

Globalisation ... global health

- Recent issue of connectedness
- Problems and solutions can travel rapidly
- Networking is important
- Information sharing is paramount

Internet traffic ... note Africa



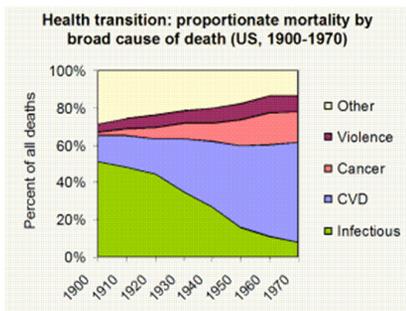
Emerging infections

- Newly identified, previously unknown infections causing public health problems
- Re-emerging
 - ... perhaps an old infection in a new locality ...
 - Infection which had fallen to such low levels but now are rising again in incidence/prevalence

Progress in control of Infections

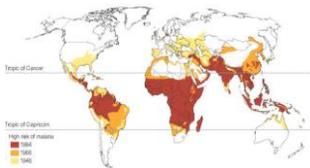
- Recognition of microbes as pathogens
- Sanitation, hygiene, vector control
- Antimicrobials
- Vaccines
- Advances in detection
- Communications
- Nutrition

Declining infections as a cause of mortality in richer settings



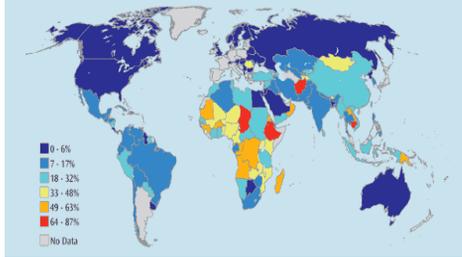


Global distribution of per capita GDP.



Global distribution of malaria.

Percentage of Population Without Reasonable Access to Safe Drinking Water



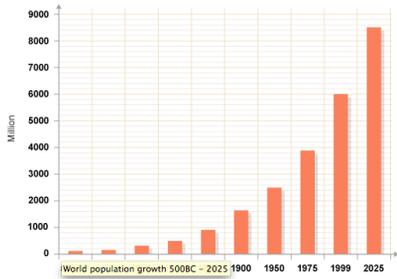
Source:
<http://www.theglobaleducationproject.org>
UNDP, UNICEF

Connected world

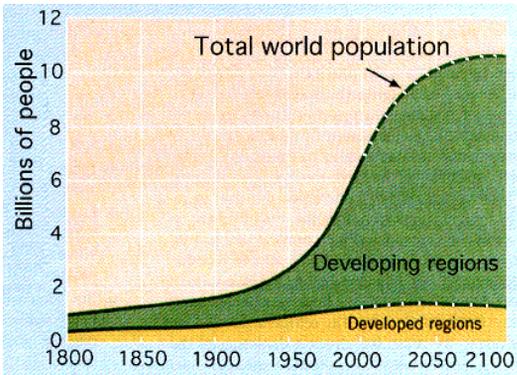
- Global health becomes local health
 - Returning travellers
- Local problems become global problems
 - Global economy, globalization ...
- Local economy determines income group
- Income group affects health (as seen with mortality data)

Increasing population, globalization, and Climate change





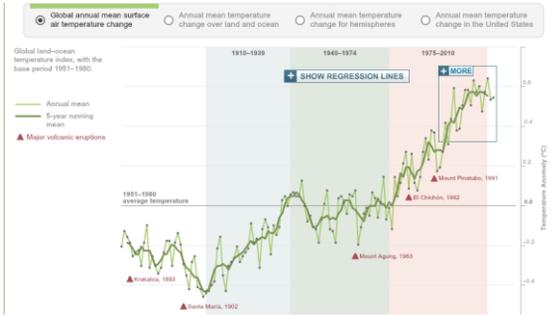
World population growth 500BC - 2025



Globalization, Climate Change, and Human Health

Anthony J. McMichael, M.B., B.S., Ph.D.
N Engl J Med 2013; 368:1335-1343 | April 4, 2013 | DOI: 10.1056/NEJMr1108941

Temperature rising over time



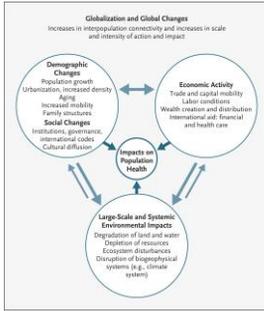
Globalisation and Health

- Interconnectedness
 - Economic intensity
 - Consequent environmental and social changes
- Interrelated pressures, stresses, and tensions arising from an overly large world population
- environmental impact of
 - Economic activities
 - Urbanization
 - Consumerism
- Widening gap between rich and poor

