b>Interpandemic</b>	1	No new influenza virus subtypes have been detected in humans. If an animal virus is circulating, the risk of human infection is considered to be low.
	2	No new influenza virus subtypes have been detected in humans. However, a circulating animal influenza virus subtype poses a substantial risk of human disease
<b>Pandemic Alert</b>	3	Human infection(s) with a new subtype occur, but no human-to-human transmission or at most rare instances of spread to a close contact
	4	Small clusters with limited human-to-human transmission occur but spread is highly localized, suggesting that the virus is not well adapted to humans.
	5	Larger clusters of influenza in humans occur but human-to-human spread is still localized.
<b>Pandemic</b>	6	Increased and sustained transmission of the influenza virus occurs in the general population



### Affected areas with confirmed human cases of H5N1 avian influenza since 2003

Status as of 30 May 2006  
Latest available update



**World Health Organization**

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Data Source: WHO / Map Production: Public Health Mapping and GIS  
Communicable Diseases (CDS) World Health Organization

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# Human Cases of H5N1 to Date



Country	2003		2004		2005		2006		Total	
	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths
Azerbaijan	0	0	0	0	0	0	8	5	8	5
Cambodia	0	0	0	0	4	4	2	2	6	6
China	0	0	0	0	8	5	10	7	18	12
Djibouti	0	0	0	0	0	0	1	0	1	0
Egypt	0	0	0	0	0	0	14	6	14	6
Indonesia	0	0	0	0	17	11	32	26	49	37
Iraq	0	0	0	0	0	0	2	2	2	2
Thailand	0	0	17	12	5	2	0	0	22	14
Turkey	0	0	0	0	0	0	12	4	12	4
Vietnam	3	3	29	20	61	19	0	0	93	42
<b>Total</b>	<b>3</b>	<b>3</b>	<b>46</b>	<b>32</b>	<b>95</b>	<b>41</b>	<b>81</b>	<b>52</b>	<b>225</b>	<b>128</b>





# The Countermeasures

**BIRD FLU ALERT!**



**YOU MUST DECLARE**  
all poultry meat,  
poultry products,  
feathers, eggs or  
egg products to a  
**Quarantine Officer.**

**Quarantine Matters!**



Australian Government  
Australian Quarantine  
and Inspection Service



# *Weapons against Pandemic Flu*

*Biological*  
*vs.*  
*Behavioral*

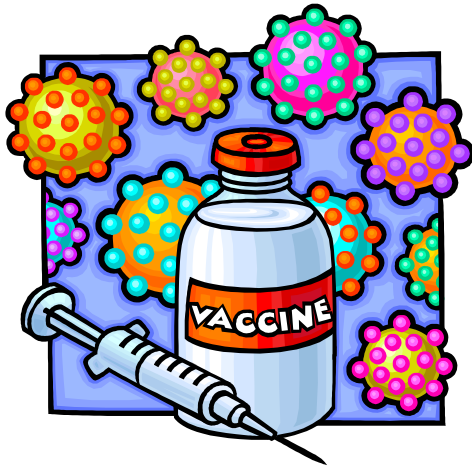




# Weapons against Pandemic Flu

## BIOLOGICAL

- ☞ Vaccines
- ☞ Anti-virals



## BEHAVIORAL

- ☞ Isolation & Quarantine
- ☞ Social Distancing
- ☞ Hand Hygiene
- ☞ Respiratory Etiquette

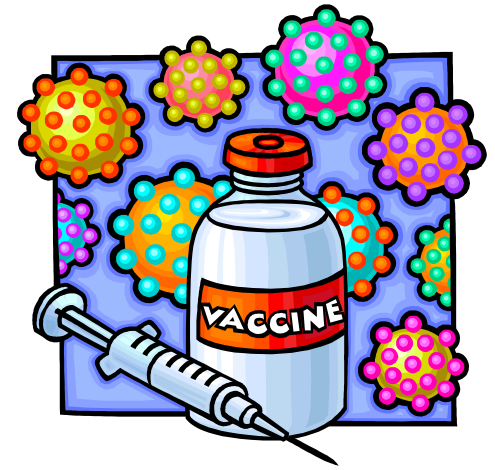
Cover  
your  
Cough

Stop the spread of germs



## ***Biological: Vaccine against pandemic flu***

- Would our typical seasonal flu vaccine be of any help?***
- How long will a pandemic flu vaccine take to develop?***
- Will we be able to produce enough in time?***
- Who should be given priority for vaccination?***
- Will it be effective?***





