Global Health Security and Roles of Cities

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History of disease and civilization

Period	Event	Disease	Place
Prehistory	Human beings lived as hunters and gatherers of food	No major communicable diseases	
1st Wave (5000 –2500 years ago)	Hunter-gatherers 'settled' into agrarian villages	Smallpox, measles, chickenpox,tuberculosis	Sumeria, Egypt
2nd Wave (2500-700 years ago)	Contact between different civilizations (through trade and travel)	Smallpox, measles	From Europe to Asia via the Silk Road
		"Black Death" /bubonic plague	Started in Europe in the 6th century
3rd Wave (700 years ago and onwards)	Trans-oceanic movement of seafarers	Smallpox, measles, influenza, typhus	To America from Europe (destroyed 90% of the population)
		Syphilis	To Europe from America
		Malaria, yellow fever	To Europe from Africa
4th Wave ?	?	?	?

(McMicheal, A.J., *Human frontiers, environments and diseases* Cambridge University Press, 2001)

Characteristics of civilization today

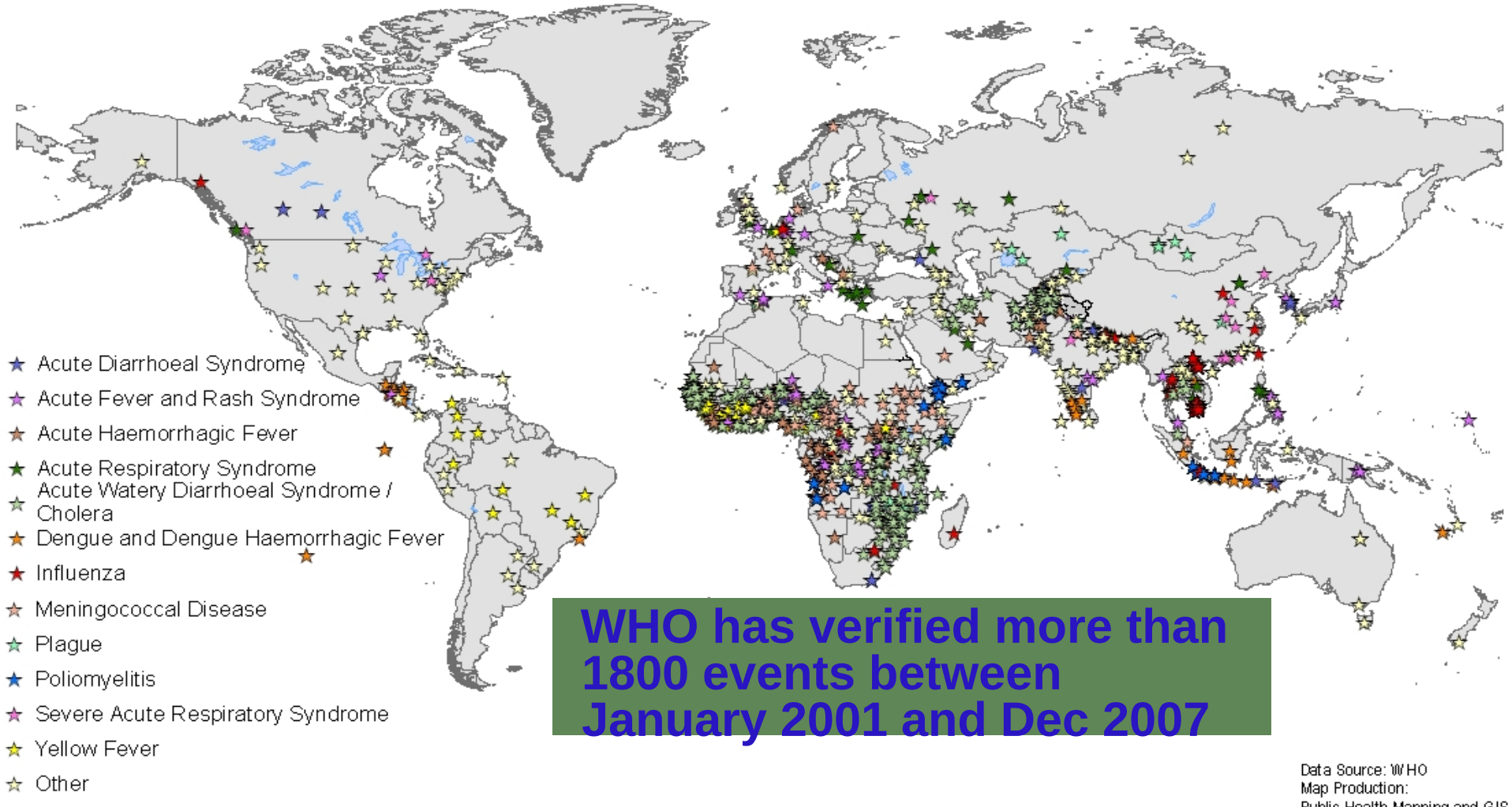
1. **Globalization** The flow of people, goods and information is unprecedented
2. **Urbanization** There are more than 20 megacities today
3. **Consumerism** Consumption has become an end in itself
4. **Demographic changes** Society is ageing

Emergence of new infectious diseases

- Globally, an average of one new infectious disease has emerged each year.
- Most are zoonoses

HIV 1	1983
HIV 2	1985
Enterocytozoon Bieneusi	1985
Human Herpesvirus 6 (HHV 6)	1986
Hepatitis C virus	1989
Hepatitis E virus	1990
Guanarito Virus	1991
Barmah Forest Virus	1992
Bartonella henselae	1992
Sin Nombre Hantavirus	1993
Cyclospora cayatenensis	1994
Sabia Virus	1994
Hendra Virus	1994
Human Herpesvirus 8	1994
Lyssavirus (in Australia)	1996
Nipah Virus	1996
New Variant CJD	1996
Influenza A(H5N1)	1997
West Nile Virus (in US)	1999
SARS CoV	2003
Monkeypox (in US)	2003

Verified Communicable Disease Outbreaks
1 January 2001 - 30 September 2005



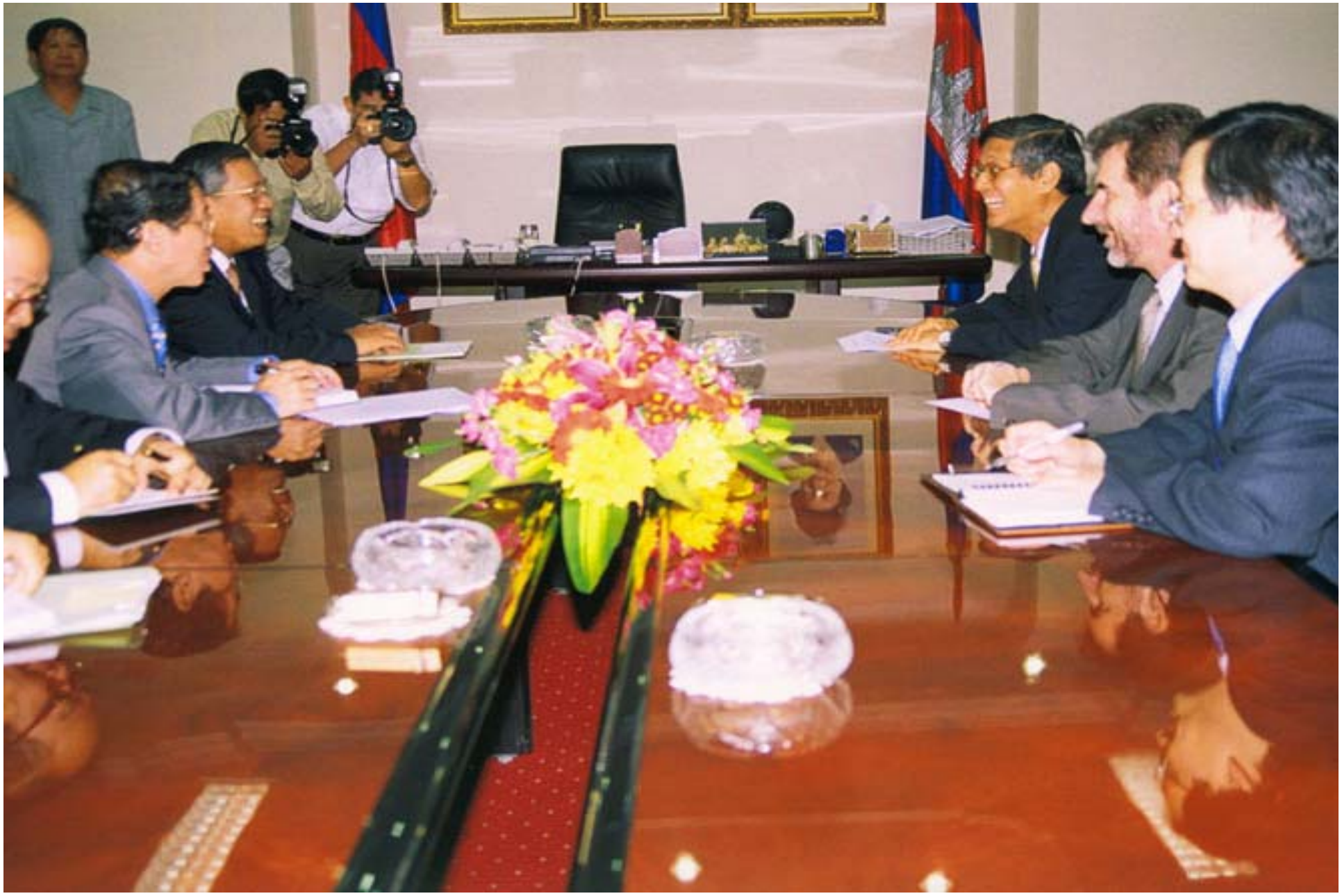
WHO has verified more than 1800 events between January 2001 and Dec 2007

