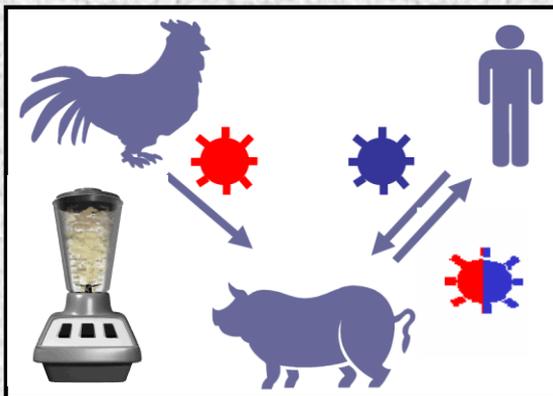


Recent Evolution of the Pandemic Threat: What Should We Be Prepared to Do?

Eric S. Starbuck, Advisor, Child Health & Pandemic Preparedness

Kathryn Bolles, Director, Health & Nutrition Global Initiative

Jeanne Koepsell, Community Case Management Advisor



Health & Nutrition
Webinar Series
Updated July 30, 2014

(Use PowerPoint slide show mode
for animation in several slides.)



Session Objectives



By the end of this session, participants will be familiar with the:

1. Current nature of the pandemic threat,
2. Role of SC health professionals in responding to a severe pandemic, &
3. Available resources.

Question



Philadelphia, USA, October 1918
(John Barry, *The Great Influenza*)

- Do any of you have experience with pandemic preparedness?

1. Current nature of the pandemic threat

**6,000,000 DEATHS
FROM INFLUENZA**

This Is Estimate For World, For
Past 12 Weeks:

RECALLS BLACK DEATH

"Flu" Five Times Deadlier
Than World War.

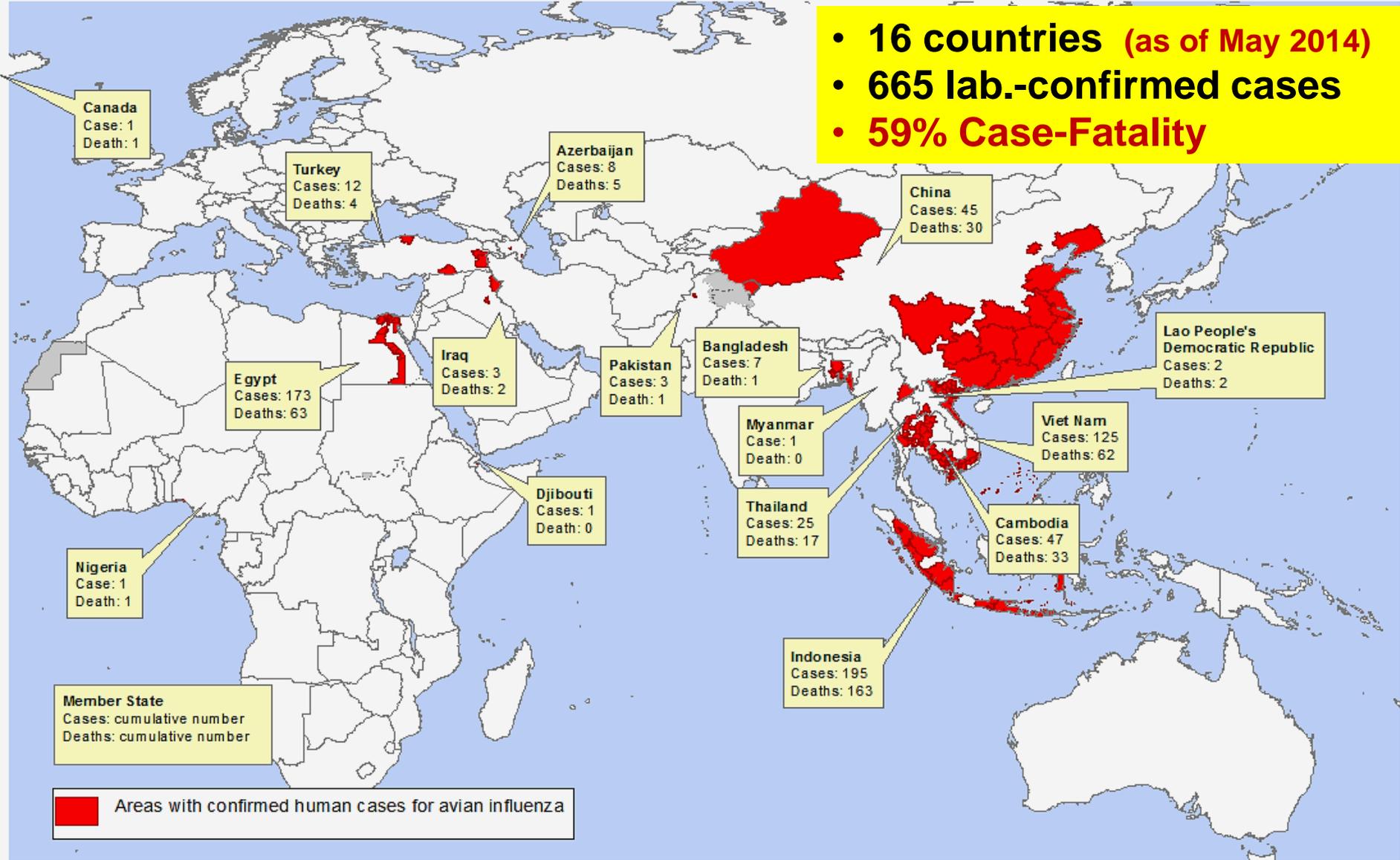
LONDON, Dec. 19.—Canadian Press.

(Canadian Press, December 1918)

- When we speak of pandemic threats, what comes to mind?

Areas with confirmed human cases for avian influenza A(H5N1) reported to WHO, 2003-2013*

- **16 countries** (as of May 2014)
- **665 lab.-confirmed cases**
- **59% Case-Fatality**



*All dates refer to onset of illness
Data as of 24 January 2014
Source: WHO/GIP

The designations employed and the presentation of the material in this publication 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 and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.
© WHO 2013. All rights reserved.

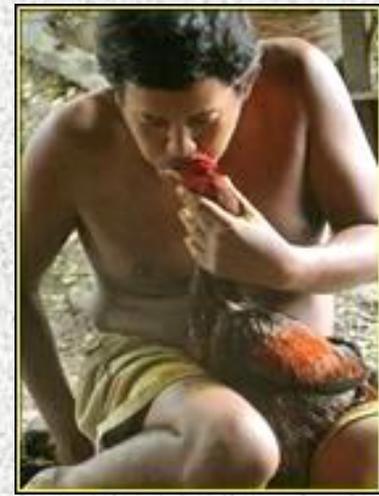


Likely Sources of H5N1 Infection in Humans

Environmental exposure? (Visiting live poultry markets. Fomites? Fertilizer? Aerosolized Feces?)



Preparing or disposing of diseased birds



Handling fighting cocks



~ 60 Clusters of 2 to 8 cases, some likely involving person-to-person transmission



Handling poultry, esp. asymptomatic ducks



Consuming uncooked duck blood (& undercooked poultry?)



The NEW ENGLAND JOURNAL of MEDICINE

established in 1812

January 27, 2005

vol. 352 no. 4

Probable Person-to-Person Transmission of Avian Influenza A (H5N1)

Kumnuan Ungchusak, M.D., M.P.H., Prasert Auewarakul, M.D., Scott F. Dowell, M.D., M.P.H.,
Rungrueng Kitphati, M.D., Wattana Auwanit, Ph.D., Pilaipan Puthavathana, Ph.D., Mongkol Uiprasertkul, M.D., Kobporn
Boonnak, M.Sc., Chakrarat Pittayawonganon, M.D., Nancy J. Cox, Ph.D., Sherif R. Zaki, M.D., Ph.D., Pranee Thawatupha,
M.S., Malinee Chittaganpitch, B.Sc., Rotjana Khontong, M.D., James M. Simmerman, R.N., M.S., and Supamit Chunsutthiwat,
M.D., M.P.H.

A Index Patient



B Mother



C Aunt



Thailand, Sep. 2004:

- A.** 11 year old girl died in Kamphaeng Phet province without H5N1 test.
- B.** Mother from BKK visited daughter in hospital, **H5N1+ without poultry exposure**, & died.
- C.** Aunt H5N1+, recovered

Influenza research at the human and animal interface

Report of a WHO working group

Geneva, Switzerland
21–22 September 2006

“Should the virus improve its transmissibility by acquiring, through a reassortment event, internal human genes, then the lethality of the virus would most likely be reduced.

“However, should the virus improve its transmissibility through adaptation as a wholly avian virus, then the present high lethality could be maintained during a pandemic.”
(page 15)

... “some modelling studies have suggested that pandemic spread could not be fully sustained in the presence of very high mortality.

“All such matters remain difficult to predict.” (page 16)

The 2 H5N1 gain of function studies that caused a stir

nature International weekly journal of science

Home | News & Comment | Research | Careers & Jobs | Current Issue | Archive | Audio & Video | F

Archive | Volume 486 | Issue 7403 | Letters | Article

NATURE | LETTER OPEN

日本語要約

Experimental adaptation of an influenza H5 HA confers respiratory droplet transmission to a reassortant H5 HA/H1N1 virus in ferrets

Masaki Imai, Tokiko Watanabe, Masato Hatta, Subash C. Das, Makoto Ozawa, Kyoko Shinya, Gongxun Zhong, Anthony Hanson, Hiroaki Katsura, Shinji Watanabe, Chengjun Li, Eiryo Kawakami, Shinya Yamada, Maki Kiso, Yasuo Suzuki, Eileen A. Maher, Gabriele Neumann & Yoshihiro Kawaoka

Affiliations | Contributions | Corresponding author

Nature 486, 420–428 (21 June 2012) | doi:10.1038/nature10831

Received 18 August 2011 | Accepted 09 March 2012 | Published online 02 May 2012 | Updated

- 4 mutations + H5N1 reassortment with H1N1 led to droplet transmission between ferrets.

