REMINDERS

- ➢ Two <u>required</u> essays (10% of your grade) were due on April 17.
- ✓ Late penalty now applies (better than a zero!).
- ✓ Must submit missing essays by May 12, 2020 to avoid a ZERO grade.

❑ EXAM III – **Final Exam**

Tuesday, May 19, 2020 from <u>9 AM</u> – 11 AM on BlackBoard

Covers Part III of the course.

- ❖ Extra Credit: "Think Geographically" Essays from <u>any five</u> of Chapters 4-12

- O R -

- ❖ The 3rd topic from required essay list plus 4 chapter essays.
  - – Last day to submit is May 12 but it is best to do them as you read a chapter.

- ➢ Extra credit may be submitted before the deadline.
- ➢ Don't wait for the due day to write them.

<u>TEXTBOOK READING FOR PART III</u>

Selected parts of Chapters 6-12

FREE TUTORING IS AVAILABLE REMOTELY from the HC Skirball Learning Center

GEOG 101
PART III

21
Life on Earth:
Population Geography 3

Chapter 6

Prof. Anthony Grande
Hunter College Geography

Lecture Topics for Part III

- ✓ **I Intro. to Human Geography**
- ➢ **II Living on the Earth**
- ✓ A. Habitat
- ✓ B. Demography
- C. Medical geography
- D. Population growth
- E. Biogeography/Ecology

III Economic Geography

IV Urban Geography

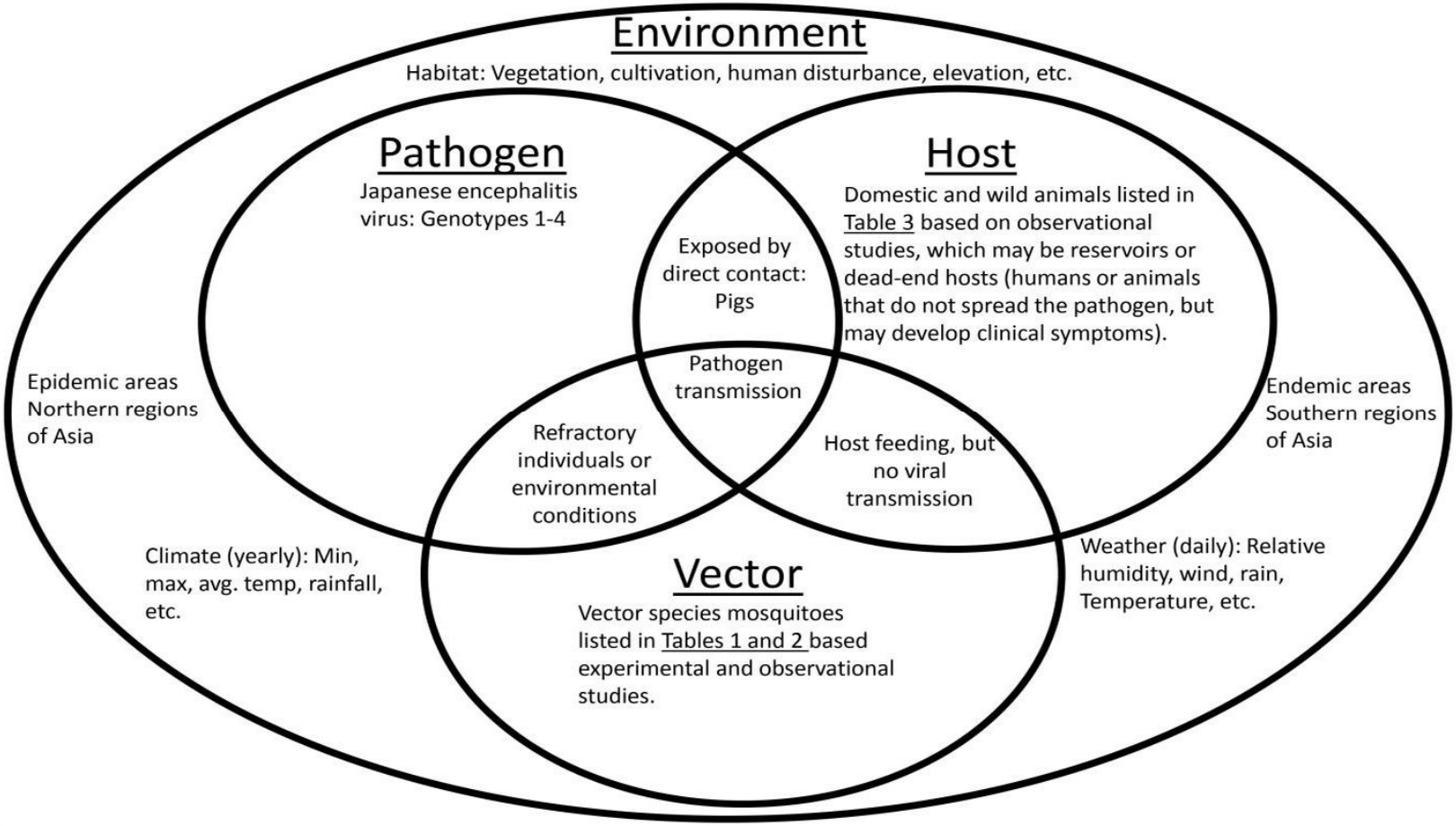
V Political Geography **(read chapter)**