World Health Organization

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: WHO
Map Production:
Public Health Mapping and GIS
Communicable Diseases
World Health Organization

Current concern about potential influenza pandemic



The way in which people live with and handle poultry in Asia


11 1 '94

Influenza pandemics in 20th century

1918: “Spanish Flu”

40-50 million deaths

A(H1N1)

1957: “Asian Flu”

1-4 million deaths

A(H2N2)

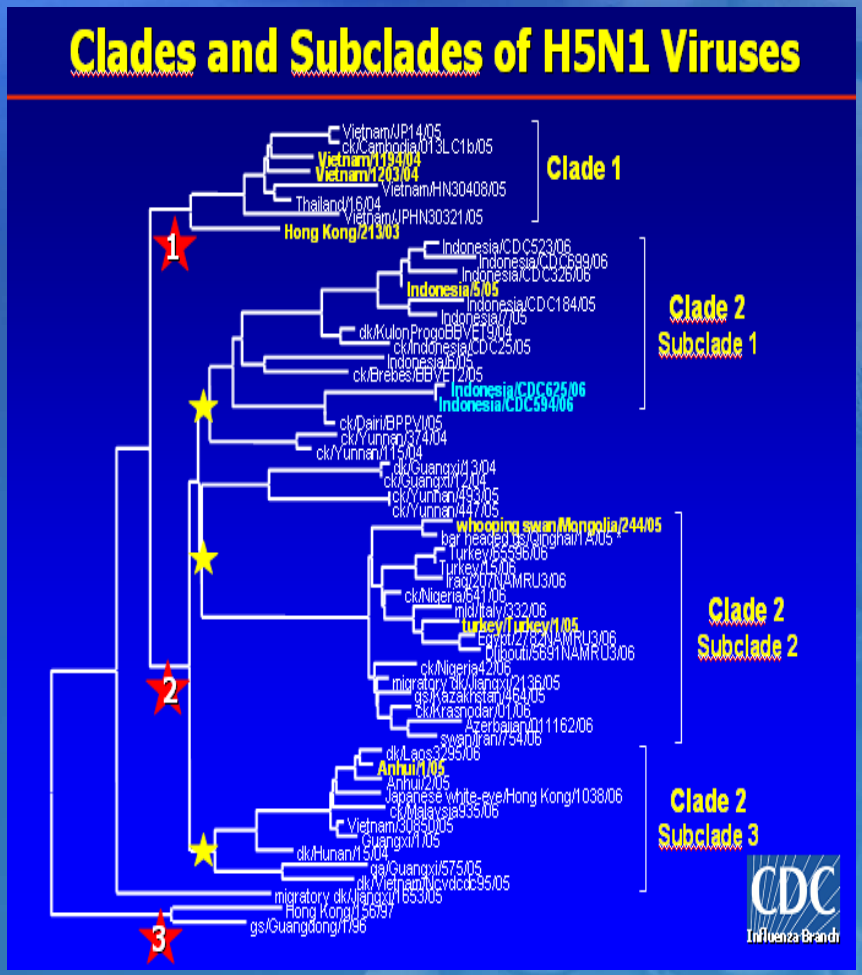
1968: “Hong Kong Flu”

1-4 million deaths

A(H3N2)

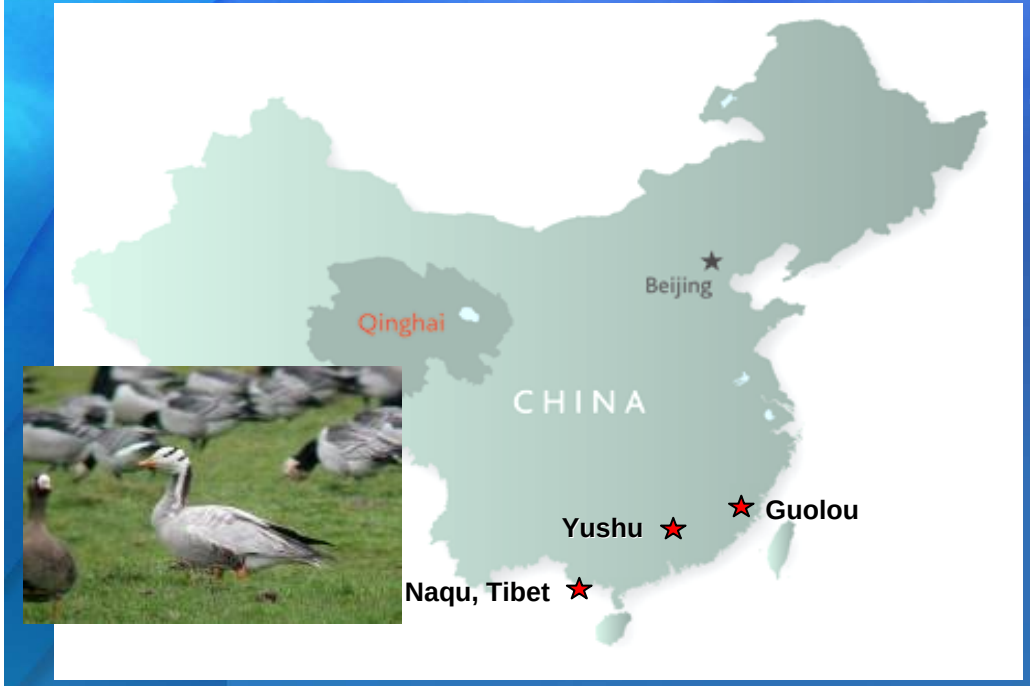
H5N1 viruses evolve rapidly

- Distinct genetic groups have been identifed.
- Different clades and subclades have been circulating in different parts of the world