(www.nature.com/nature/journal/v486/n7403/full/nature10831.html)

Science 22 June 2012:
Vol. 336 no. 6088 pp. 1534-1541
DOI: 10.1126/science.1213362

Science
AAAS

REPORT

Airborne Transmission of Influenza A/H5N1 Virus Between Ferrets

Sander Herfst¹, Eefje J. A. Schrauwen¹, Martin Linster¹, Salin Chutinimitkul¹, Emmie de Wit^{1,2}, Vincent J. Munster^{1,2}, Erin M. Sorrell¹, Theo M. Bestebroer¹, David F. Burke², Derek J. Smith^{1,2,3}, Guus F. Rimmelzwaan¹, Albert D. M. E. Osterhaus¹, Ron A. M. Fouchier^{1,†}

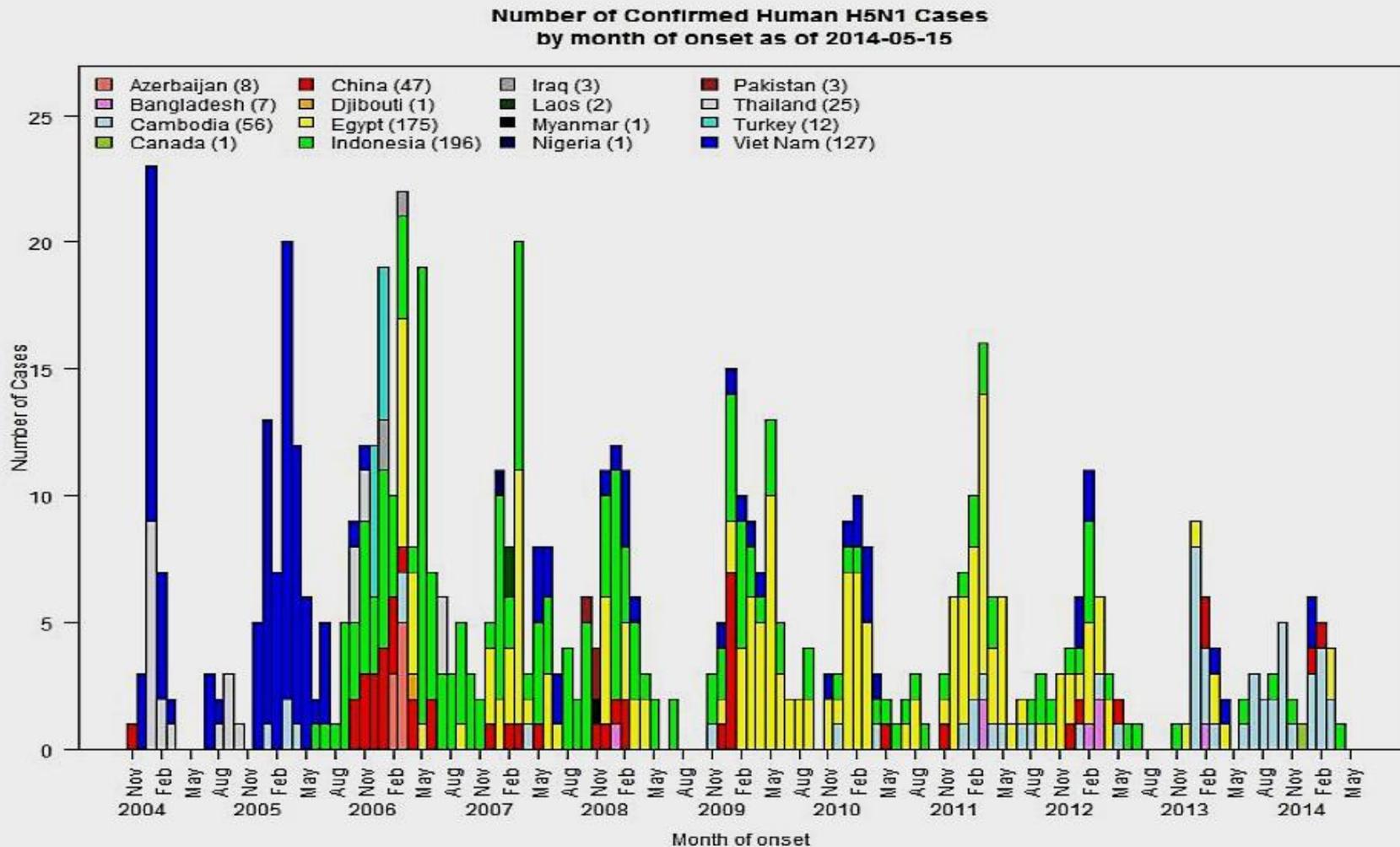
- H5N1 viruses which achieved respiratory transmission between ferrets had 5 mutations in common.

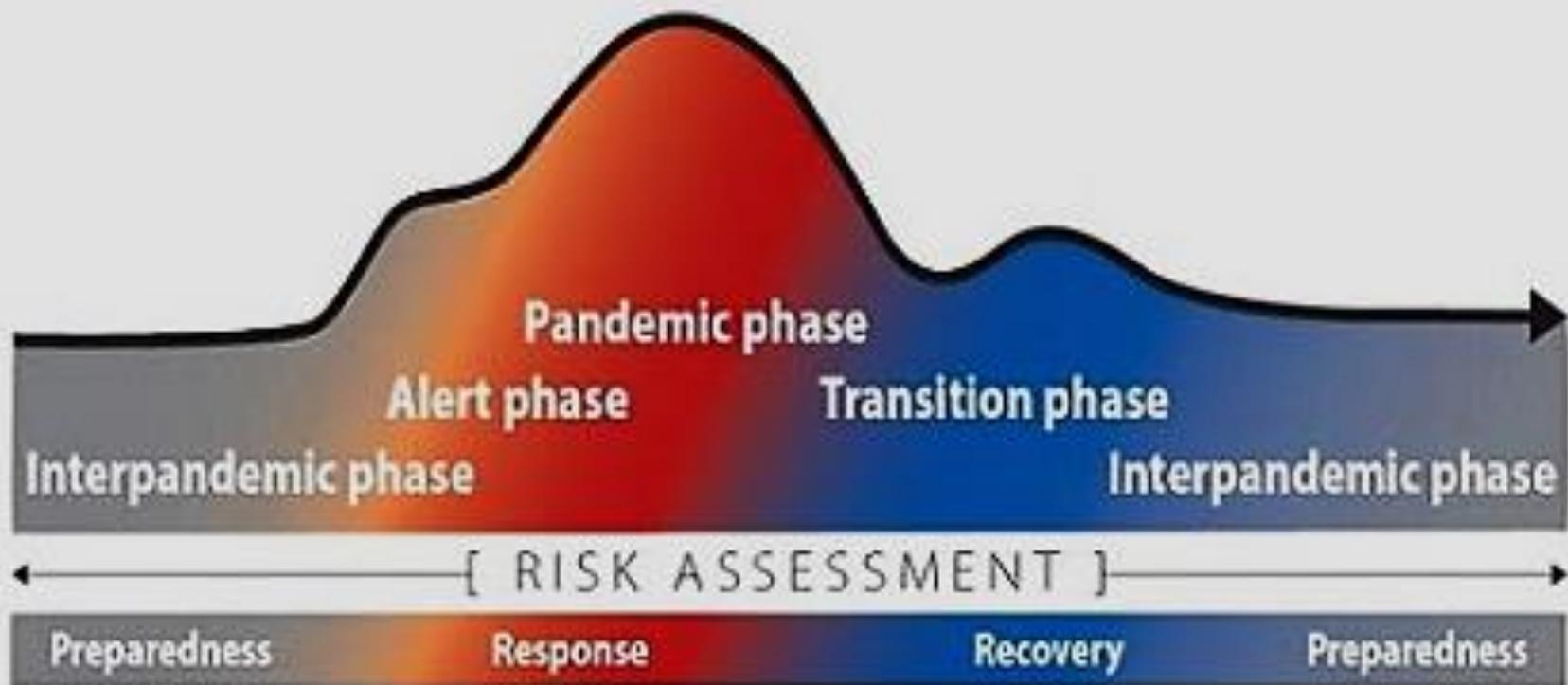
(www.sciencemag.org/content/336/6088/1534.full)



Although human cases of H5N1 peaked in 2006, cases are still being reported, with Cambodia reporting the most cases in recent months.

Figure 1: Epidemiological curve of avian influenza A(H5N1) cases in humans by reporting country and month of onset.