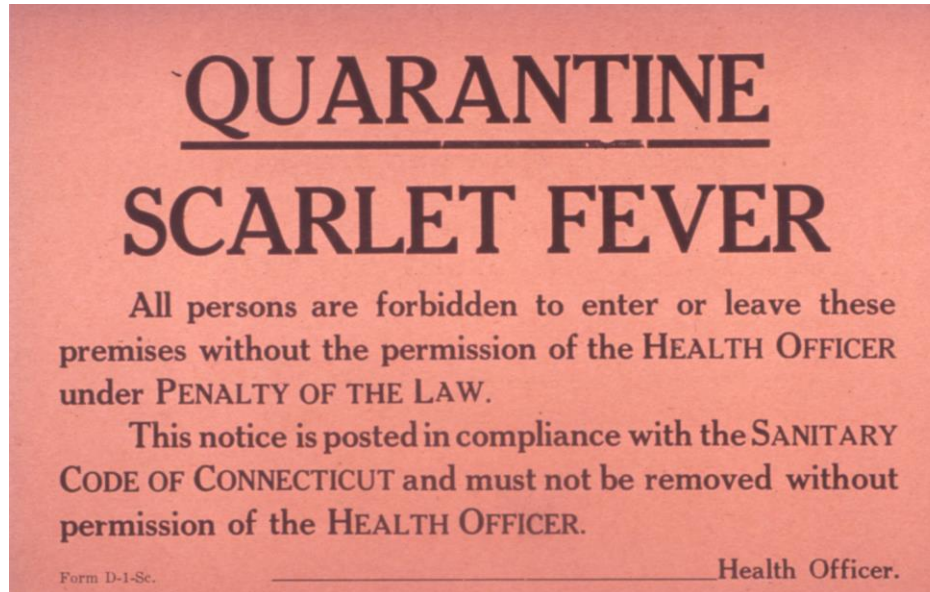
## ***Biological: Anti-virals***

- ➔ Will there be enough Tamiflu?***
- ➔ Will H5N1 be resistant to Tamiflu by the start of a pandemic?***
- ➔ Who should get Tamiflu?***
- ➔ What is the most effective regimen?***





## ***Behavioral: Isolation & Quarantine***



- ☞ Would isolation & quarantine work for an illness with such a short incubation period?***
- ☞ How would we support a broad scale quarantine?***
- ☞ 90% compliance in Toronto. What about in the United States?***
- ☞ How would quarantine effect your business?***



## ***Behavioral: Social Distancing***

- ➔ At what point do we close down public spaces like schools, malls, public transportation?***
- ➔ Would we have the political will to make hard choices with such profound economic consequences?***





## ***Behavior: Personal Responsibility***

- Respiratory etiquette***
- Hand hygiene***
- Staying home if you are sick***





# ***Burlington County's Plan***

- 1. Education***
- 2. Surveillance***
- 3. Mass distribution of vaccine or anti-virals***
- 4. "Community Care Center" system to support isolation and quarantine of county residents***
- 5. Implementation of social distancing measures***



## Recommended Resources

- ☞ **US Dept of Health & Human Services**

**<http://www.pandemicflu.gov>**

- ☞ **World Health Organization (WHO)**

**[http://www.who.int/csr/disease/avian\\_influenza/en/](http://www.who.int/csr/disease/avian_influenza/en/)**

- ☞ **World Organization for Animal Health (OIE)**

**[http://www.oie.int/download/AVIAN%20INFLUENZA/A\\_AI-Asia.htm](http://www.oie.int/download/AVIAN%20INFLUENZA/A_AI-Asia.htm)**

- ☞ **U.S. Centers for Disease Control (CDC) <http://www.cdc.gov/flu/avian/>**

- ☞ **Centers for Infectious Disease Research and Policy, University of Minnesota,**

**<http://www.cidrap.umn.edu/index.html>**

- ☞ **Flu Wiki (on-line, collaborative website)**

**<http://www.fluwikie.com/index.php?n=Main.HomePage>**



## Recommended Resources

- ➔ **Specter, M. *A Reporter at Large: Nature's Bioterrorist: Is there any way to prevent a deadly avian flu pandemic?* The New Yorker (2005). Posted on-line 2-21-05  
[http://www.newyorker.com/fact/content/articles/050228fa\\_fact1](http://www.newyorker.com/fact/content/articles/050228fa_fact1)**
- ➔ **Osterholm M. *Preparing for the Next Pandemic.* The New England Journal of Medicine 2005; 352: 1839-1842**



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- ☞ ***McCarthy R et al. The revolution in influenza care. Patient Care Oct. 2000, 22-42.***
- ☞ ***Singh S, DiLoreto S. Preparing your practice for the influenza season. Patient Care Sep. 2001, 18-28.***
- ☞ ***Tancik, C. Viral upper respiratory infections and adult pertussis: An Update. Resident & Staff Phys 46(14):17-21, 2000.***