Serious Condition of H1N1

1. Outbreak of H5N1 in migratory birds in Qinghai province, China



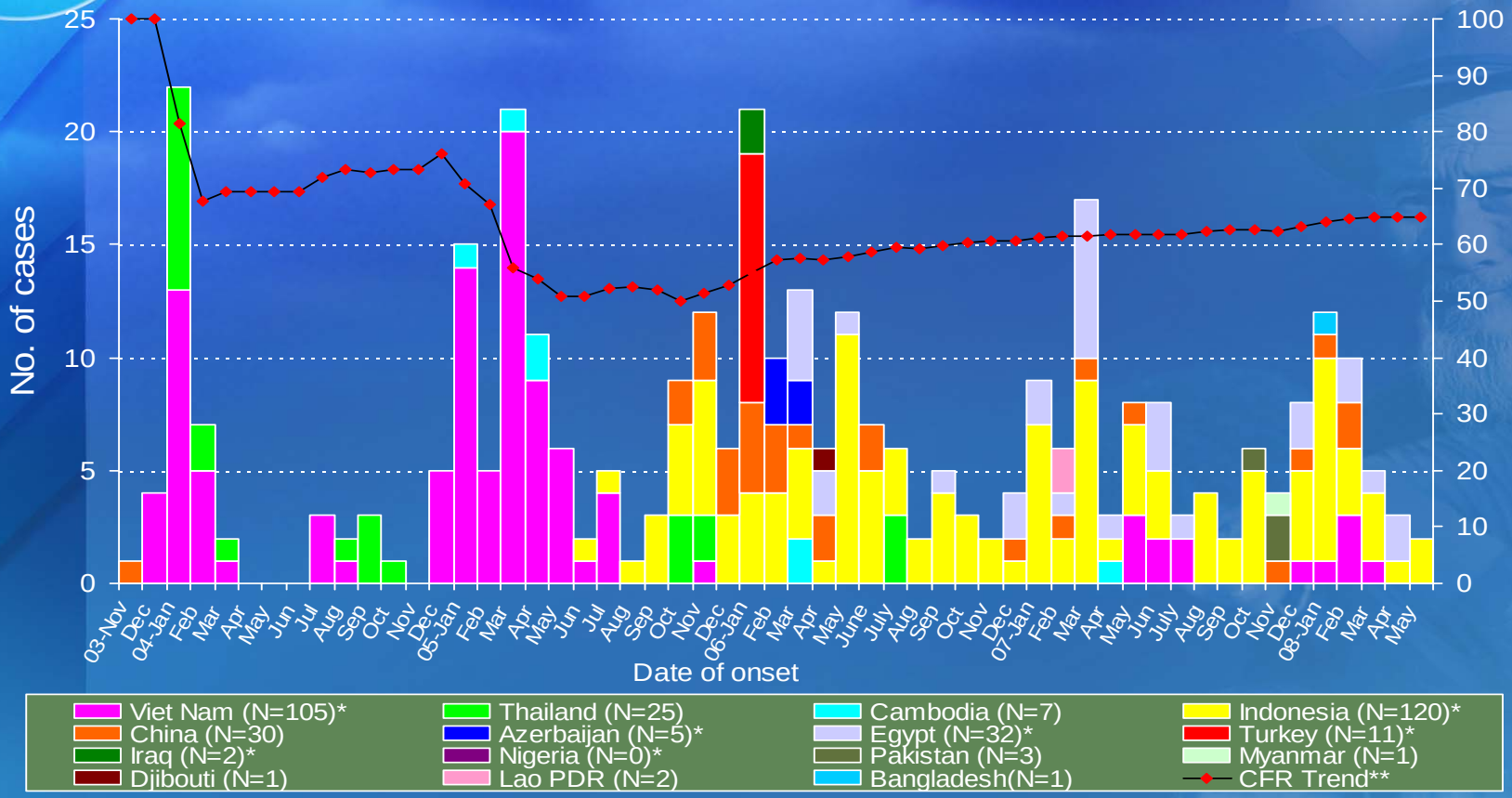
Over 6,000 migratory birds died in May and June 2005 in Qinghai Lake. This event was unprecedented – significant mortality in wild birds is very unusual

2. Optimum temperature of growth

- Seasonal epidemic viruses (human to human transmission) replicate most efficiently at 33℃.
- H5N1 replicates most efficiently at 37 ℃.
- A recent study points out that some H5N1 viruses now can replicate at 33℃

出典:*PLoS Pathog.* 2007 October; 3(10): e133.

Human Avian Influenza A (H5N1) Cases by Onset Date and Country (n=347) (as of 19 June 2008)



As of 19 June 2008, total of 385 cases were reported officially to WHO

* Cases missing onset date are excluded:

1 Viet Nam, 13 Indonesia, 3 Azerbaijan, 18 Egypt, 1 Turkey, 1 Iraq, 1 Nigeria

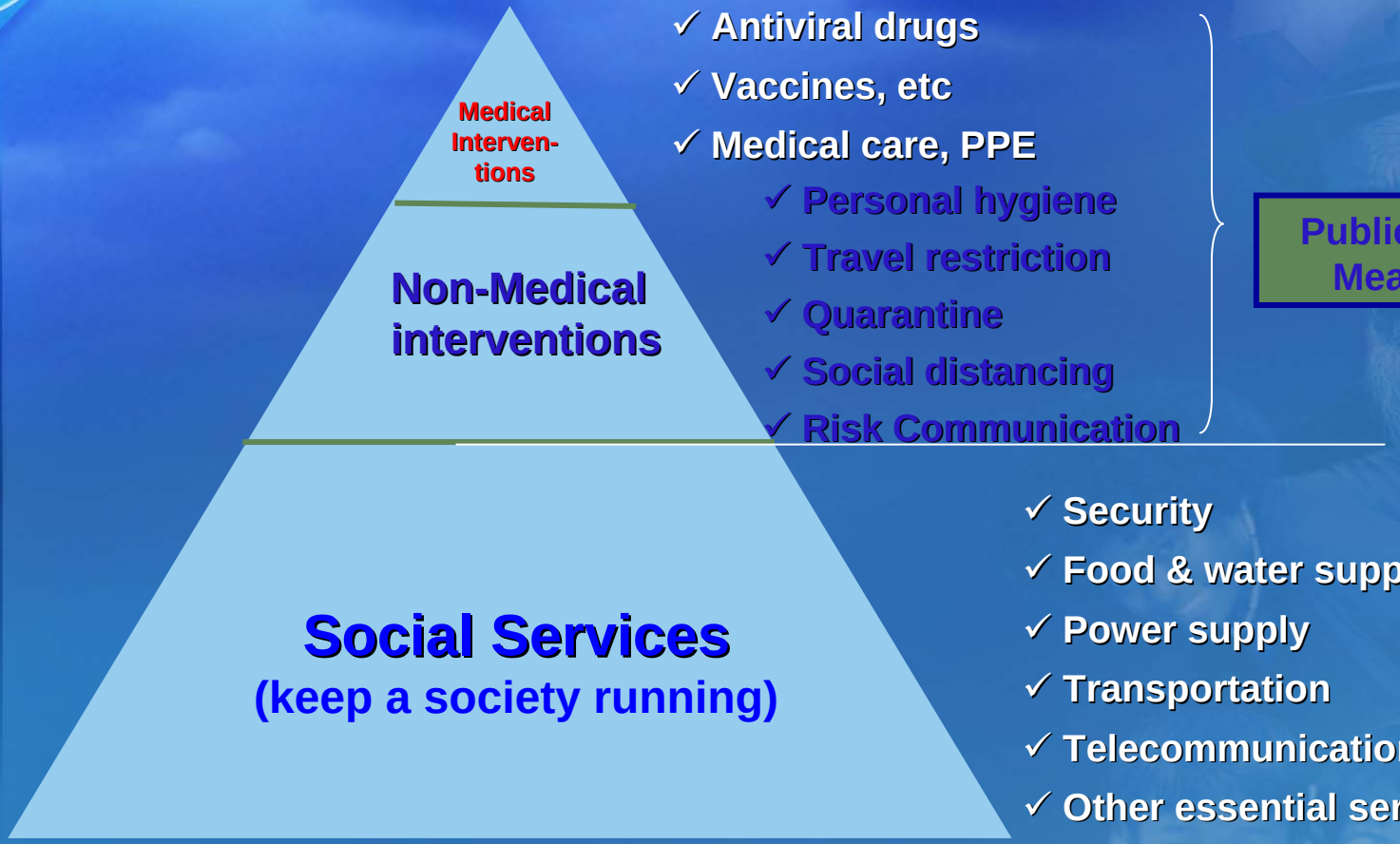
** CFR Trend: computed based on cumulative dead & total