Changes

- The loss of biodiversity
- human-induced climate change

SOCIAL, ECONOMIC, ENVIRONMENTAL DOMAINS : Influences on health



Environment change

- Excessive population pressure on regional environments
 - soil exhaustion
 - water depletion
 - loss of various wild animal and plant food species

- “Vicious Cycle”
 - Potentiates poverty/disadvantage
 - Poverty assoc with high birth rate

Infections and globalisation

- Freshwater shortages
 - River flows threatened with climate change and industrialisation of rivers/diversions

- Growing food/crops to feed an increasing world population:
 - land degradation, water shortages, and climate change

- Is technology just
 - “kicking the can down the street”?
- Need education
- Need societal change

Examples ...

WRI: Climate Graphics - Potential Impacts of Climate Change
 Note: Potential disease transmission is case of temperature rise.

Disease	Vector	Population at risk (million)	Number of people currently infected or new cases per year	Present distribution	Likelihood of altered distribution
Malaria	Mosquito	2,400 ²	300-500 million	Tropics and Subtropics	
Schistosomiasis	Water snail	600	200 million	Tropics and Subtropics	
Lymphatic Filariasis	Mosquito	1,094 ³	117 million	Tropics and Subtropics	
African Trypanosomiasis (Sleeping sickness)	Tsetse fly	99 ⁴	250,000 to 300,000 cases per year	Tropical Africa	
Dracunculiasis (Guinea worm)	Cricket-like (Copepod)	100 ⁵	100,000 per year	South Asia, Arabian Peninsula, Central-West Africa	
Leishmaniasis	Phlebotomine sand fly	390	12 million infected, 500,000 new cases per year ⁶	Asia, Southern Europe, Africa, Americas	
Onchocerciasis (River blindness)	Black fly	123	17.5 million	Africa, Latin America	
American Trypanosomiasis (Chagas disease)	Triatomine bug	100 ⁷	18 million	Central and South America	
Dengue	Mosquito	1,800	10-50 million per year	All Tropical countries	
Yellow Fever	Mosquito	450	more than 5,000 cases per year	Tropical South America, Africa	

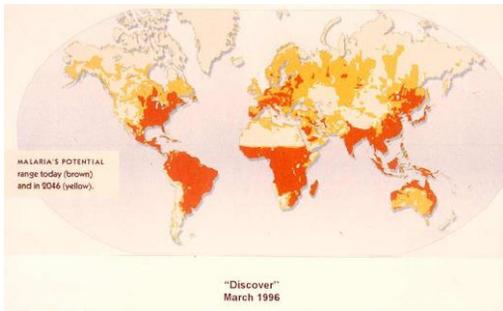
Climate change and infections

- Example
 - China:
 - medium-scenario warming model
 - schistosomiasis will extend northward
 - 20 million MORE people at risk by 2050
 - Dengue
 - Spread of habitat for the vector (Aedes mosquito)

Chikungunya – painful joint infection viral infection; mosquito-borne

- Prior to 2006, chikungunya virus disease was rarely identified in U.S. travelers.
- From 2006–2013, studies identified an average of 28 people per year in the United States. All were travelers visiting or returning to the United States from affected areas in Asia, Africa, or the Indian Ocean
- **In late 2013, the first local transmission of chikungunya virus in the Americas was identified in Caribbean** countries and territories. Local transmission means that mosquitoes in the area have been infected with the virus and are spreading it to people.
- Beginning in 2014, chikungunya virus disease cases were reported among U.S. travelers returning from affected areas in the Americas and **local transmission was identified in Florida, Puerto Rico, and the U.S. Virgin Islands**

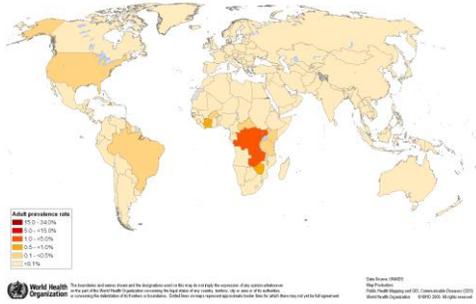
Global Warming and Malaria



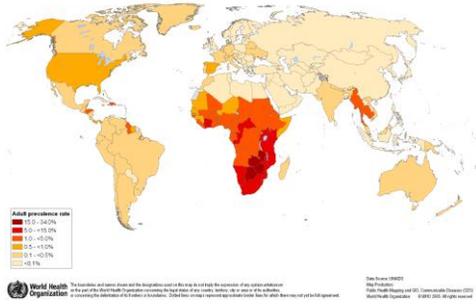
HIV

- Worldwide disease

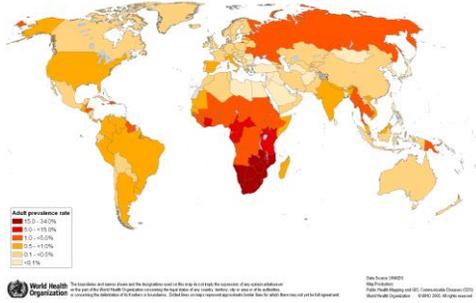
Adult (15-49) HIV prevalence rate (%), 1985