The current WHO phase of pandemic alert for avian influenza A(H5N1) is:
ALERT

www.who.int/influenza/preparedness/pandemic/h5n1phase/en/

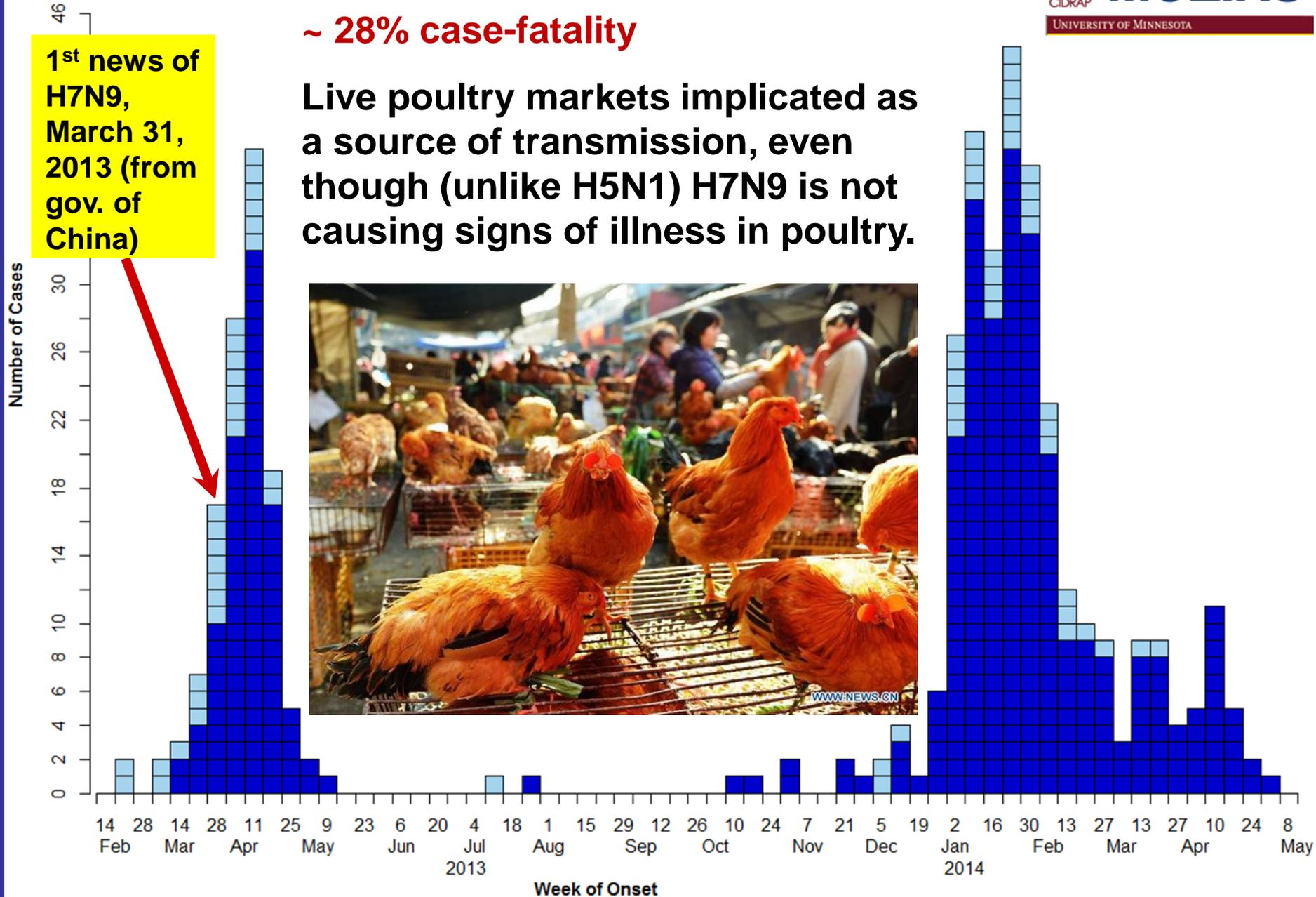
Cases of H7N9 Influenza in China by Week of Onset (May 16, 2014)

441 Total Cases: 122 Deaths

~ 28% case-fatality

Live poultry markets implicated as a source of transmission, even though (unlike H5N1) H7N9 is not causing signs of illness in poultry.

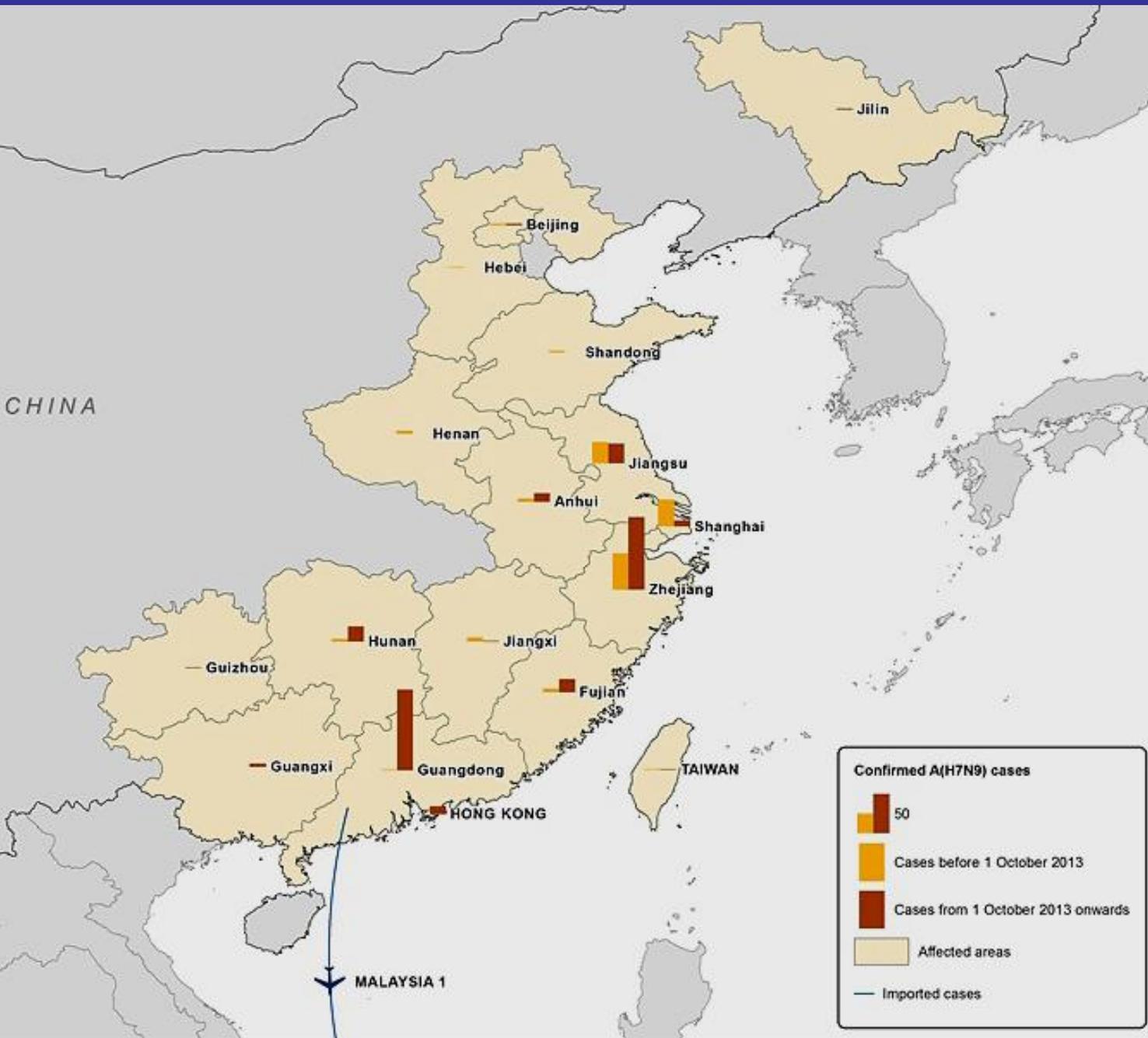
1st news of H7N9, March 31, 2013 (from gov. of China)



H7N9

“The continued transmission of a novel reassortant avian influenza virus, in one of the most densely populated areas in the world, capable of causing severe disease in humans, is a cause for concern due to the pandemic potential of the virus.”

ECDC, May 2014



Three Requirements for a Flu Pandemic:

1. Novel flu virus for humans
2. Ability to replicate in humans & cause illness
3. **Ability to pass easily from person to person**
(signaled by growing clusters / outbreaks of human cases)

H5N1

Yes

Yes

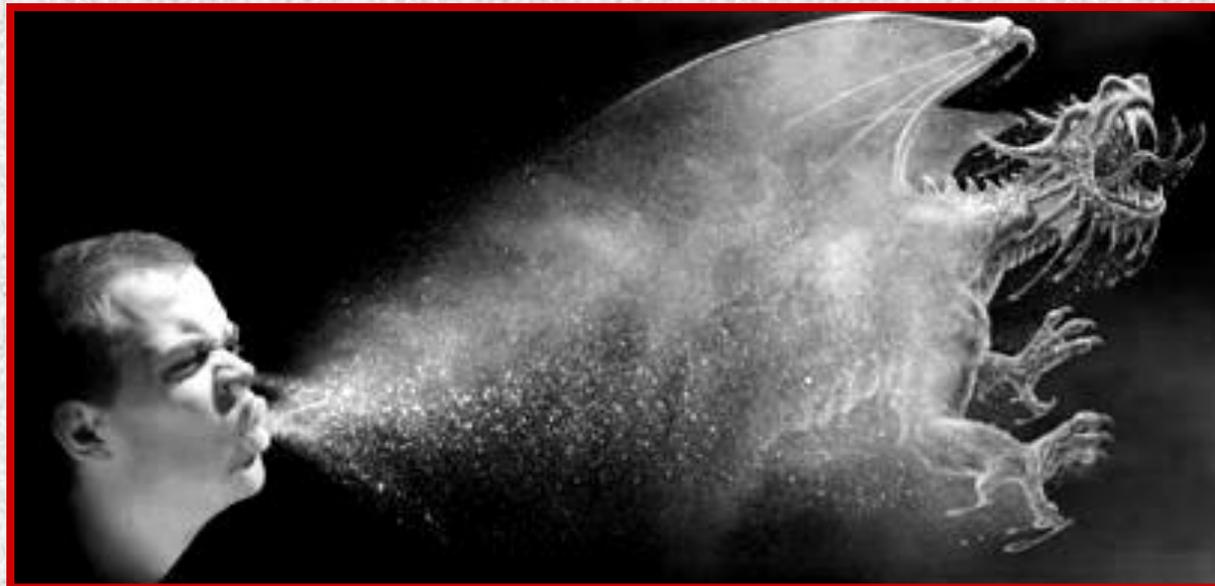
Not Yet

H7N9

Yes

Yes

Not Yet



Seasonal & Pandemic Flu:

Modes of Person-to-Person Transmission:

Close Exposure (1 - 2 meters / 3 - 6 feet):

1. Large **droplets** from coughing, sneezing, & talking, to other's nose & mouth (& eyes?);
2. **Contact**: direct (hand-to-hand) & indirect (hand-to-surface-to-hand – less common?);
3. **Airborne / aerosol / droplet nuclei**: By aerosol-generating medical procedures & in shared air spaces with poor air circulation? Can remain suspended in air for longer, but **NOT** long distance or in ventilation systems?



(Nothing to do with the birds or pigs!)

(WHO: www.cdc.gov/ncidod/EID/vol12no01/05-1370.htm
www.cidrap.umn.edu/cidrap/content/influenza/panflu/biofacts/panflu.html)



pH1N1 spread rapidly around the world in 2009 (even though more of its genes were swine & human, than avian!)