Medical Geography

- **MEDICAL GEOGRAPHY** studies the **well-being of people as an aspect of habitat.**
  - Medical characteristics are studied **spatially** (i.e., where they occur and how they spread).
  - The are **correlated to conditions of site and situation** as wind direction, watershed, wells and aquifers, **and to routes of dispersal.**
- **EPIDEMIOLOGY:** the study of the cause and control of disease.

Medical Geog.: Epidemiology Diagram

“The Case for Greater Focus on Mosquitoes, Ticks in Epidemiology”



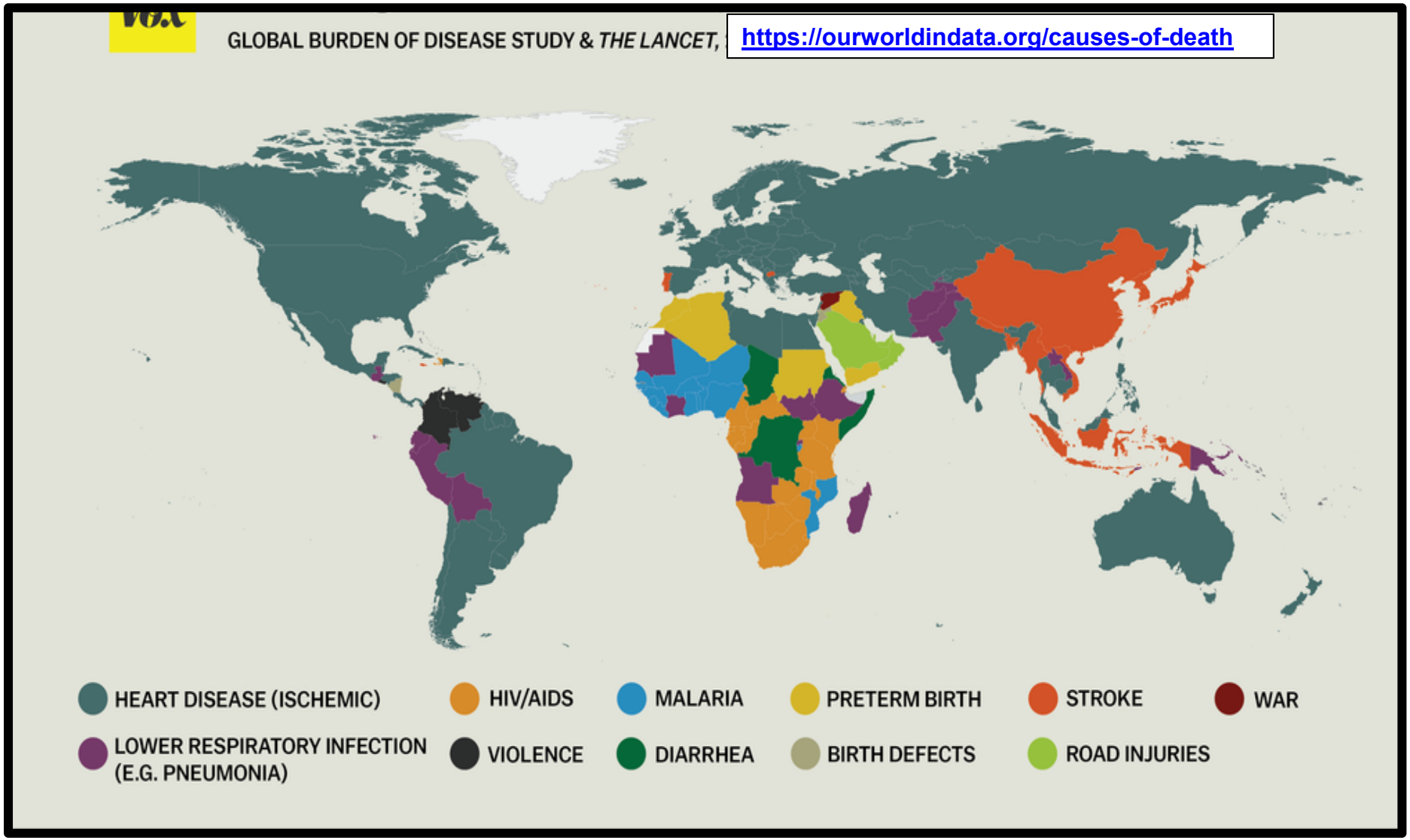
Reference: "Japanese Encephalitis Virus: Placing Disease Vectors in the Epidemiologic Triad," by Ana R. S. Oliveira, Lee W. Cohnstaedt, and Natalia Cernicchiaro, published online, August 2, 2018, in the Annals of the Entomological Society of America.