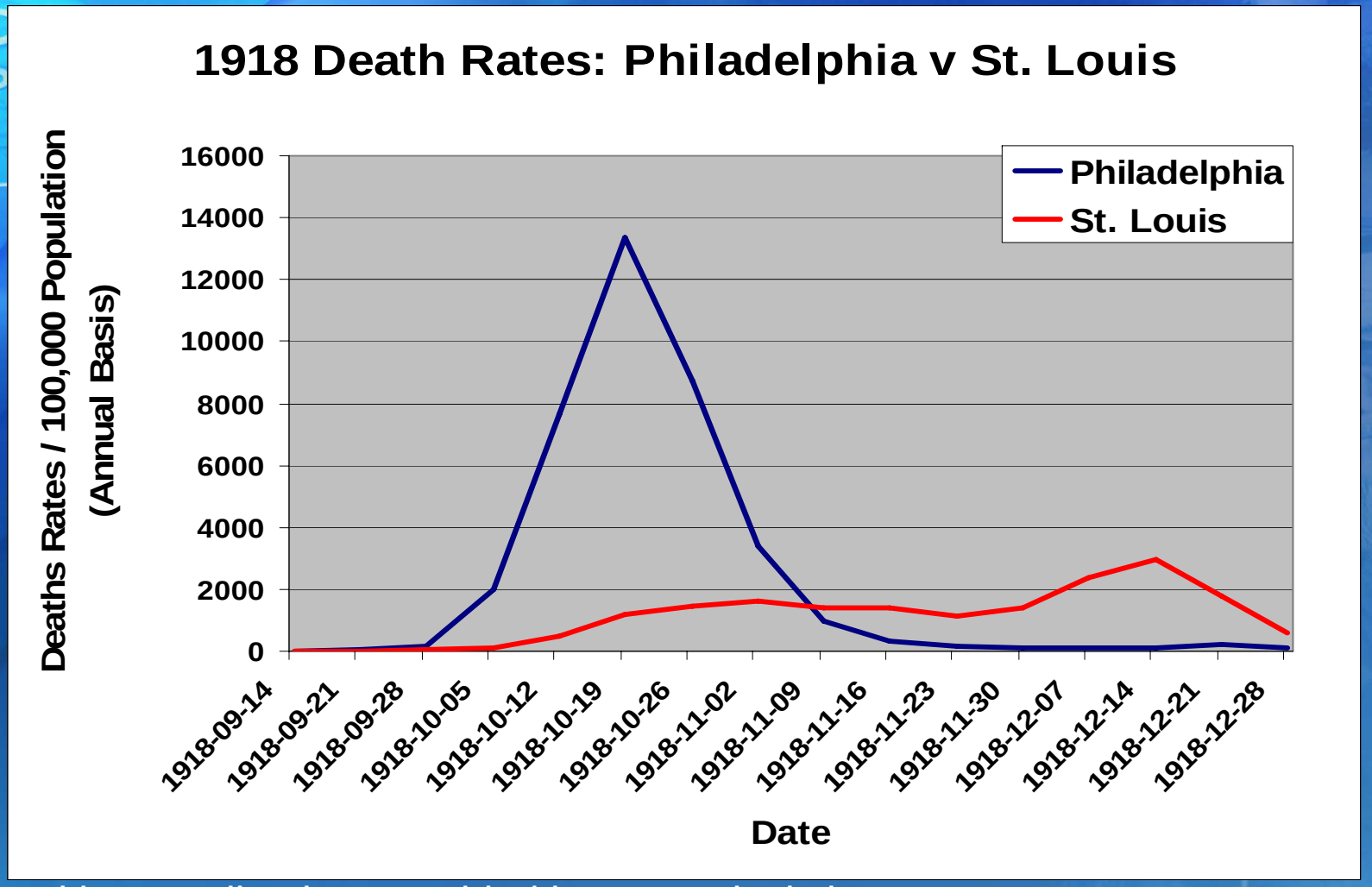
Spread of 1918 Pandemic in USA

Spread of 1918 Influenza Pandemic in USA

Source: America's Forgotten Pandemic - The Influenza of 1918 - 1989

Strategy: Pandemic Preparedness

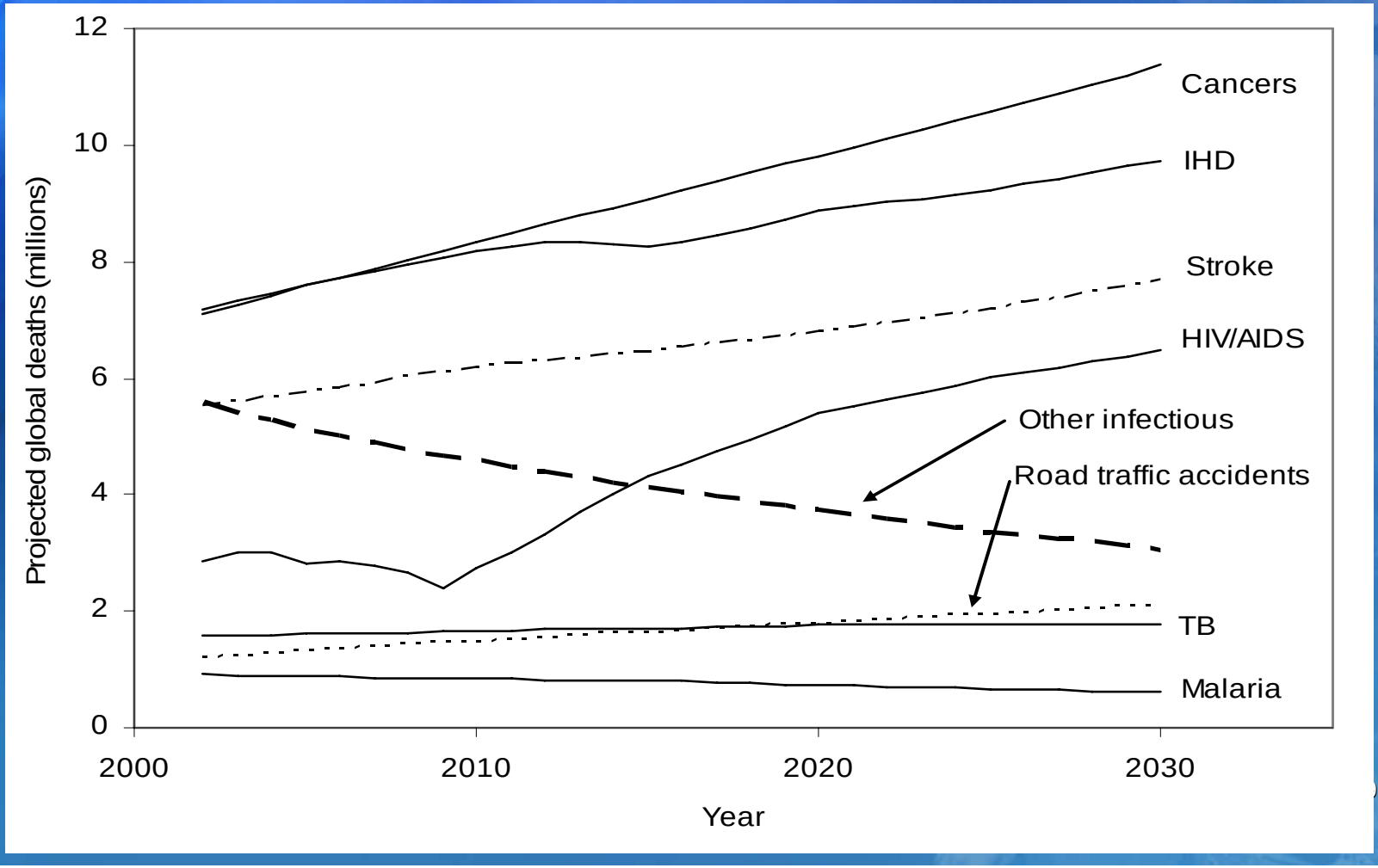




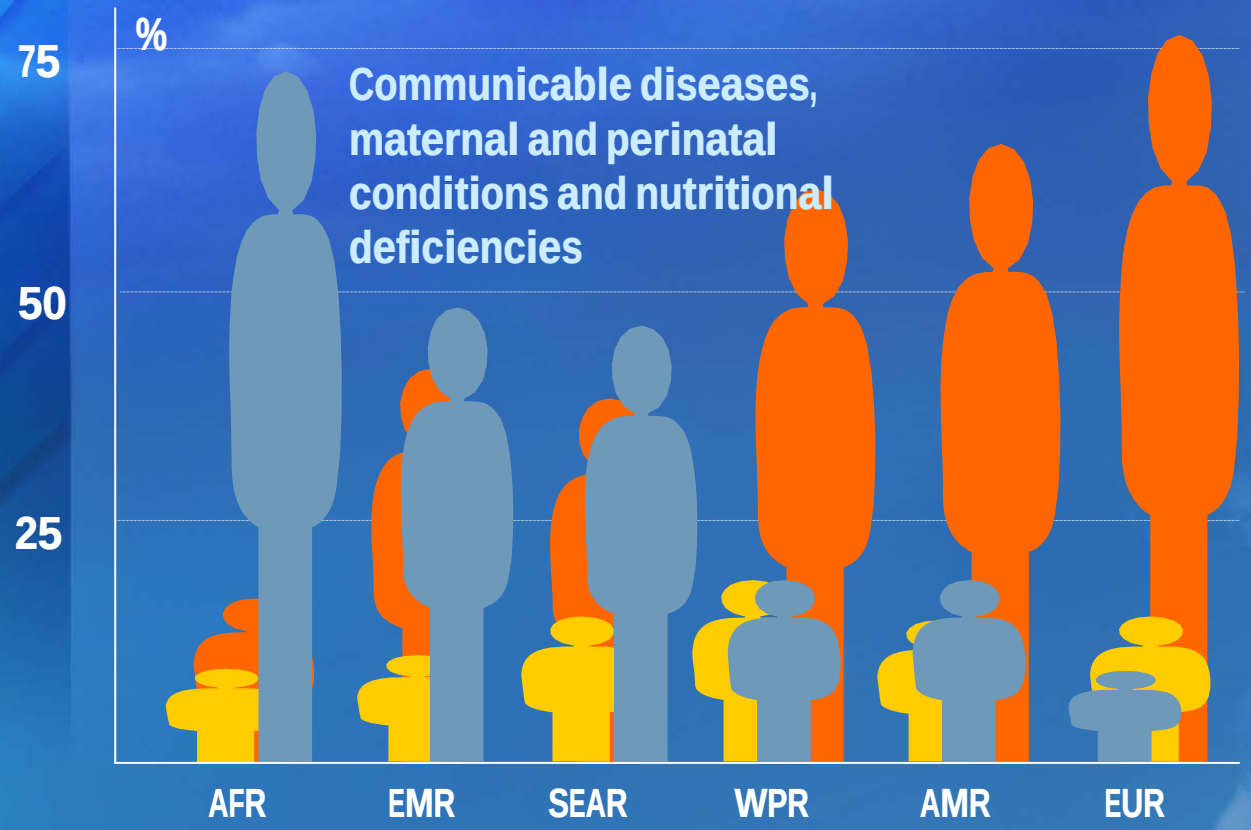
Weekly mortality data provided by Marc Lipsitch

Time Check !