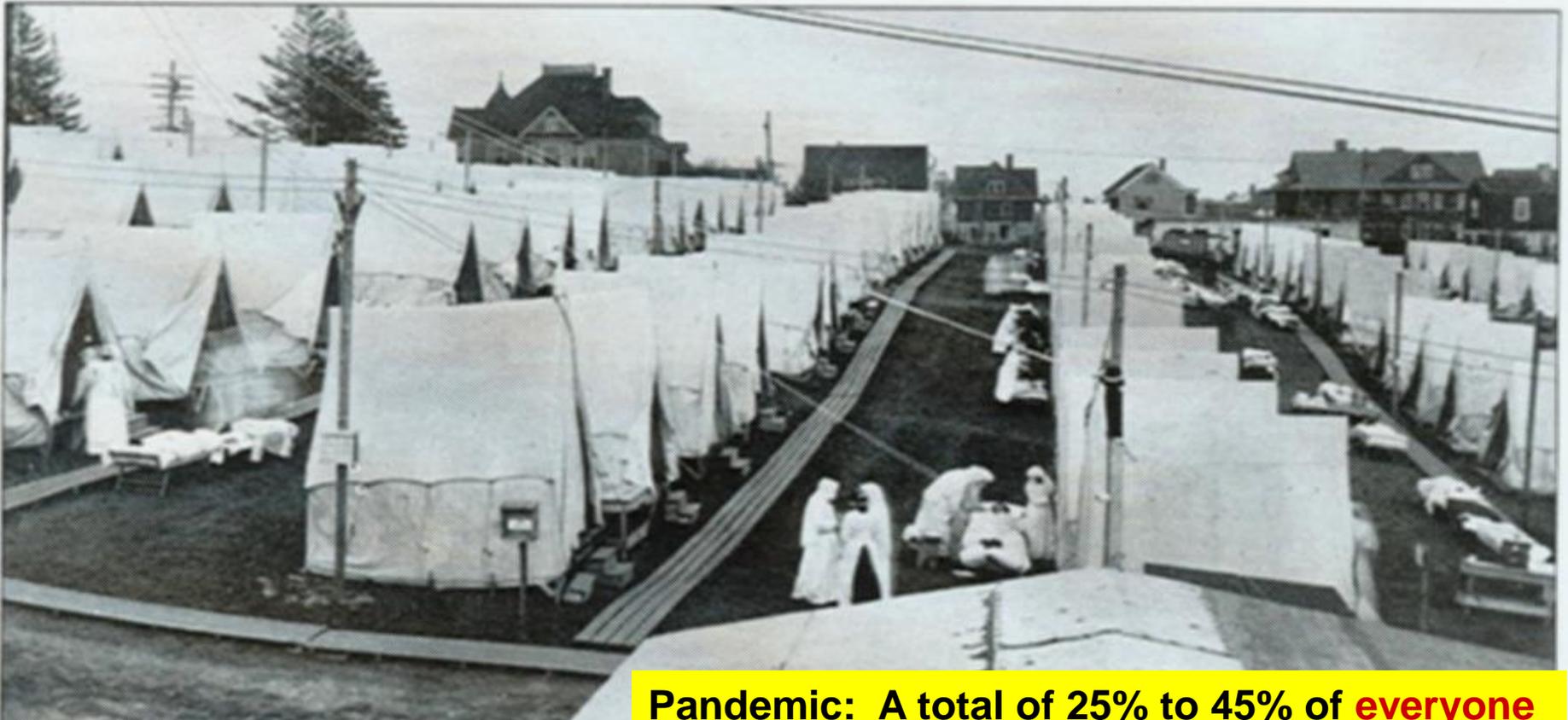
pip.rubberfeet.org



(Border closures & travel restrictions may delay spread of the virus, but are unlikely to stop it.)

“Few” countries have the staff, facilities, equipment, & hospital beds needed to cope (in a severe pandemic wave - WHO, Oct. 2005)

9. Massachusetts was the first state to suffer huge numbers of civilian deaths. This is a hospital in Lawrence.



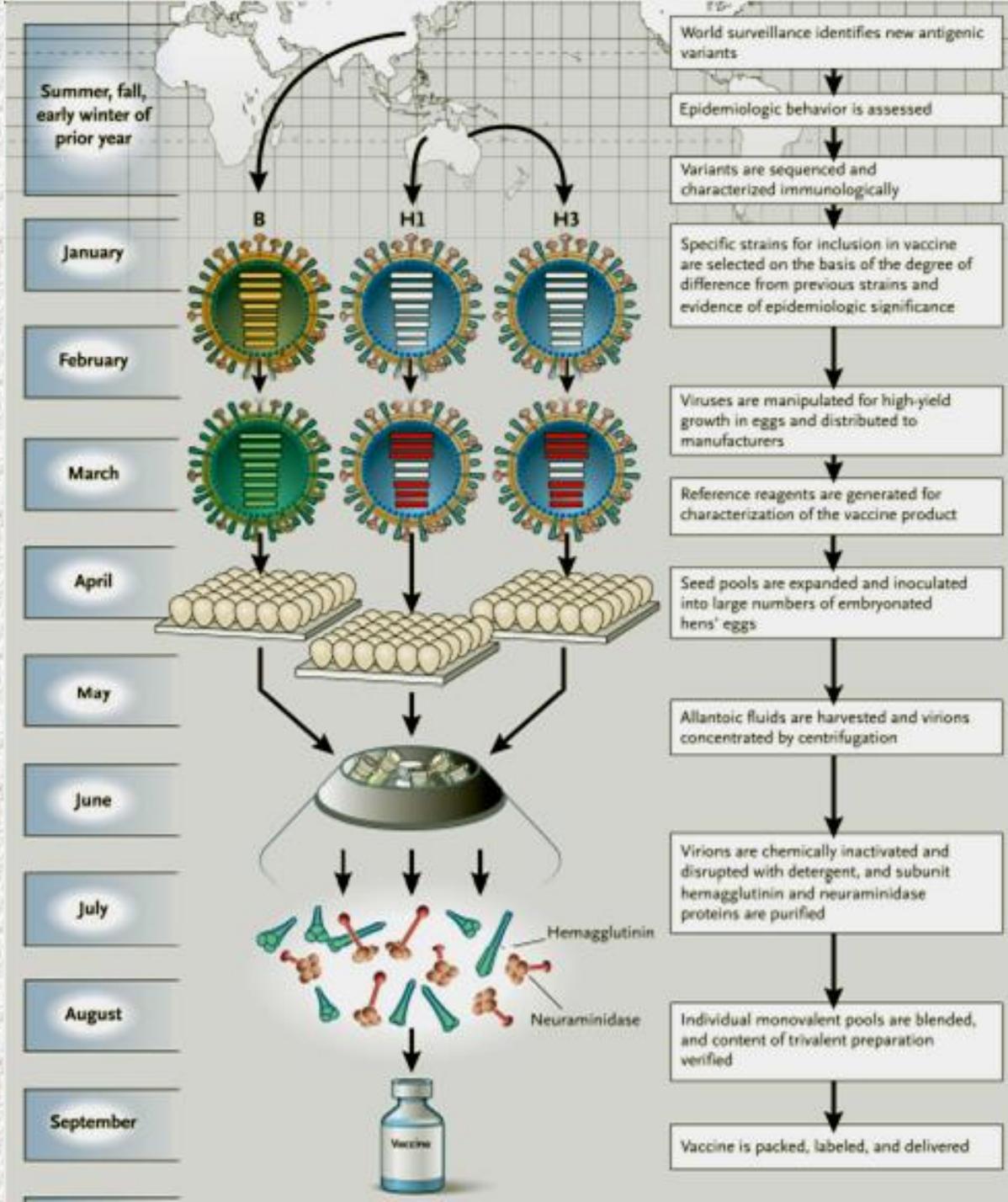
(John Barry. *The Great Influenza*.)

Pandemic: A total of 25% to 45% of everyone on earth gets sick with the flu. (WHO, June 2013)

Annual Process of Development, Manufacturing, & Distribution of Seasonal Flu Vaccine

Currently, effective pandemic flu vaccine also needs to match the specific flu strain.

Thus, mass production can start only after the pandemic starts.



MAJOR ARTICLE

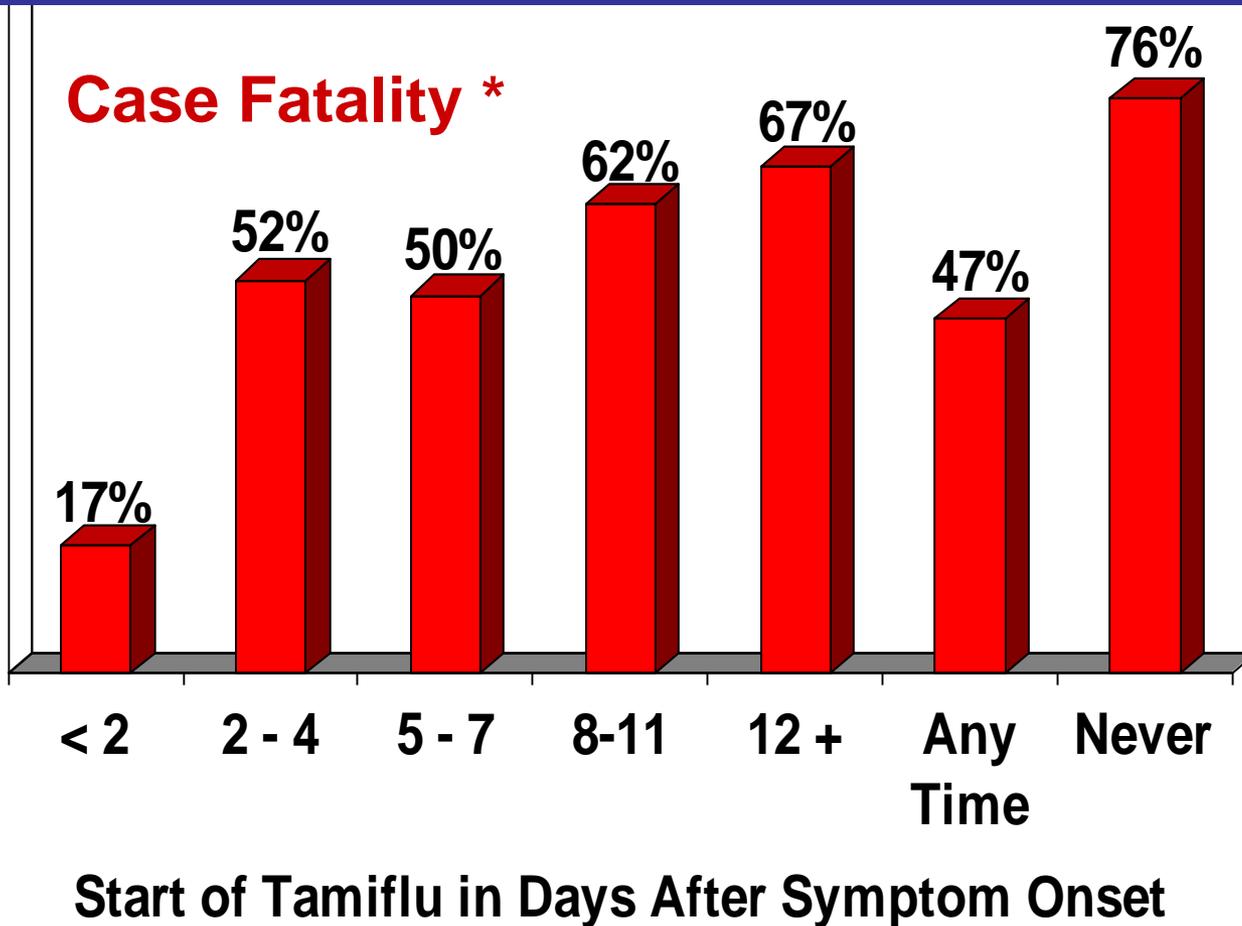
(September 2010)

Effectiveness of Antiviral Treatment in Human Influenza A(H5N1) Infections: Analysis of a Global Patient Registry

Capacity for antiviral production remains inadequate to meet global needs.