Health and Nutrition

Important part of the population question.

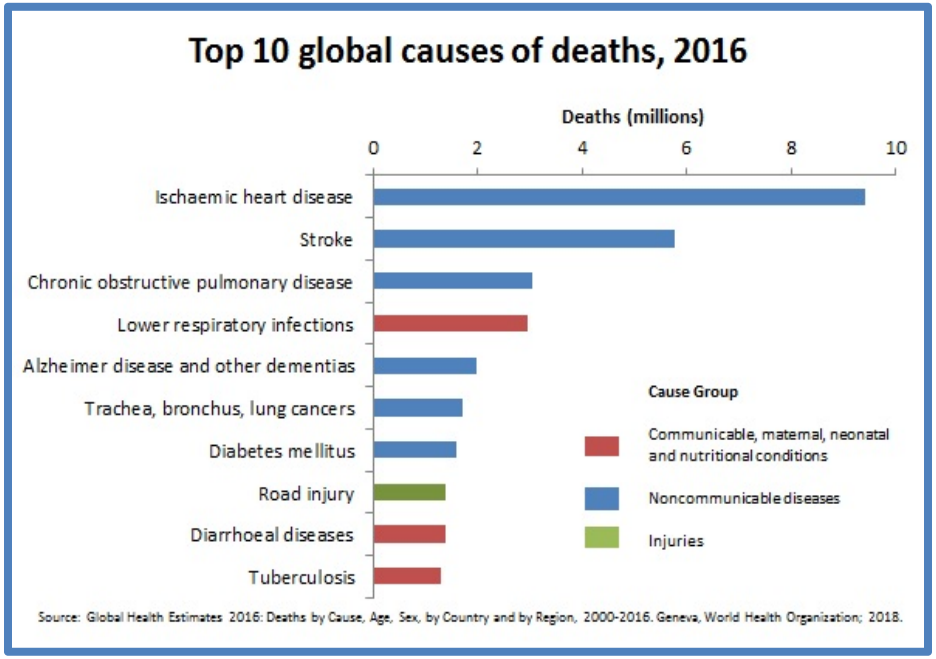
- **Areas with good health and nutrition can accommodate large numbers of people.**
  - ✓ They also become **PULL** factors (drawing more people).
  - Conversely, areas prone to food and water shortages or disease can experience PUSH factors, but in many cases it is just the negative version of STAY.
- **Analysis includes:**
  - **Food availability** (type/diet/caloric value)
  - **Life expectancy/infant mortality** (BR/DR/wellness)
  - **Disease** (susceptibility/transmission/DR/social issues)

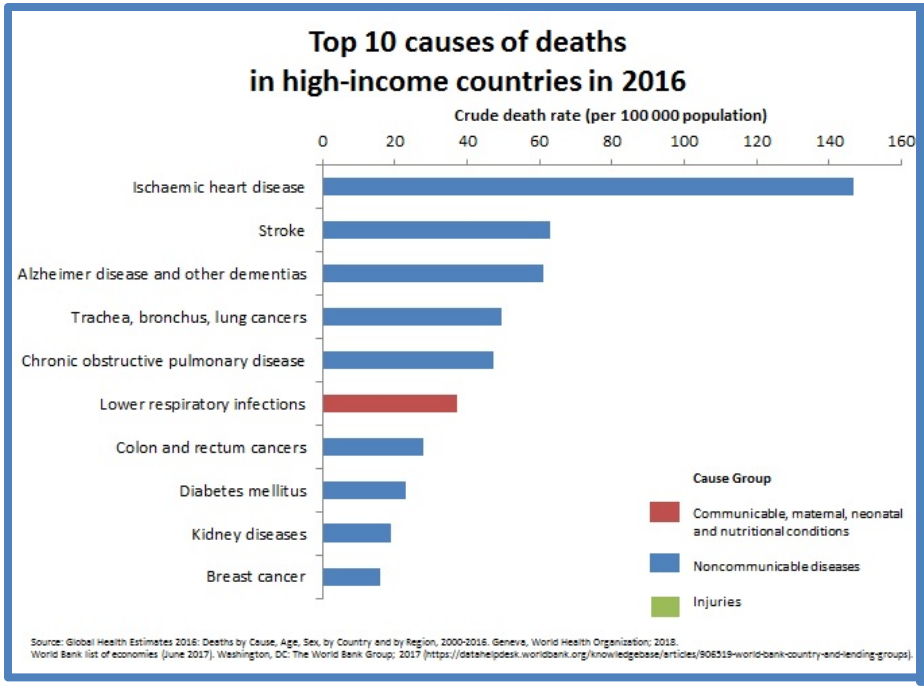
Generalized Leading Causes of Death
by major category, worldwide