# ***Vision of Pandemic Flu in New Jersey***

***Joseph J. Matula, DO, FAAFP***

***Lockheed Martin Maritime Systems &  
Sensors - Medical Services***

***Moorestown, NJ***



## **Pandemic H5N1 in South Jersey**

### **☞ Estimates of Attack Rate and Mortality Rate for H5N1 Pandemic vary greatly:**

- **Many estimates list an expected attack rate of 25-50%**
- **Current mortality rate is ~ 50%, actual mortality rate for an H5N1 Pandemic may differ from this greatly.**
- **For the sake of discussion, we will assume a 40% attack rate and a 2% mortality rate.**
- **At these rates, pandemic H5N1 will have a profound effect on our community.**



## Widespread Panic?





<b><i>Typical Flu Season</i></b>	<b><i>Pandemic Flu (projected)</i></b>
<b><i>Seasonal</i></b>	<b><i>Can occur anytime</i></b>
<b><i>250,000 to 350,000 deaths globally</i></b>	<b><i>estimated 180-360 million deaths</i></b> <i>(Osterholm, NEJM article)</i>
<b><i>36,000 deaths and &gt; 200,000 hospitalizations in United States</i></b>	<b><i>estimated 1.7 million deaths</i></b> <i>(Osterholm, NEJM article)</i>
<b><i>78 deaths in Burlington County in 2003</i></b>	<b><i>estimated 2500 deaths</i></b> <i>(based on Osterholm's assumptions)</i>



## **What The Numbers Mean**

- ☞ ***In the midst of the pandemic, expect 40% of the population to be symptomatic***
  - ***40% of Police, Fire, EMS***
  - ***40% of doctors, nurses, and other healthcare personnel***
  - ***40% of military and National Guard personnel***
  - ***40% of utility workers (phone, water, water treatment)***
  - ***40% of teachers***
  - ***40% of ALL workers***
- ☞ ***Additional members of each of these groups will be unavailable:***
  - ***Home caring for sick family members***
  - ***Self-isolation with refusal to work***
- ☞ ***Number of dead will overwhelm funeral/mortuary capabilities***



## ***Pandemic Flu Effects***

- ☞ ***The regional healthcare system will be quickly overwhelmed due to the high volume of critically ill patients.***
  - ***Emergency Rooms swamped***
  - ***Intensive Care Units and ventilators quickly used up***
  - ***Primary care physician offices quickly overloaded.***
  - ***Many ill will have to rely on home care.***
- ☞ ***There will be an overall impact on all phases of life.***
  - ***Delivery systems will be slow or interrupted.***
  - ***Farming, food production affected.***
  - ***Manufacturing sharply curtailed.***
- ☞ ***Major impact on daily living***
  - ***Schools closed, many business closed, limited food supply, many normal services interrupted. Travel may be limited to restrict the spread of the disease.***



## ***Pandemic Flu Effects***

### ***☞ Possibility of panic***

- Decreased services, limited food supply, fears, and lack of sufficient law enforcement may lead to unstable situations (looting of food stores, etc.).***

***☞ Many projections anticipate that if a Global H5N1 Pandemic occurs, it may come in several waves, each lasting for several weeks.***

***☞ The overall time from start to finish may be 8-36 months.***



## Why Should Business be Involved?

### ☞ **Human Aspect:**

- ***We have an obligation to insure the health and welfare of our employees .***

### ☞ **Business Aspect:**

- ***Surviving a pandemic (or other catastrophe) must be part of every organization's Business Continuity Plan.***
- ***The businesses prepared for the pandemic flu are more likely to be the businesses that survive along with their employees.***



## **Lockheed Martin's Position**

**☞ Lockheed Martin is taking an active role in Pandemic Flu Planning as part of the overall Business Continuity Plan (BCP):**

- A Corporate Pandemic Planning Group has been established to formulate an overall corporate strategy that interfaces with our existing BCP.**
- Regional and local Pandemic Planning Support (PPS) Groups have been established to coordinate planning with local health departments and county planning agencies.**
- We are investigating a host of options to make us better prepared to respond to the coming threat.**
- A comprehensive checklist is in the process of being implemented which will align resources and plans at all levels.**
- The corporate, regional, and local teams meet on a regular basis to coordinate activities and finalize plans.**
- Cooperation with state, county, and local resources enhance our overall plan.**



## ***Specific Business Decisions to be considered***

- ☞ Employees on travel/overseas assignments.***
- ☞ Defining “mission critical” personnel***
- ☞ Telecommute (sufficient resources?)***
- ☞ On-site isolation of key personnel?***
- ☞ Status of employees sent home***
  - Active employee status with pay vs. layoff?***
  - Continuation of benefits***
- ☞ Screening of employees before they come to work***





## Fight Fear With Knowledge

- ☞ ***The best way for our community and our businesses to survive will be for all of us to take the appropriate steps to plan and prepare to protect ourselves, our families, our communities, and our businesses.***