Antiviral drugs may be compromised by development of resistance.

Will antibiotics play a more important role in the next pandemic?



- Medical masks (surgical / procedure) help protect against droplets
- N95 also for aerosols (important for suctioning, nebulizer treatment, etc.), but should be fit-tested using a kit
- Neither protect eyes or prevent contact transmission
- Better on cases than on uninfected?
- Limited effectiveness data for flu
- **Must discard after dirty or moist**
- **Will likely be in short supply**
- **Woven cloth masks: Little data**



1918 (& 21st Century?)

(CDC: www.cdc.gov/Features/MasksRespirators/
WHO: www.cdc.gov/ncidod/eid/vol12no01/05-1371.htm)

Even full PPE with N-95 mask is not completely protective.

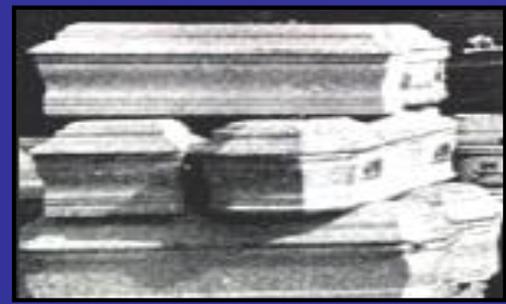
pip.rubberfeet.org



(Good hand hygiene & minimizing exposure are also important.)

Severe Pandemic Flu: A Unique Set of Challenges for Preparedness & Response

1. Limited recent experience (1918)
2. Unpredictable onset
3. Unpredictably high mortality
4. Person-to-person respiratory transmission (Folks at home, work, school, are a threat.)
5. Infeasibility of containment (except at onset?)
6. Global scale (↓ domestic & international aid)
7. Extended duration
8. Limited benefits of vaccines & anti-virals
9. NPIs: Important, but have substantial negative socio-economic consequences
10. Substantial social & economic disruption
11. Responding facilities & organizations themselves challenged



National Risk Register of Civil Emergencies

2012 edition

Figure 1: Risks of terrorist and other malicious attacks

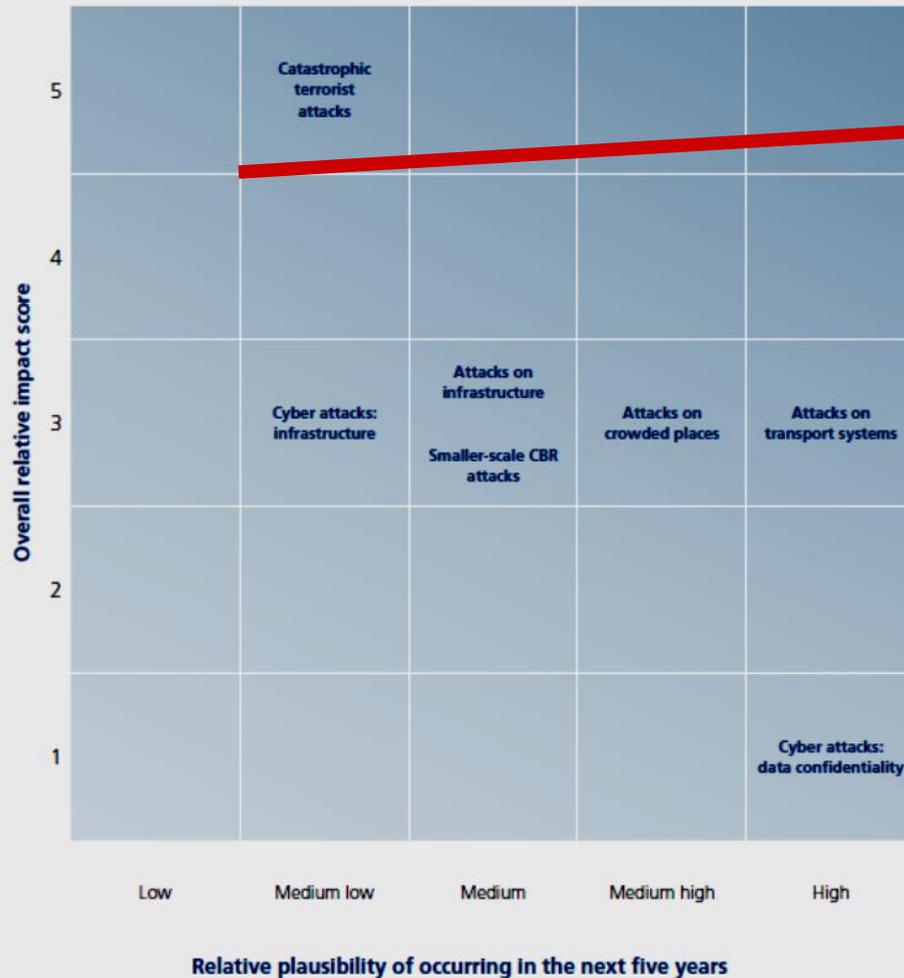
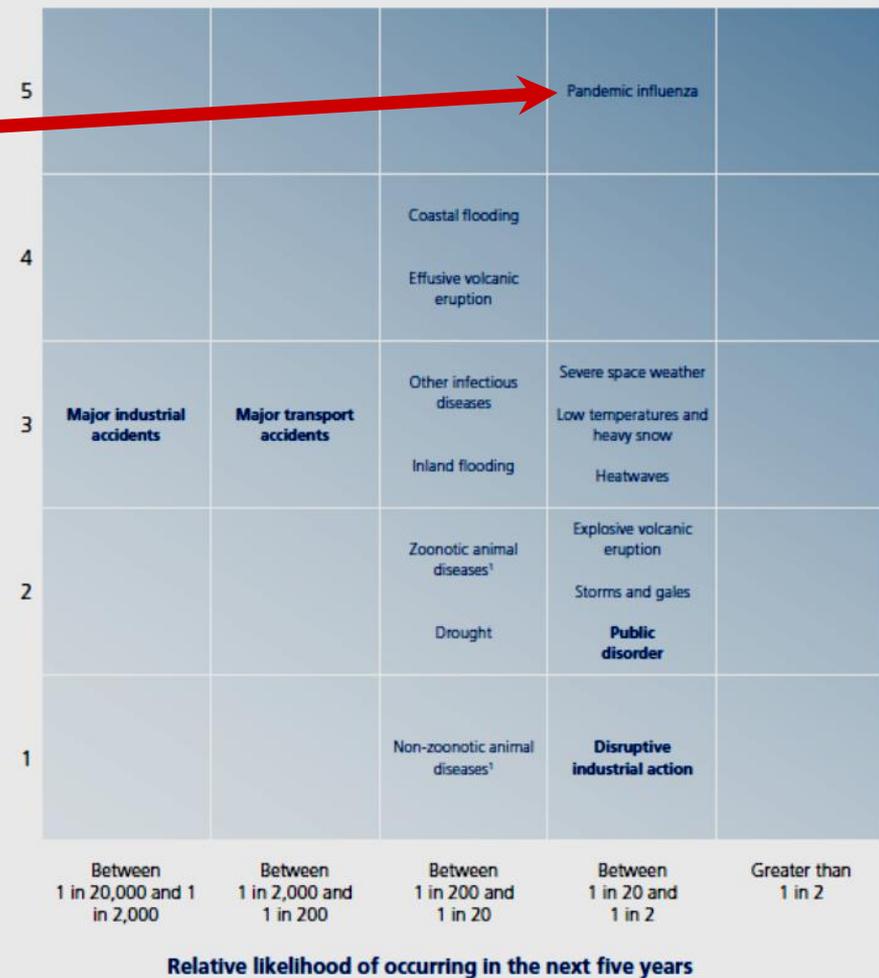


Figure 2: Risks of natural hazards and major accidents



What do you think is the answer to this question?

Influenza and other respiratory viruses

Open Access



Are we prepared to help low-resource communities cope with a severe influenza pandemic?

Eric S. Starbuck, Rudolph von Bernuth, Kathryn Bolles, Jeanne Koepsell

Department of Health and Nutrition, Save the Children, Westport, CT, USA.

Correspondence: Eric S. Starbuck, Department of Health and Nutrition, Save the Children, 54 Wilton Rd., Westport, CT 06880, USA.

E-mail: estarbuck@savechildren.org

Accepted 25 September 2012. Published Online 12 November 2012.

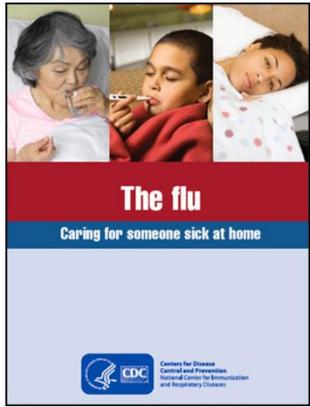
Recent research involving lab-modified H5N1 influenza viruses with increased transmissibility and the ongoing evolution of the virus in nature should remind us of the continuing importance of preparedness for a severe influenza pandemic. Current vaccine technology and antiviral supply remain inadequate, and in a severe pandemic, most low-resource communities will fail to receive adequate medical supplies. However, with suitable guidance, these communities can take appropriate actions without

substantial outside resources to reduce influenza transmission and care for the ill. Such guidance should be completed, and support provided to developing countries to adapt it for their settings and prepare for implementation.