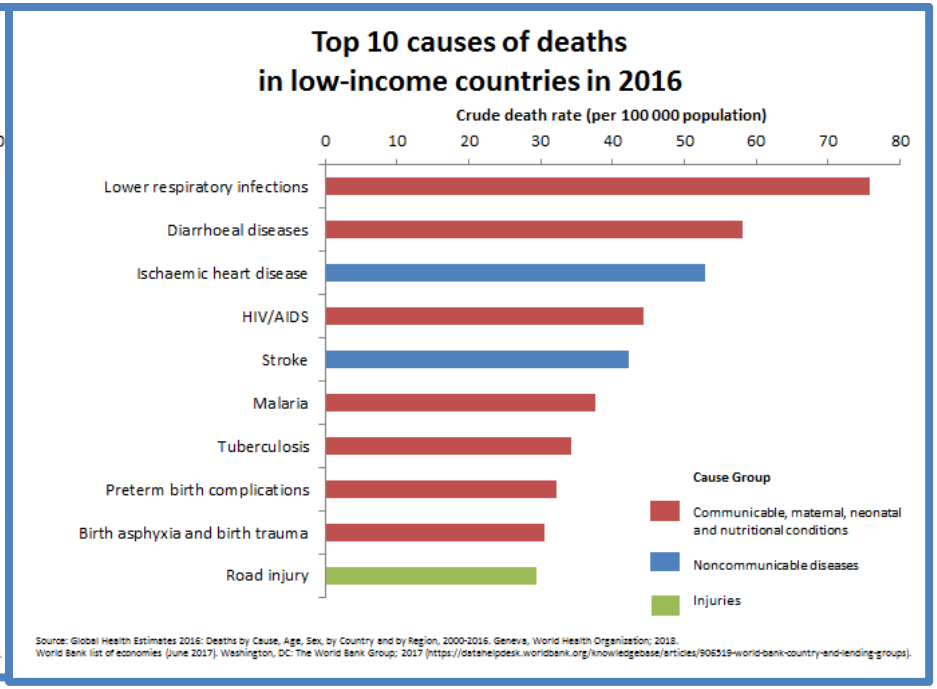


Top 10 Causes of Death Worldwide in 2016

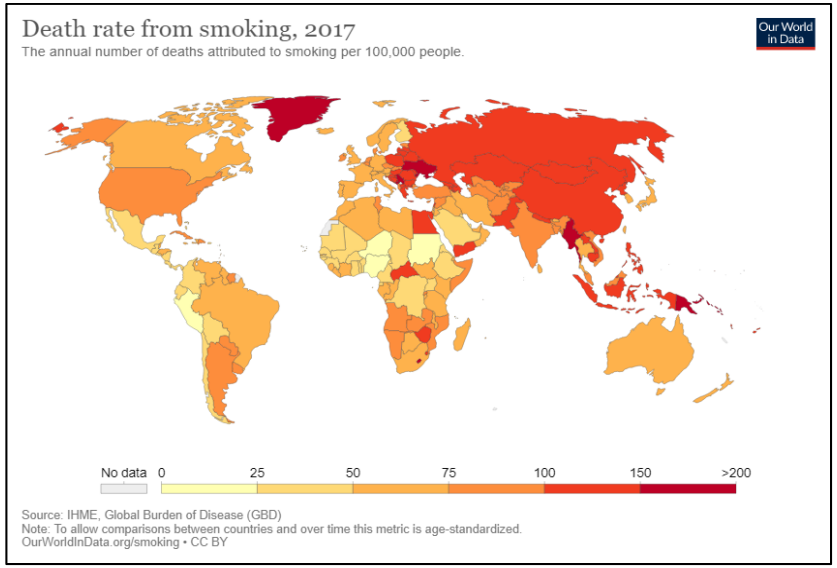
Source: United Nations
World Health Organization (WHO), 2018
https://www.who.int/