2. Increasing burden of noncommunicable disease

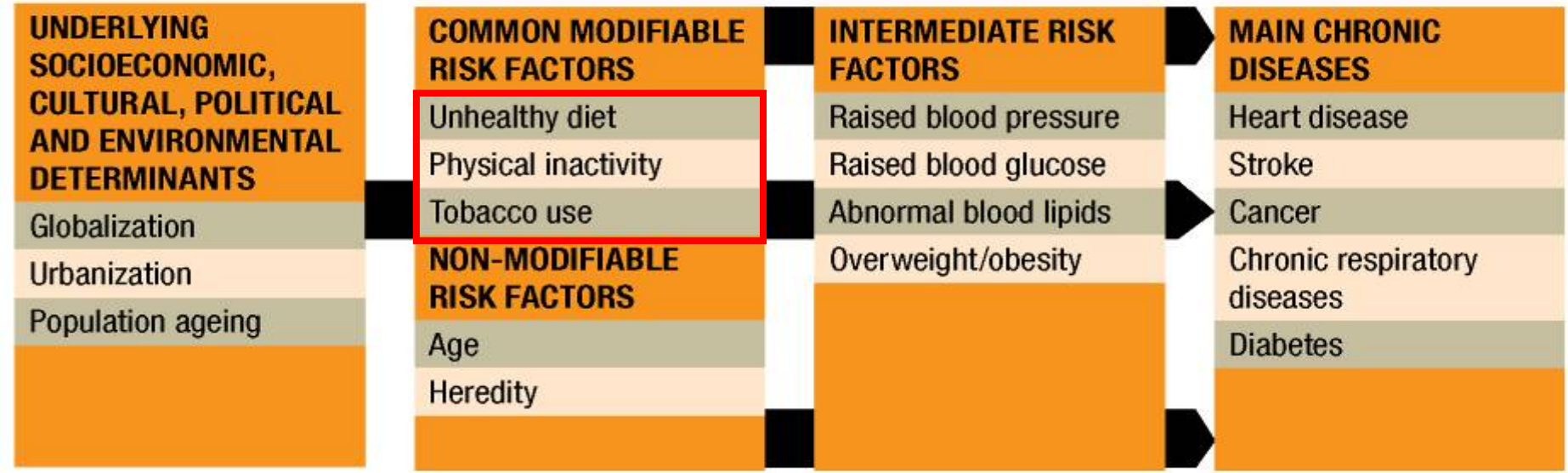


Heavy burden of NCD compared to other conditions



DALY = Disability-Adjusted Life Year
Source: World Health Report, 1999

Causes of chronic diseases



Outcome of risk reduction

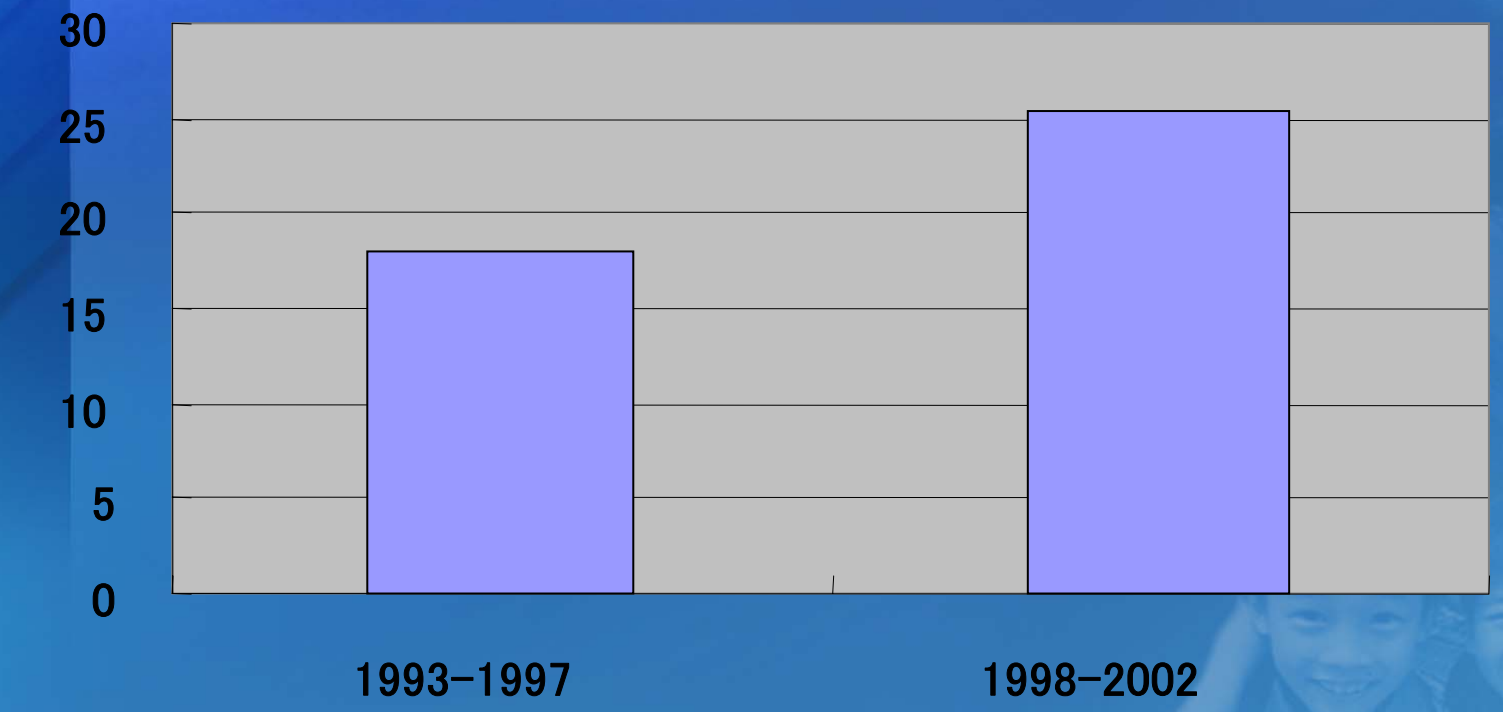
Healthy diet, regular physical activity and avoidance of tobacco