Keywords Developing countries, influenza, nonpharmaceutical interventions, pandemic, preparedness, public health.

Please cite this paper as: Starbuck *et al.* (2013) Are we prepared to help low-resource communities cope with a severe influenza pandemic? *Influenza Other Respiratory Viruses* 7(6), 909–913.

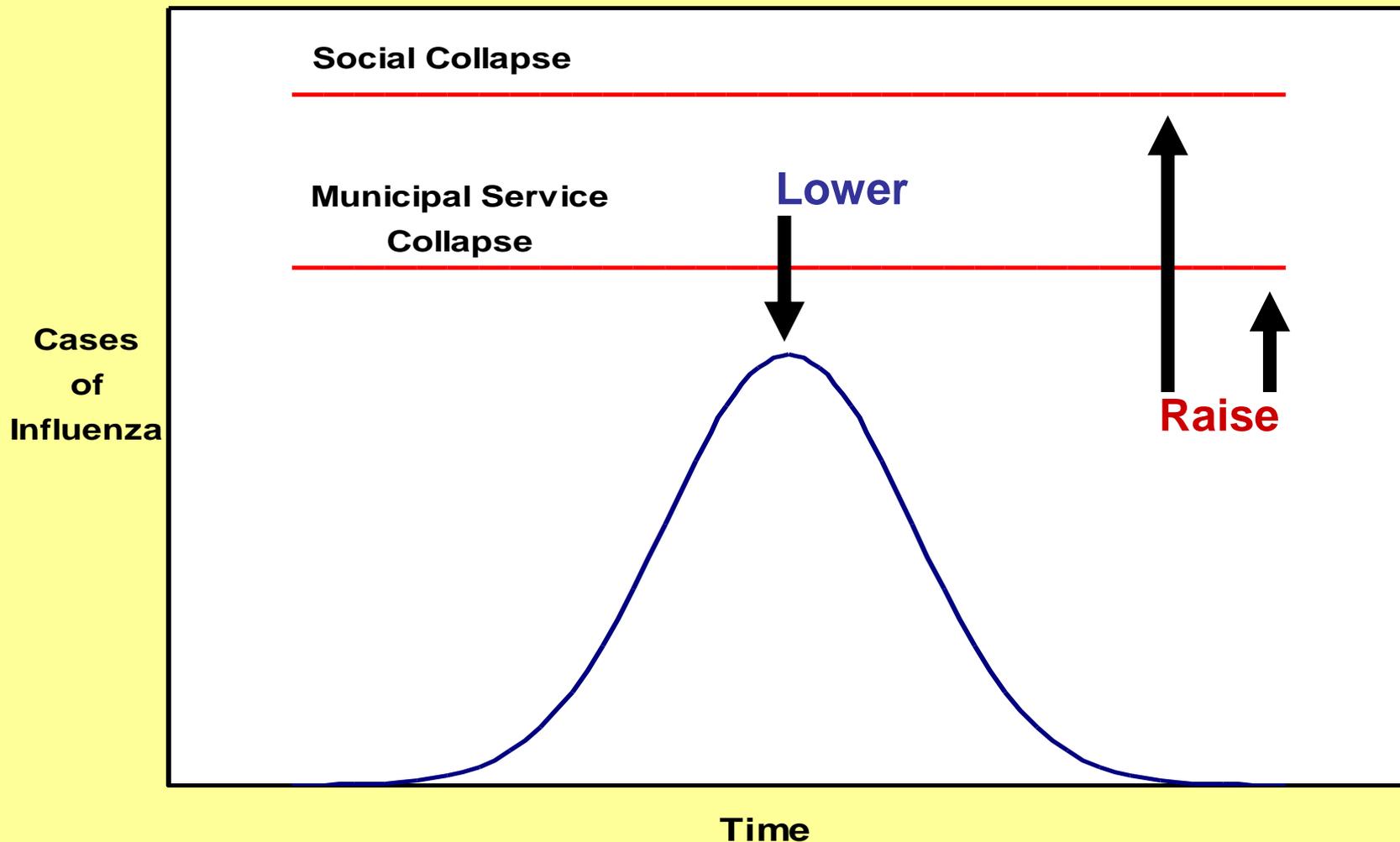
Basic Public Health Measures to Mitigate Pandemic Flu in Low-Resource Settings

	Family / Household Level	Community / District Level (Depending on pandemic severity)
<p>Prevention</p> 	<ul style="list-style-type: none"> Keep your distance. Wash your hands. Cover your coughs & sneezes. Isolate your ill (including ventilation, cleaning, masks, & HH members minimizing interaction with others if pandemic is severe). 	<p>Limiting public crowding, gathering, mixing, & contacts, including:</p> <ul style="list-style-type: none"> Closing schools & child care, & Advising on travel & transport. Training community workers in infection control. Educating families on prevention.
<p>Care</p> 	<p>Care for those ill with the flu (ILI):</p> <ul style="list-style-type: none"> Rest Fever Medications Fluids Nutrition Care seeking 	<ul style="list-style-type: none"> Educating families on home care. Assisting the neediest/ sickest households (incl. care, food, water, psychiatric first aid?, burial?). Community case management (including antibiotics for pneumonia) where feasible. Continuity of care for selected conditions (such as HIV & TB medications) if feasible.
<p>Cross-Cutting Content:</p> <ul style="list-style-type: none"> What is pandemic flu? / Symptoms / Transmission. Keeping communities informed (numbers, location, & severity of cases; & best sources of info. & guidance.) Addressing community perceptions & concerns. 		

Goals of Community Mitigation & Business Continuity Planning in a Severe Pandemic

(St. Louis County Dep. of Health, 2006: www.pandemicprep.org/)

St. Louis - 200?



**NATIONAL LEVEL
PREPAREDNESS AND RESPONSE PLAN
ON PANDEMIC INFLUENZA
(Non-Pharmaceutical Interventions)**

In Nepal, H2P (Red Cross, CARE, & SC) supported MOH development of plans & materials for key interventions, including NPIs, at district & community levels.



Government of Nepal
Ministry of Health and Population
Department of Health Services

December 2009

**PANDEMIC INFLUENZA
PREPAREDNESS AND RESPONSE**

Participant's handbook for
HEALTH WORKERS

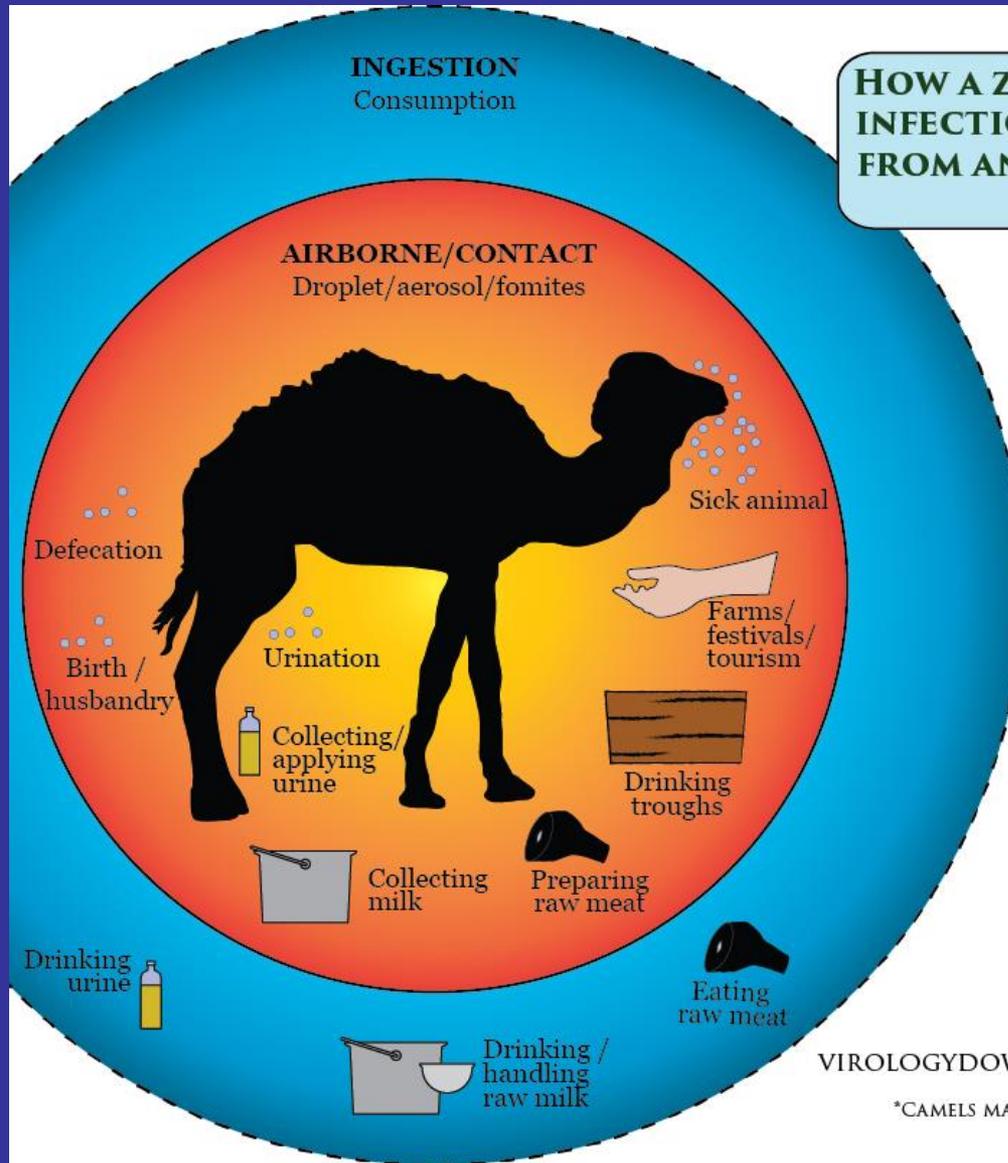
April 2009



Government of Nepal
Ministry of Health and Population
Department of Health Services
Epidemiology and Disease Control Division
Teku, Kathmandu