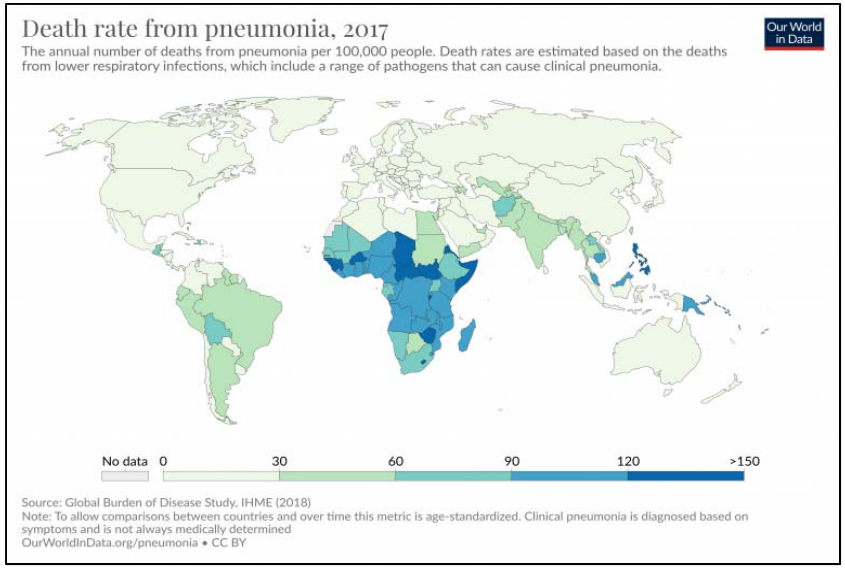


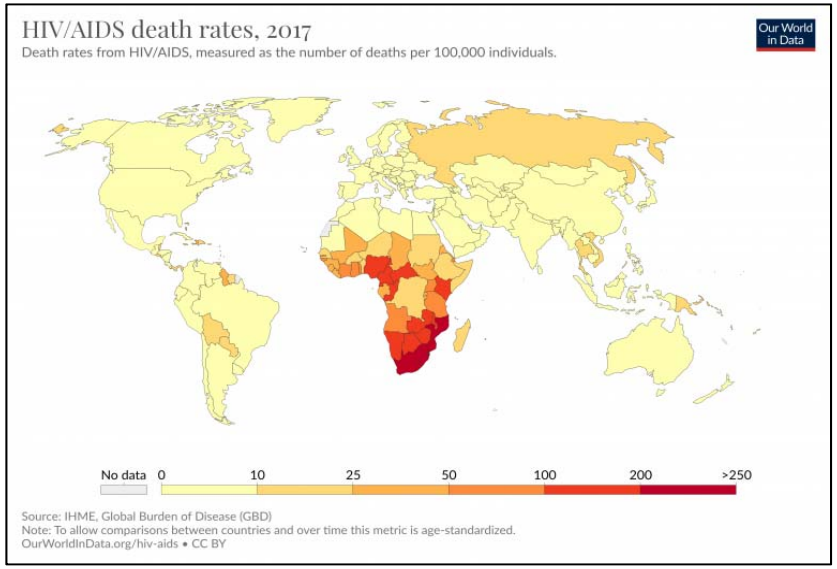


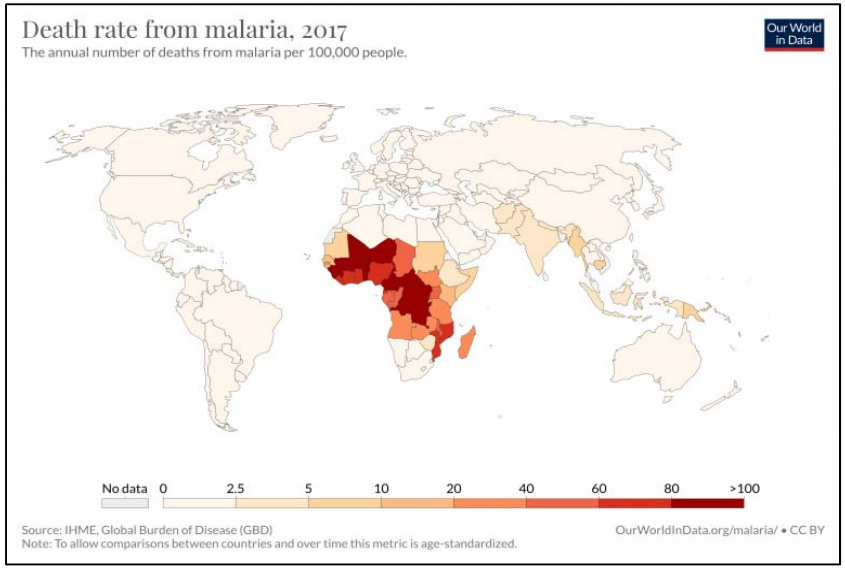


Causes of Death by Category (2017)