Could avoid 80% of CVD, DM and 40% of cancers.

?

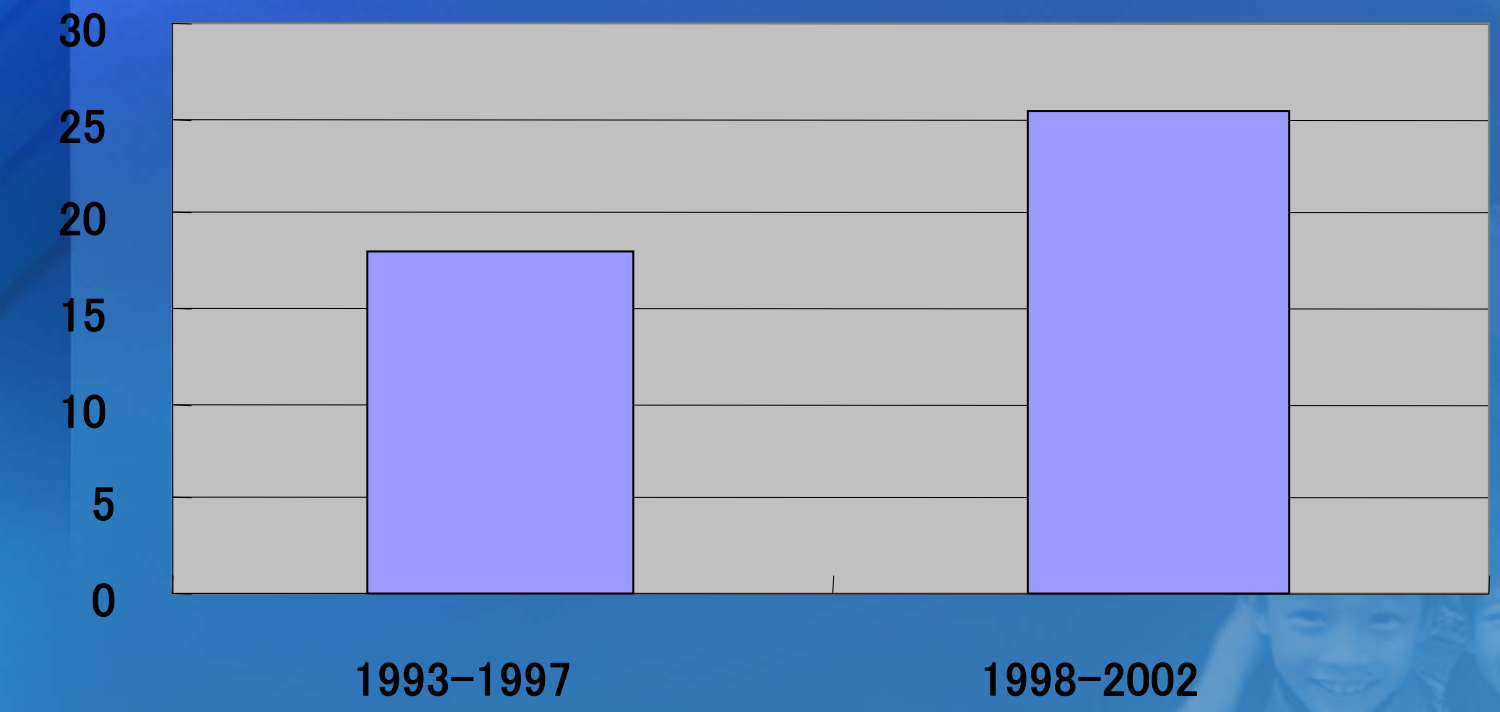
Death rate

Per 100,000

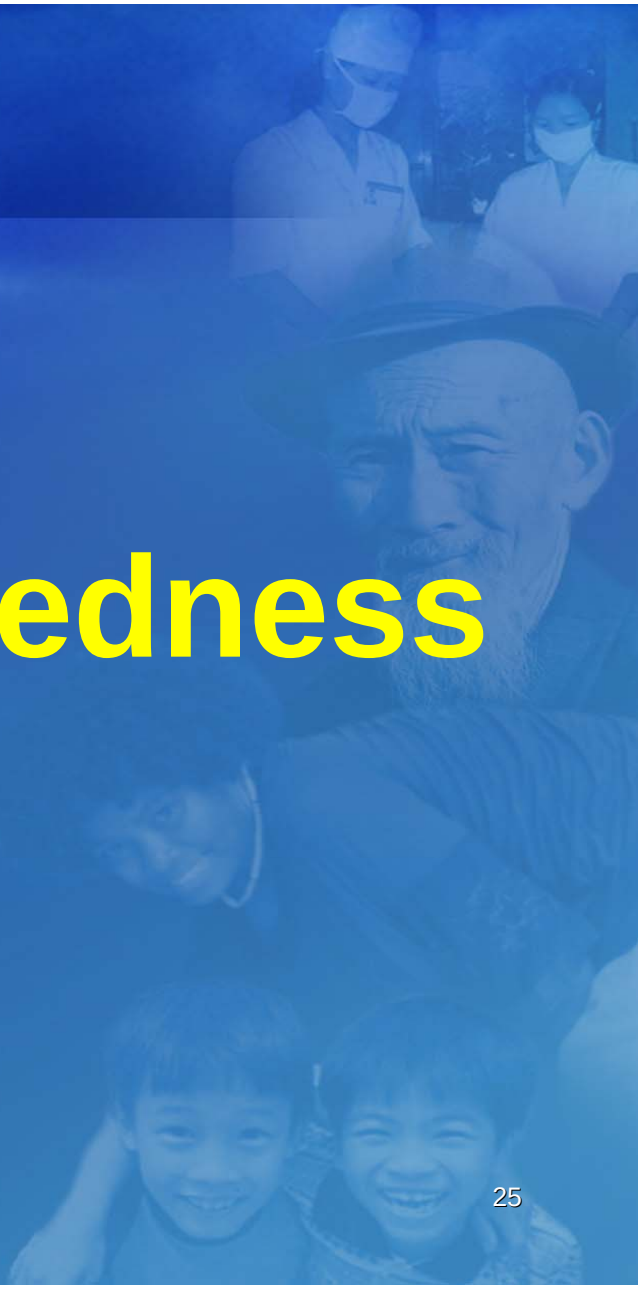


Suicide

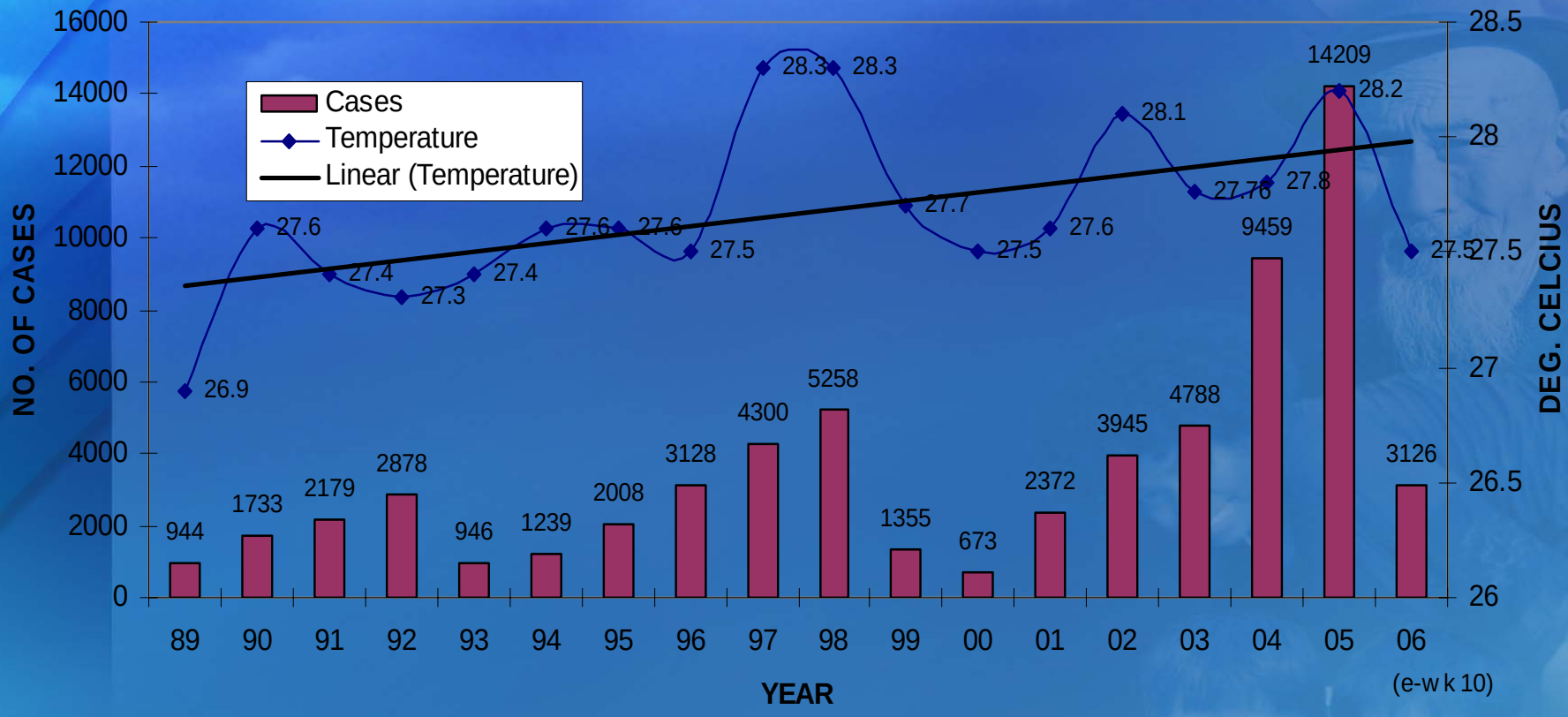
Death rate
Per 100,000



Lack of connectedness



Dengue cases 1989-2006

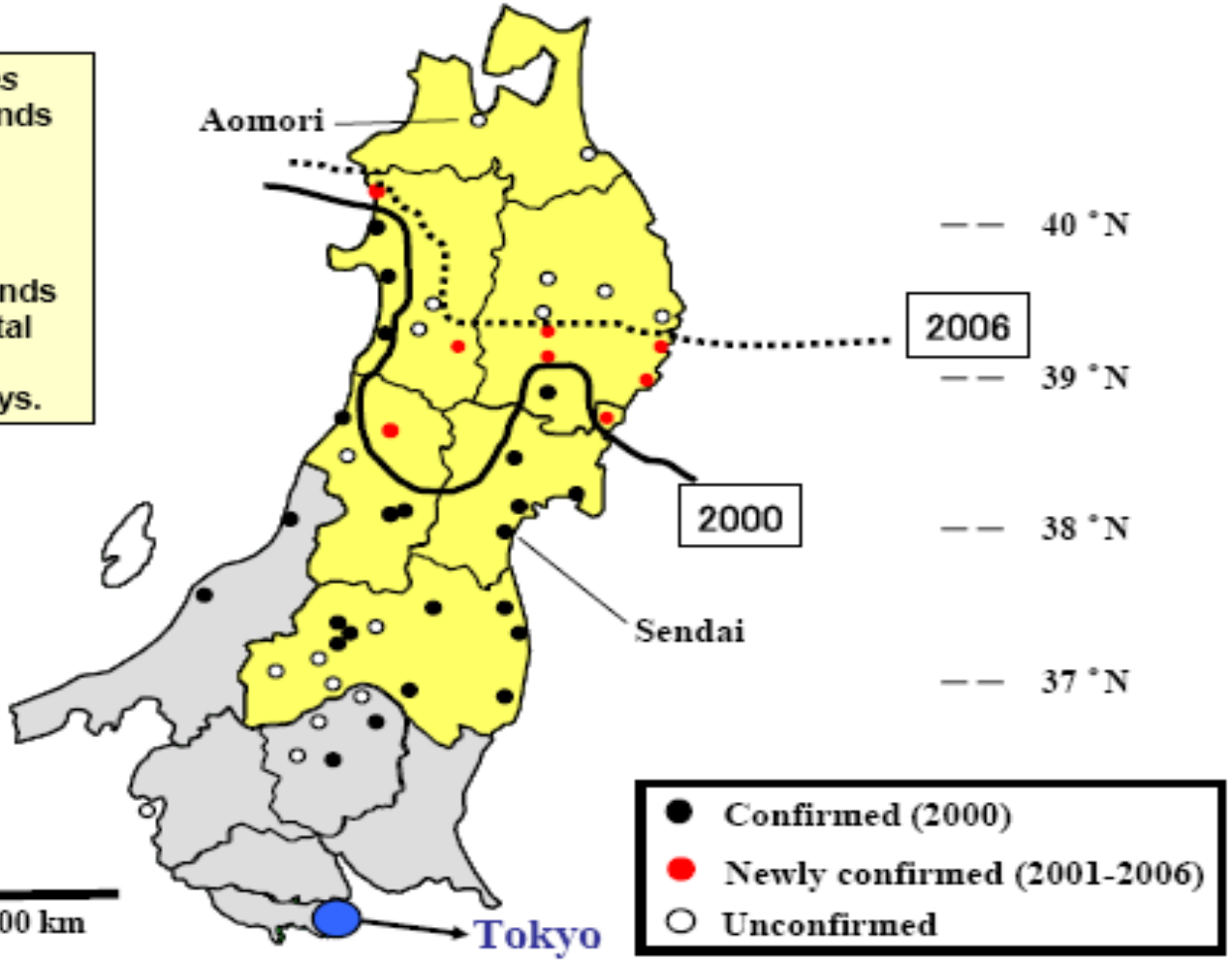


Distribution of *Aedes albopictus* in the Tohoku district (2000-2006)

Distribution area of *Aedes albopictus* well corresponds to the area where annual mean of the mean daily temperature of ≥11C;

more exactly, it corresponds to the area where the "total effective temperature" exceeds 1,350 degree-days.