Flu is not the only pandemic threat to worry about & prepare for:

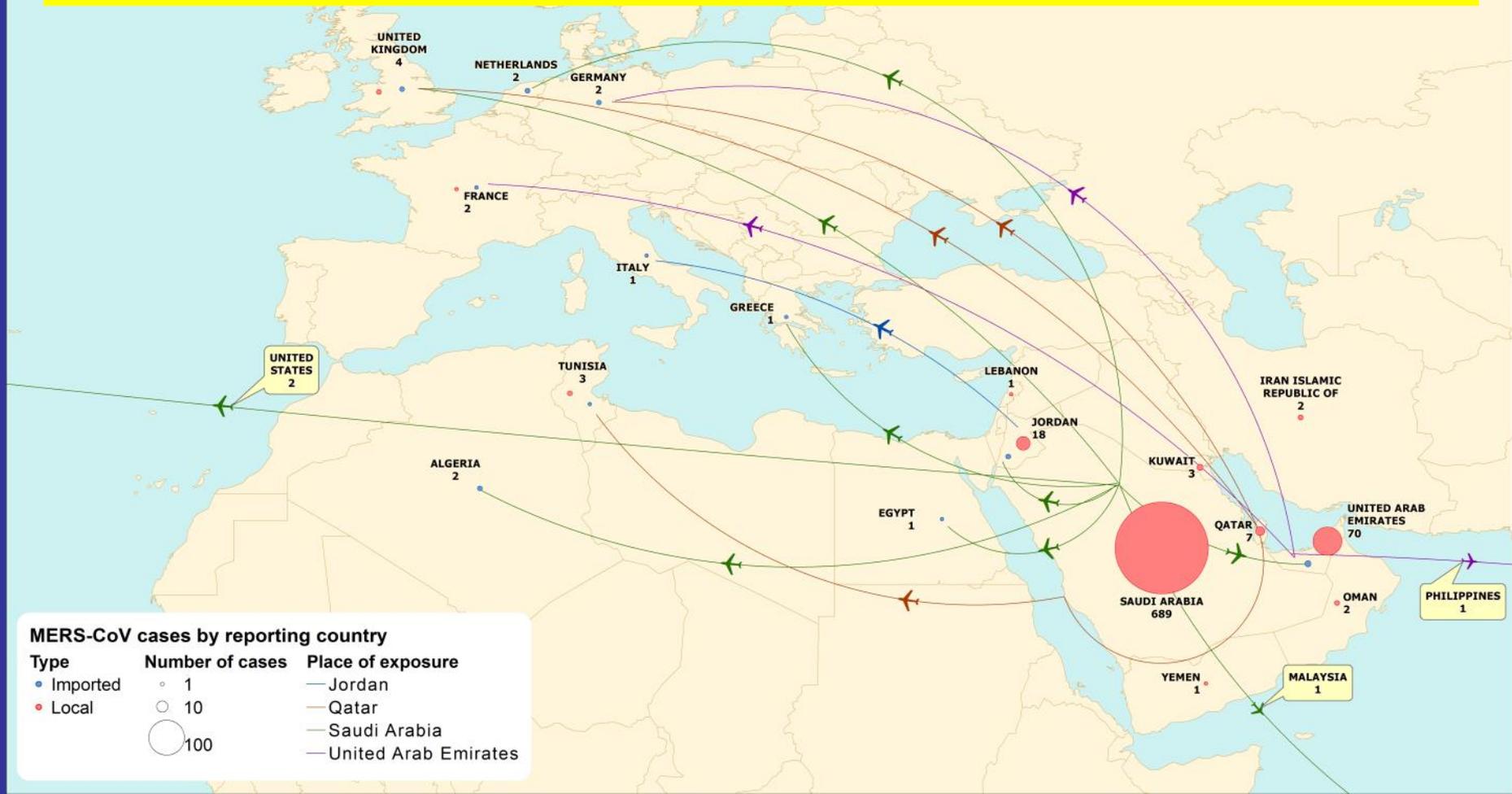
Now there's MERS-CoV (Middle-East Respiratory Syndrome – Coronavirus, related to SARS & to CoVs which cause the common cold).



HOW A ZOOONOTIC MERS-COV INFECTION MAY BE ACQUIRED FROM AN ACTIVELY INFECTED* CAMEL

Distribution of confirmed cases of MERS-CoV by reporting country and place of probable infection, March 2012 - 04 June 2014 (n=815)

“There have been clusters of cases in health-care facilities, where human-to-human transmission appears to be more efficient, especially when infection prevention & control practices are inadequate. Thus far, no sustained community transmission has been documented.” (WHO, FAQs, May 2014)

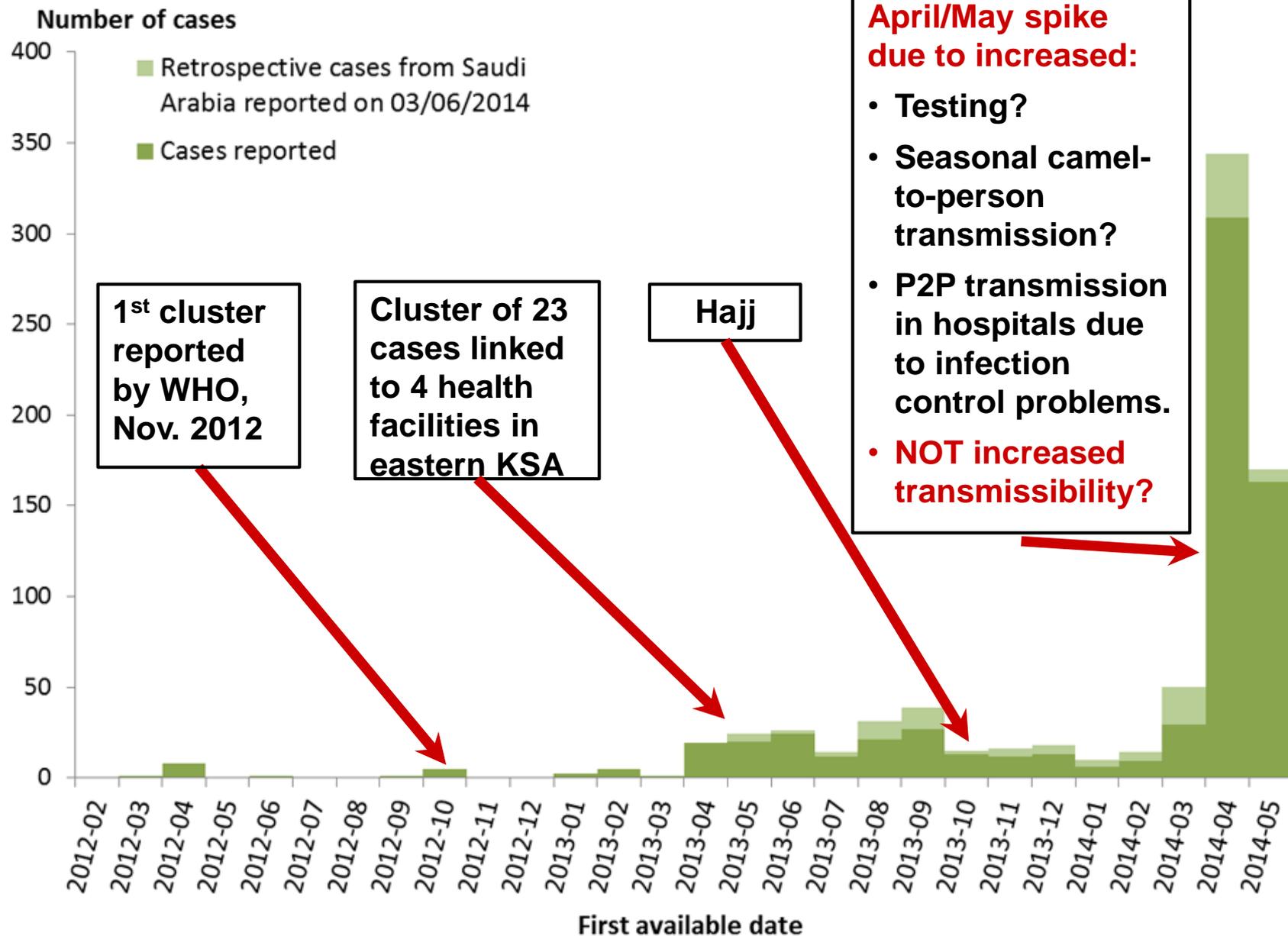


MERS-CoV cases by reporting country

Type	Number of cases	Place of exposure
• Imported	○ 1	— Jordan
• Local	○ 10	— Qatar
	○ 100	— Saudi Arabia
		— United Arab Emirates

Distribution of confirmed cases of MERS-CoV by first available month and time of reporting, March 2012 – May 2014

815 cases, ~ 38% case-fatality



Question



March 2005 H5N1 survivor in Hanoi

- What are some of the things that these 3 current threats have in common?

H5N1, H7N9, & MERS have several things in common:

- Apparent high case fatality.
- Limited P2P transmission among close contacts, but not sustained transmission.
- All 3 are RNA viruses which could potentially evolve into viruses capable of sustained P2P respiratory transmission (?), & potentially retain some of their current apparent high lethality.



If one of these (or H10N8, Nipah Virus, etc.) does go pandemic:

- Likely unavailability of vaccine or antiviral treatment for much or all of the world's population during at least the first several months.
- **If severe:** Likely important roles & similar content of home care for the ill, NPIs to slow transmission, & measures for continuity of key services.