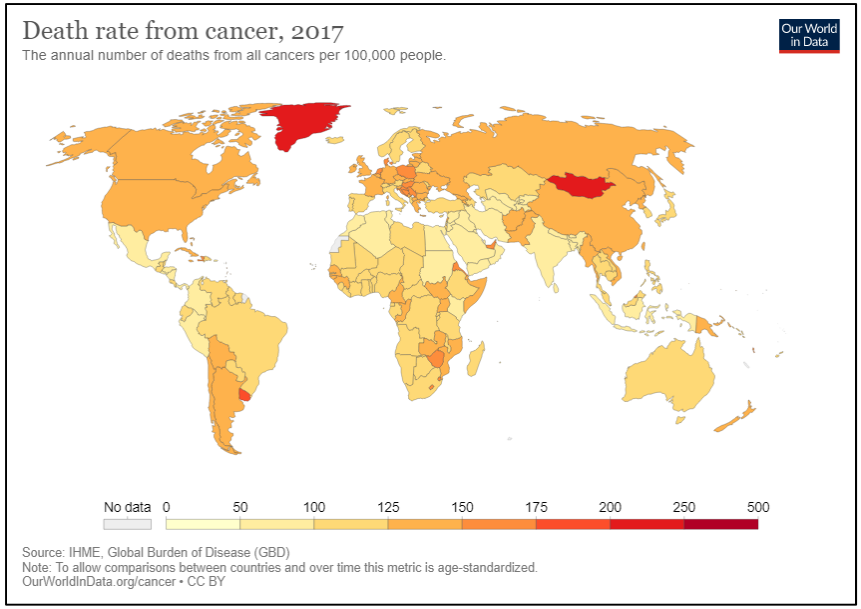


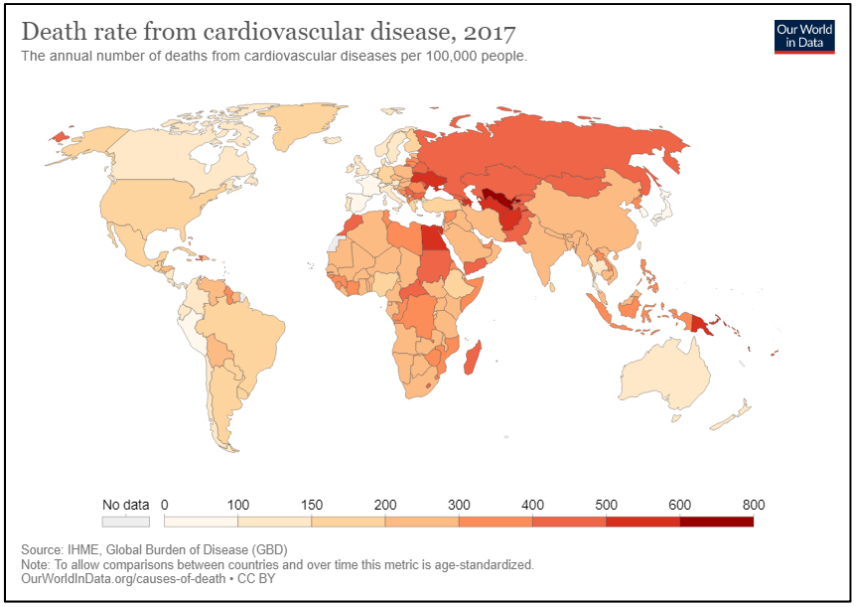


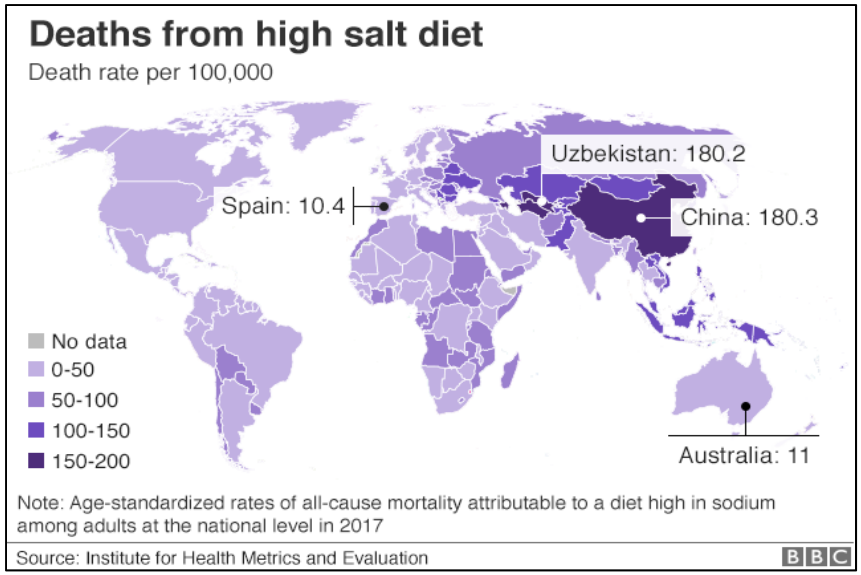


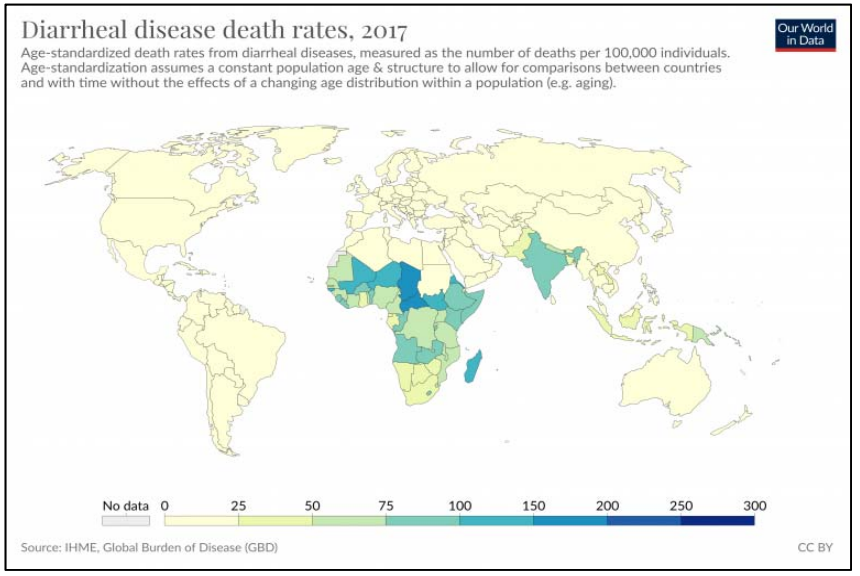


Causes of Death by Category (2017)









Hunger vs. Poor Nutrition

- **Hunger:** A feeling when one does not eat enough food to fill current physiological needs. It can be temporary or