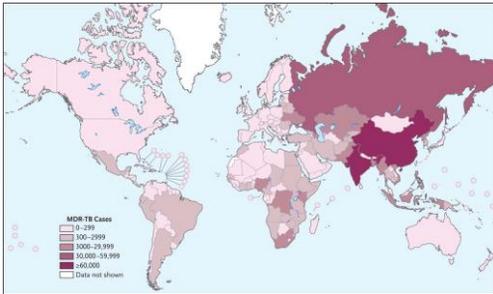


Adult (15-49) HIV prevalence rate (%), 1995



Adult (15-49) HIV prevalence rate (%), 2005





Tuberculosis

- Ireland
 - 230 notifications per 100,000 population in 1952 (first records kept)
 - 9.7 per 100,000 in 2001
 - 11.3 per 100,000 in 2007
 - 9.2 per 100,000 in 2010

- In 2010, 40.7% of cases were born outside Ireland compared to 43.0% in 2009 and 43.3% in 2008
 - GLOBAL INTERCONNECTEDNESS

- WHO:
 - Reduce the global incidence of active TB to less than 1 case per million by 2050

Resurgence Of Tuberculosis

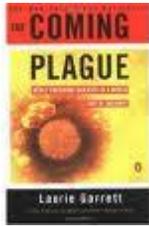
Factors leading to an increase in TB:

- **Failure to tackle poverty in society** and . . .

- **HIV** **Africa**

- **Decaying Pubic Health Infrastructure** **Eastern Europe**

- **Migration** **Ireland / Europe**



Classification

Arenaviridae	Bunyaviridae	Filoviridae	Flaviviridae
Junin	Crimean-Congo H.F.	Ebola	Kyasanur Forest Disease
Machupo	Hantavirus	Marburg	Omsk H.F.
Sabia	Rift Valley fever		Yellow Fever
Guanarito			Dengue
Lassa			

Common process - multifactorial

- Vascular damage
 - Viral invasion
 - Complement/cytokine activation
 - Immune complex deposition
- Coagulation problems
 - Low platelets
 - Reduced clotting factors
 - DIC
- Immune failure
- End organ damage
 - Viral cytopathy
 - Host response





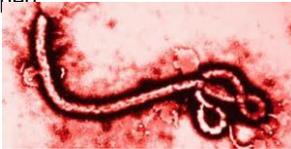
Hemorrhagic Fever Symptoms

If you have recently developed the following symptoms, go to the hospital now:

- Marked Fever
- Muscle Aches
- Fatigue
- Loss of Strength
- Dizziness
- Exhaustion



- Filovirus
- RNA virus
- Enveloped



Ebola

- 1976
 - First documented outbreaks
 - Simultaneously in Zaire (=Congo) and Sudan
- Subsequently
 - Rare/intermittent outbreaks in Africa
 - Mainly central Africa
 - <500 cases
 - 30% cases were healthcare workers in Zaire, 1995
 - 7% in Uganda, 2000

Recent outbreaks

- Uganda - 2012
- West Africa – 2013/14/15
 - Difficult to control
 - Connectedness
 - Education
 - Communication

EbolaTransmission

- Reservoir is UNKNOWN
 - Bats implicated
 - Infected non-human primates (“bushmeat”)
- Requires close contact with Ebola patient
- Nosocomial transmission
 - Reuse of needles and syringes
 - Exposure to infectious tissues, excretions, and hospital wastes



Current Ebola Outbreak

- August 8, 2014: WHO:
 - “International Public Health Emergency”
 - “the outbreak is an extraordinary event and a public health risk to other states”
 - ...serious in view of the virulence of the virus, the intensive community and health facility transmission patterns and the weak health systems in the currently affected countries
 - a coordinated international response is deemed essential to stop the spread of ebola”

Current Ebola outbreak

- Probable “index cases” December 2013
- Initial cases noted:
 - February 2014:
 - in forested areas of Southwestern Guinea
 - Spread to Liberia, Sierra Leone
 - (Nigeria – fewer cases)
 - Mainly rural, but including some large, densely populated cities (e.g. Monrovia)
 - Many healthcare workers infected
 - Compounding problem – patients not wishing to attend hospitals