2. Role of SC health professionals in responding to a severe pandemic



Community case management during an influenza outbreak

TRAINER'S GUIDE

A TRAINING PACKAGE FOR

COMMUNITY HEALTH WORKERS

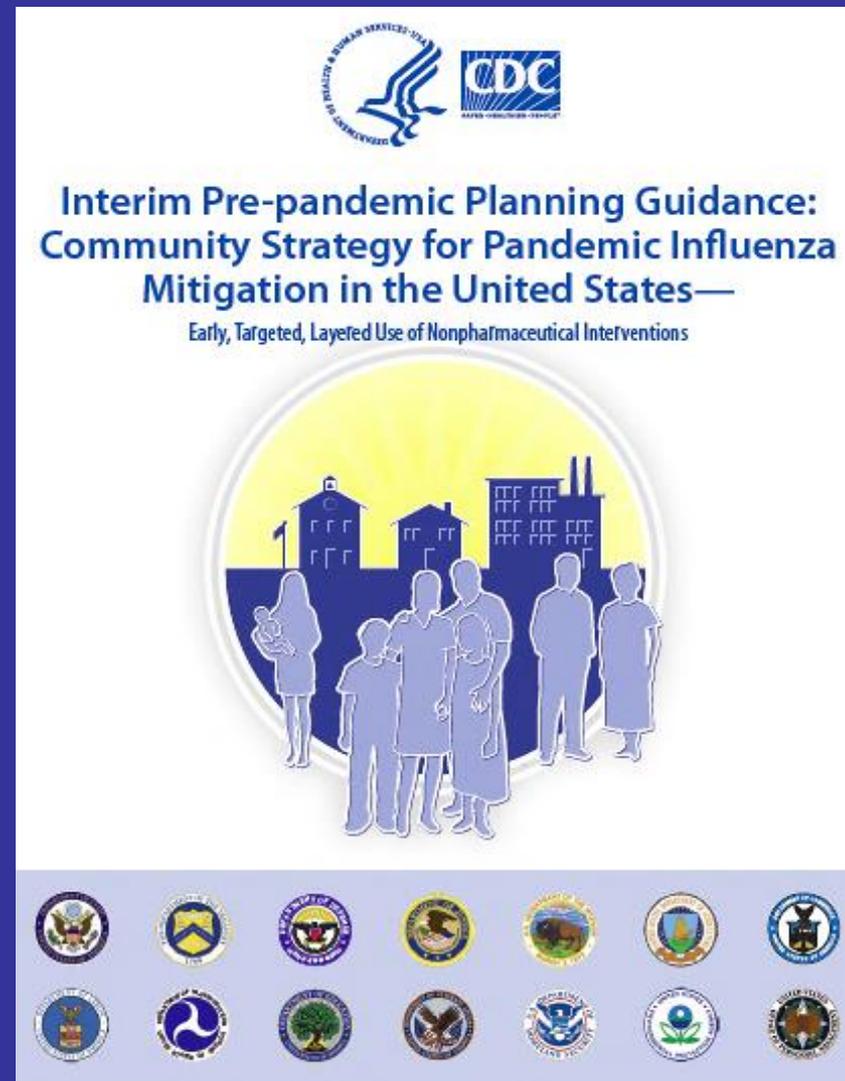


World Health
Organization

- What do you think your roles should be in responding to a severe pandemic?

How could you help SC address our 3 priorities in a severe pandemic?

- Health & safety of SC staff & their families.
- Continuity of key SC business & services.
- Mitigate the effects of a severe pandemic in the communities in which we work.



3. Available Resources

www.savethechildren.org/publications/technical-resources/avian-flu/

Influenza & Pandemic Threats

Key Information for All Staff

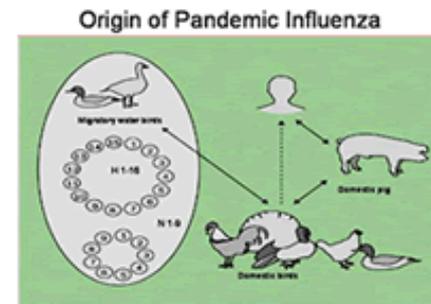
- Seasonal Flu, Pandemic Flu, and You - What SC Staff Should Know and Be Prepared For (Jan. 2011)
- Pandemic Threats: Summary Travel Guidance for SC Staff (Dec. 2013)
- Flu & You (CDC)



A Save the Children family's six week food stockpile.

Additional Information for Influenza Point Persons

- Pandemic Threats: News & Guidance Links (Dec. 2013)
- Seasonal & Pandemic Flu Preparedness Checklist for SC Country & Field Offices (Jan. 2011)
- Severe Pandemic Flu: Challenges for Preparedness & Response (1 page, Sep. 2011)



Pandemic Threats: News & Guidance Links for Health Professionals & Outbreak Responders

Updated May 2014, with best general links in yellow. (Input to estarbuck@savechildren.org please)

1. Outbreak Alerts & Generic Guidance - official sites (sometimes a little slow with breaking news)

www.who.int/csr/don/ **WHO Global Alert & Response (GAR) 1st WHO posts on disease outbreaks**

<http://ecdc.europa.eu/> **European CDC** (Excellent risk assessments & good public health guidance)

<http://wwwnc.cdc.gov/travel/notices> **US CDC Travel Health Notices**

2. Timely independent expert reporting & analysis of important news on flu & other outbreaks

www.cidrap.umn.edu/cidrap/ **CIDRAP**, Univ. of Minn.: See “overviews.” Excellent (posts ~ 6:00 PM)

<http://virologydownunder.blogspot.com.au/> **Virology Down Under**, Ian Mackay, Univ. of Queensland

3. Selected news on flu / outbreaks, regularly updated (incl. trusted blogs with short commentary)

<http://afludiary.blogspot.com/> **Avian Flu Diary** (Experienced & trusted, Mike Coston, Florida-based)

<http://crofsblogs.typepad.com/h5n1/> **H5N1 blog** (Quite Good, Crawford Kilian, Vancouver-based.)

12. Key official guidance on public health interventions (including NPIs & home care for flu)

- www.cdc.gov/nonpharmaceutical-interventions/index.html **US CDC pages on NPIs**
- <http://www.cdc.gov/nonpharmaceutical-interventions/guidance/index.html> **Interim Pre-Pandemic Planning Guidance: Community Strategy for Pandemic Influenza Mitigation in the U.S. - Early, Targeted, Layered Use of Nonpharmaceutical Interventions, US CDC, Feb. 2007** (10 MB, also at: http://www.flu.gov/planning-preparedness/community/community_mitigation.pdf)
- http://ecdc.europa.eu/en/publications/Publications/0906_TER_Public_Health_Measures_for_Influenza_Pandemics.pdf **Guide to public health measures** to reduce the impact of influenza pandemics in Europe – ‘**The ECDC Menu**,’ European CDC, Sep. 2009
- www.who.int/influenza/resources/documents/community_case_management_flipbook/en/index.html **Community case management during an influenza outbreak: A training package for community health workers, WHO, 2011** (includes family-level NPIs & home care)
- www.cdc.gov/flu/homecare/ **The Flu: Caring for Someone Sick at Home, US CDC, Feb. 2013**

Global Alert and Response (GAR)

[GAR Home](#)[Alert & Response Operations](#)[Diseases](#)[Global Outbreak Alert & Response Network](#)[Biorisk Reduction](#)

Disease Outbreak News (DONs)

New information

[Latest DON](#)

Recent DONs

10 June 2014

[Human infection with avian influenza A\(H7N9\) virus – update](#)

6 June 2014

[Ebola virus disease, West Africa – update](#)

4 June 2014

[Ebola virus disease, West Africa – update](#)

4 June 2014

[Middle East respiratory syndrome coronavirus \(MERS-CoV\) – update](#)

[– Full list of DONs](#)

Announcement: WHO to change the way it reports H5N1 cases

Henceforward, WHO will publish information on human cases with H5N1 avian influenza infection on a monthly basis on the Influenza webpage:

[Monthly Risk Assessment Summary](#)

Cases of human infection with H5N1 will only be reported on Disease Outbreak News for events that are unusual or associated with potential

Related links

[Ebola virus disease \(EVD\)](#)
[Avian influenza A\(H7N9\) virus](#)
[Coronavirus infections](#)
[Pandemic \(H1N1\) 2009](#)
[Influenza at the Human-Animal Interface \(HAI\)](#)

Related documents

[↓ WHO outbreak communication planning guide – 2008 edition pdf, 811kb](#)

[WHO outbreak communications guidelines](#)
[Outbreak communication: best practices for communicating with the public during an outbreak](#)

Communication for behavioural impact (COMBI)

[COMBI toolkit for behavioural and social communication in outbreak response](#)
[Field workbook for COMBI planning steps in outbreak response](#)

Last Question

TAHITI BUILDS PYRES OF INFLUENZA DEAD

Seventh of Papeete's Population Succumbs and Bodies Feed Steady Fires.

FOOD AND MEDICINE SCARCE

Victims of Plague Everywhere Are Surrounded by Dying, While Disease is Spreading.

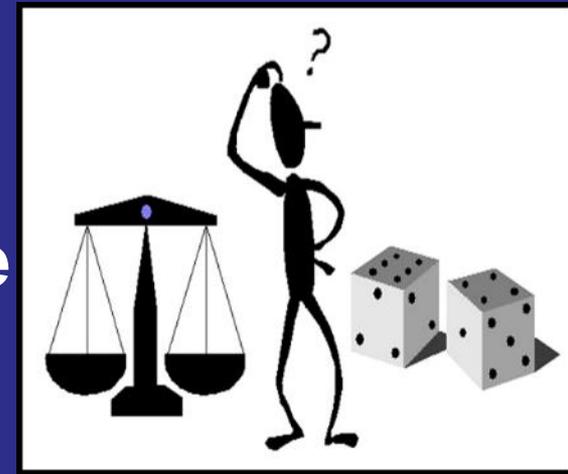
PAPEETE, Tahiti, Dec. 9.—Influenza

(December 1918)

- What kind of preparedness should SC maintain for this kind of threat (rare, severe pandemic involving respiratory transmission of a novel virus)?

SC Actions to Consider?

1. Update listserv to communicate with senior Country Office & Member health staff?
2. Update Business Continuity Plans (for “all hazards”)?
3. Ask Country Offices & Members to appoint Pandemic Point Persons (as in 2006 & 2009)?
4. Train Pandemic Point Persons (as in 2006)?
5. Update Pandemic Preparedness Plans (from those prepared in 2006)?
6. Others?



Conclusions

- H5N1, H7N9, & MERS are associated with high case-fatality among confirmed cases & small clusters of cases likely involving non-sustained P2P transmission.
- There is concern that a novel RNA virus, like one of these, could evolve into one capable of sustained P2P respiratory transmission, & potentially cause a severe pandemic.
- In such a scenario, vaccine & antiviral treatment would likely be unavailable to much or all of the world's population during at least the first several months.
- SC health professionals should be aware of this threat & familiar with resources to address our priorities in a severe pandemic.