long-lasting *(when the person does not get enough to eat to maintain physical needs over a sustained period of time).*
  - Hunger can lead to malnutrition.

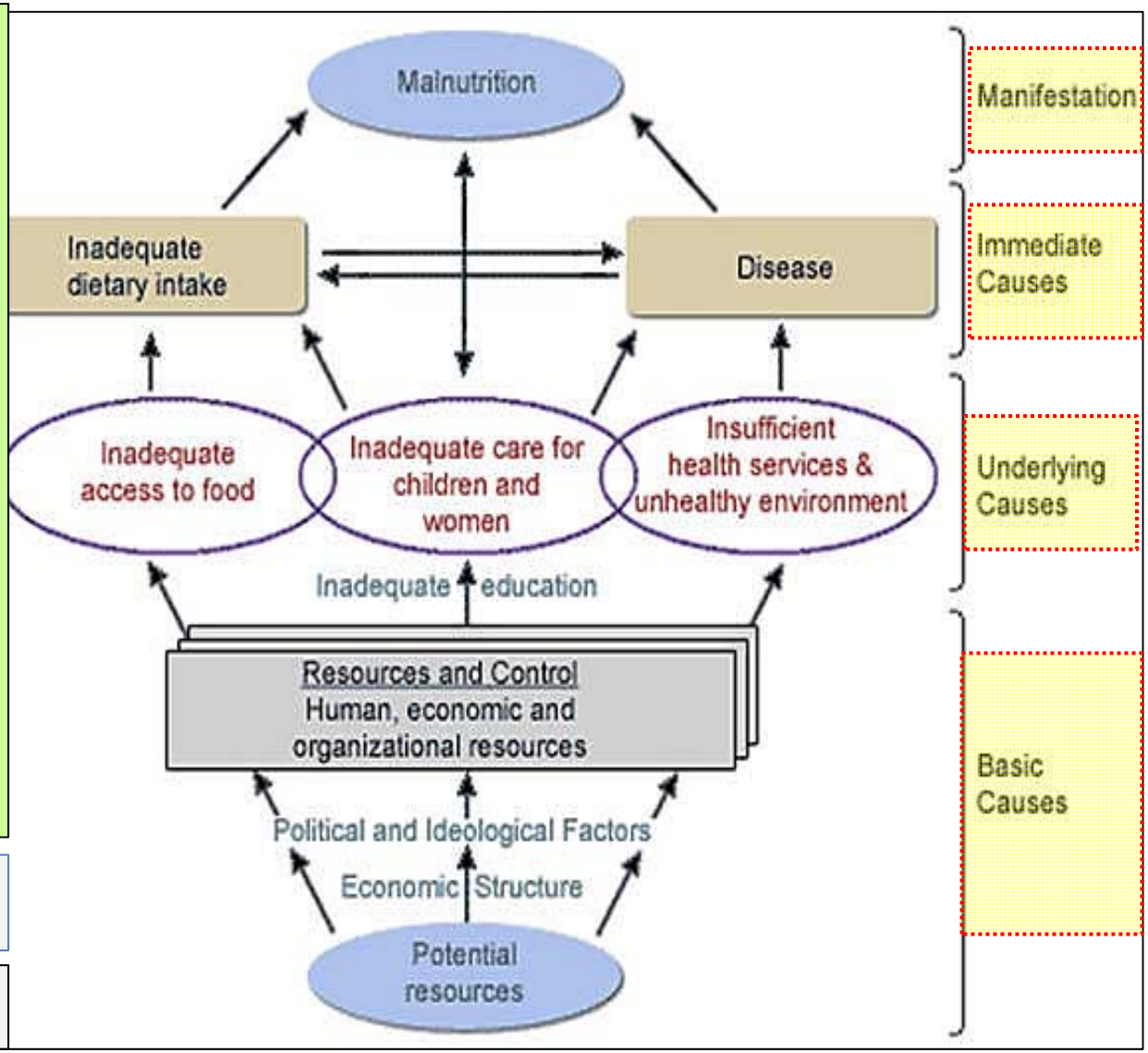
- **Malnutrition: any disorder of nutrition** resulting from an unbalanced, insufficient or excessive diet or from the impaired absorption, assimila-tion or use of foods.