Total effective temperature
= Σ [temperature (℃) − 11]
(when temperature > 11℃)



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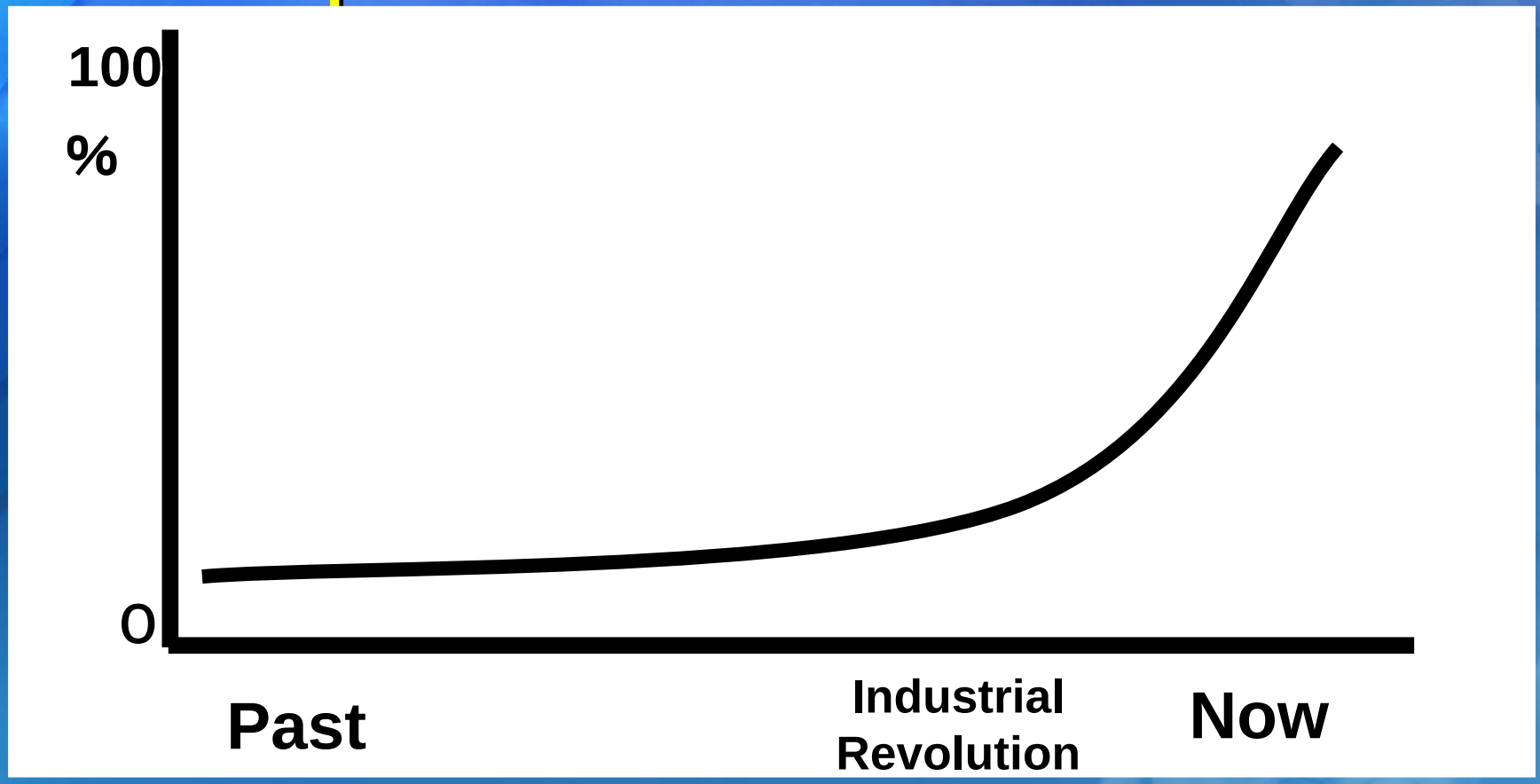
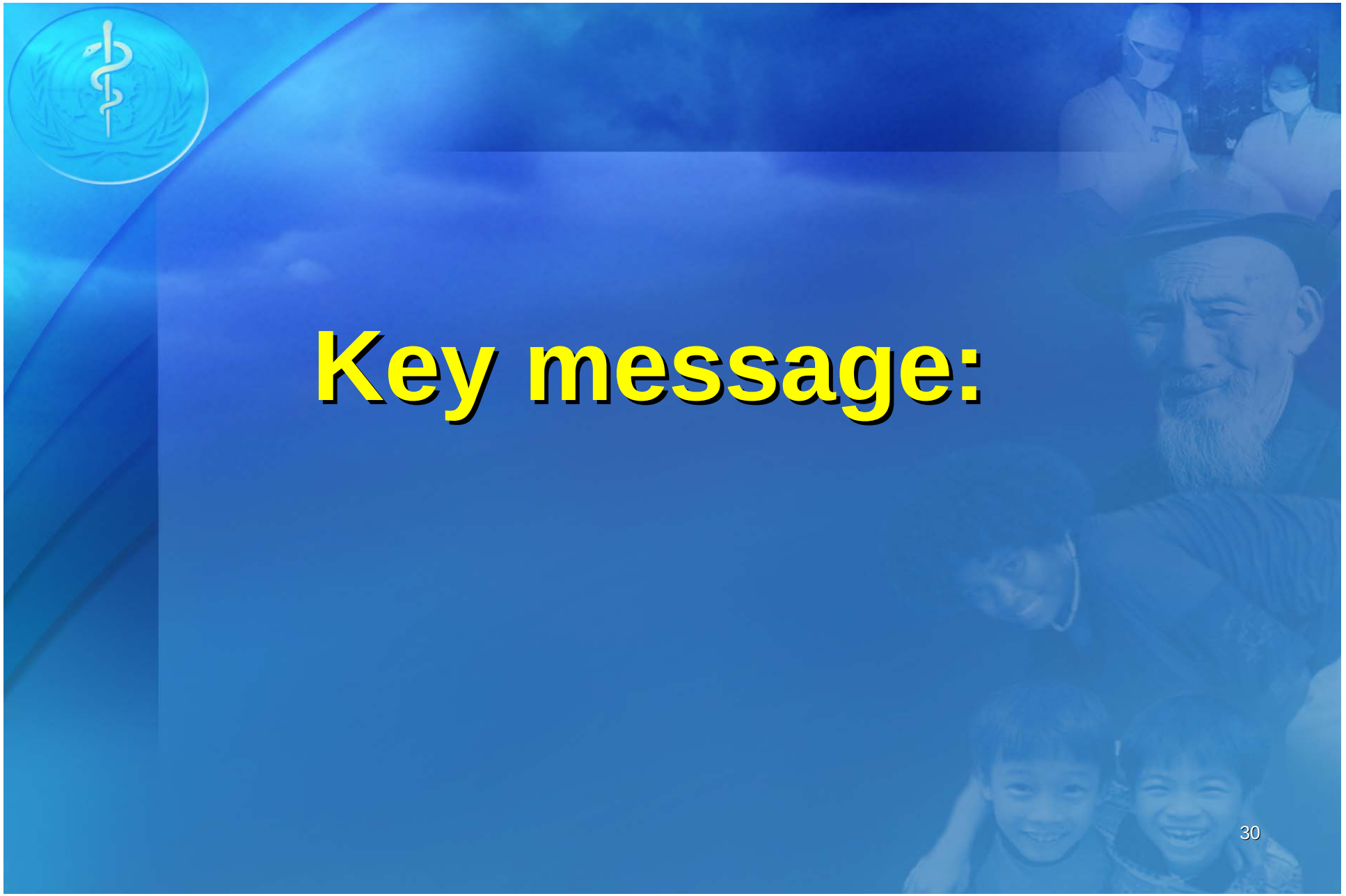
2nd Wave	Contact between different civilizations	Smallpox, measles	from Europe to Asia
		"Black Death"	Europe in the 6th century
3rd Wave	Trans-oceanic movement of seafarers	Smallpox, measles, etc	To America from Europe
		Syphilis	To Europe from America
		Malaria, yellow fever	To Europe from Africa
4th Wave	• **Globalization** • **Urbanization** • **Consumerism** • **Demographic changes**	• **Noncommunicable diseases** • **communicable diseases** • **Increasing environmental health risks**	**All over the world**

To what extent are human beings responsible for diseases?





Key message:

1. Be innovative in technology and policy development; and live responsibly with nature

- Change the ways in which humans co-exist with other species
- Proactively identify, report and contain threats to public health security
- Maintain a healthy lifestyle
- Build supportive environments conducive to health
- Promote policies which enable us to use cleaner and greener technologies

2. Be agents for change by establishing "new" connectedness in society

Build up a "common forum" which includes representatives of civil society, the older persons, scholars, NGOs, private companies and public organizations and capitalize on the decentralization movement and higher education of citizens to influence local and national conditions.

- Discuss issues based on long-term vision
- Take up various issues which are being neglected by existing institutions/mechanisms
- Share the sense of social responsibility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