Current update

- As of 23 August 2015
 - 28 041 cases of Ebola virus disease in West Africa
 - 11 302 deaths
- 3 confirmed cases of EVD were reported in the week up to 23 August, all reported from Guinea
- For the second consecutive week, no new confirmed cases have been reported from Sierra Leone
- Liberia has reported no new cases

High Mortality

- 70%
- ?% in Western Centres
 - Much lower

Fear

- Contagion
 - Preparedness of patient pathway
 - Exactly how and where the patient goes
 - Preparedness of staff:
 - PPE
 - Training
 - Buddy system
 - Rostering – avoiding fatigue
 - Minimizing unnecessary patient contact

Clinical

- Expert opinion rather than clinical trial based
- However
 - Supportive care predominates

Clinical and Lab findings

- 2 – 21 days incubation
 - Mean 4-10 days
- Early symptoms
 - Fever, headache, myalgia, sore throat, chest pain
 - Lymphadenopathy
 - GI symptoms very common
 - Can be cholera like; initially non-bloody
- Later in the disease add:
 - Bleeding, petechia
 - (although bleeding is often not a major finding)
 - Shock, multiorgan failure

[Be aware of differential diagnosis]

- Same features as malaria, general sepsis
- These patients will likely have malaria risk
- (Malaria will be more likely than Ebola, and if untreated can kill)
- Malaria test should also be done on all patients presenting with a syndrome that is possibly Ebola



23 Oct 2012 Hemorrhagic fever - India: (FM)
 22 Oct 2012 Cholera - Ghana (SA) severe, human
 23 Oct 2012 Arbov. hantav. - Armenia (SA) (SA) (SA)
 23 Oct 2012 Arbov. hantav. - Armenia (SA) (SA) (SA)
 23 Oct 2012 Arbov. hantav. - Armenia (SA) (SA) (SA)
 23 Oct 2012 Hemorrhagic fever w/renal synd - Russia: (SA)
 23 Oct 2012 Hemorrhagic fever w/renal synd - Russia: (SA)
 23 Oct 2012 Undiagnosed deaths, porcine - Ukraine: (RF)

WHO: Ebola outbreak in Democratic Republic of Congo stabilises

An outbreak of Ebola virus disease in the Democratic Republic of Congo (DRC) has stabilised, with no new deaths or cases in that country, the World Health Organization (WHO) stated on Tue 23 Oct 2012. For the past 10 days, the death toll from the haemorrhagic fever has remained at 38 and no new cases have been registered, the WHO said in a bulletin. The last case of hospitalisation dates to 11 Oct 2012, according to the statement released to the press on Tuesday 23 Oct 2012. A total of 73 people are believed to have infected and the fatality rate in the outbreak is 48 percent.

"We are very, very optimistic," WHO Kinshasa representative Leighton Burns told AFP. "It hasn't just one case to start up a cycle of transmission." The fact that the disease had been confined to the town of Isiro and its neighbourhood was a positive factor, he added. Epidemics were declared in mid-August 2012 in the northeastern Orientale Province. But researchers have dated the outbreak back May.

The Ministry of Health, the WHO, the Centers for Disease Control and Prevention (CDC) based in Atlanta, Georgia, Medecins Sans Frontieres (MSF), and the DRC's MINISANTÉ (health) have been working in close cooperation to control the outbreak. To date, their treatment or response to Ebola Virus Disease, which kills between 25 and 90 percent of those who fall sick, depending on the strain virus, according to the WHO. The disease is transmitted by direct contact with blood, faeces, and sweat, by sexual contact and by unsterilised handling of contaminated surfaces.

Congo DR has recorded 8 outbreaks of Ebola virus disease, one of the world's most virulent diseases, since the virus was first seen near a Congolese river that gave the disease its name in 1976.

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 Commissioned by:
 ProMED-mail
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The previous bulletin over the extent of the outbreak and the numbers of cases and fatalities, is now available. A total of 73 people believed to have been infected, 38 of whom have died, giving a fatality rate of 48 percent.

A map of the provinces of DRC is available at <http://www.epidemiol.com/temonero/epidemiol-republica-democratica-republico-of-congo-political-map.html> and the interactive ProMED-mail/HealthMap of Congo DR can be accessed at <http://healthmap.org/2012-10-23/>

Conclusion

- Emerging infections are likely to remain a feature in a globally connected world with an increasing population
 - Multifactorial
 - Far reaching consequences

- Complex, resource-intense, multifaceted management required
 - for individual cases and overall control

Is there hope in a connected world?

- Connectedness makes all infectious diseases applicable to all of us
- It also makes scientific advances applicable to all, even remote, populations
- And facilitates coordination of efforts