  - **Undernutrition:** caused by an inadequate food supply or an inability of the body to use the nutrients in food.
  - **Overnutrition:** excess nutrient and calorie intake over time; may be regarded as a form of malnutrition when it leads to morbid obesity.
  - **Chronic malnutrition:** the long-term ingestion/use of less-than-required nutrient amounts; can result in physiological short-comings and vulnerability to disease and other illnesses.

Spatial Aspects of Malnutrition

DIAGRAMING MALNUTRITION

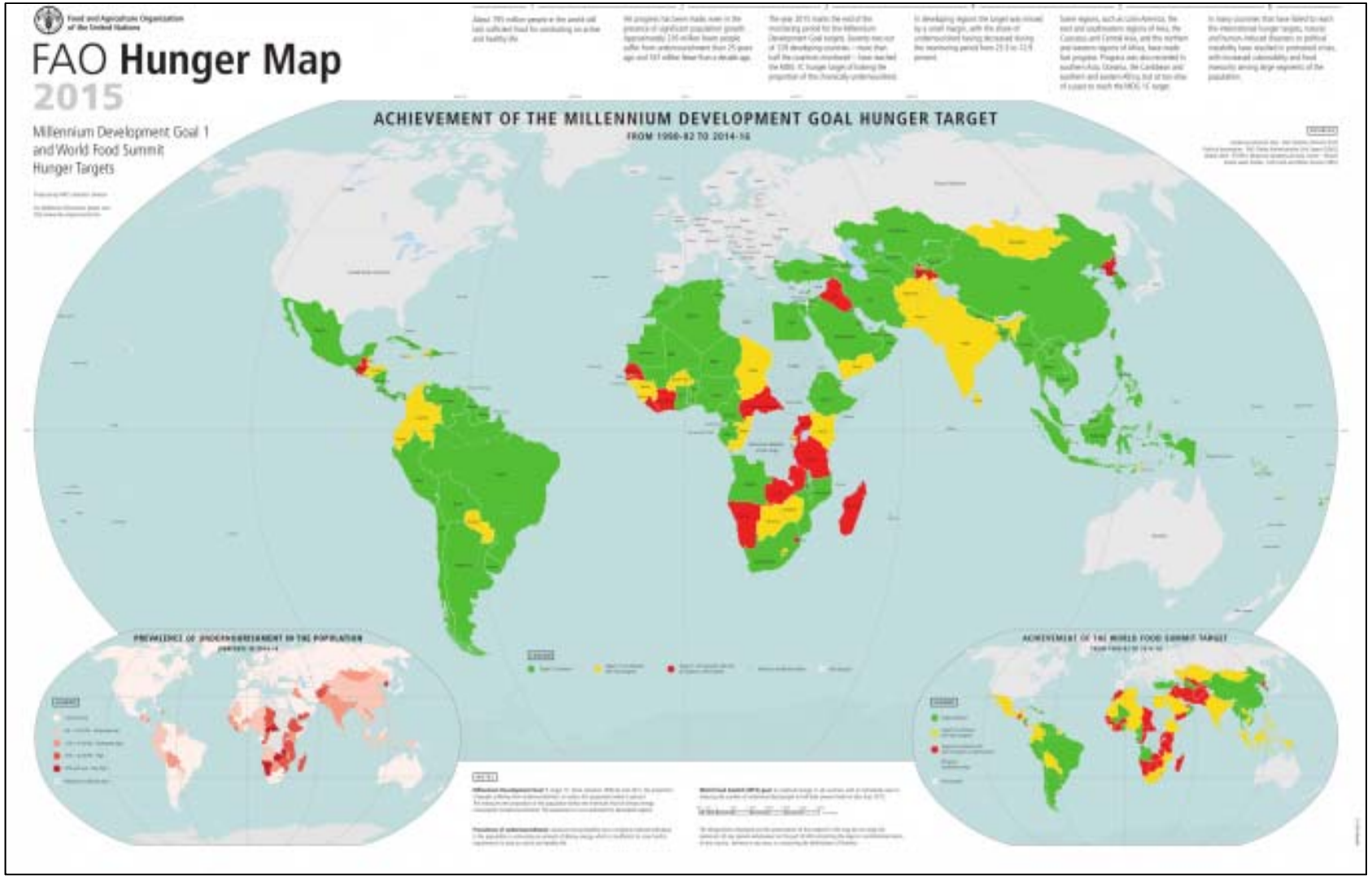
- ✓ Varies regionally depending on local conditions.
- ✓ It can be mapped and studied spatially in relation to global, regional and/or local environmental issues: climate change, water supply, soil fertility, severe weather, etc.



https://www.worldhunger.org/hunger-and-nutrition-facts/

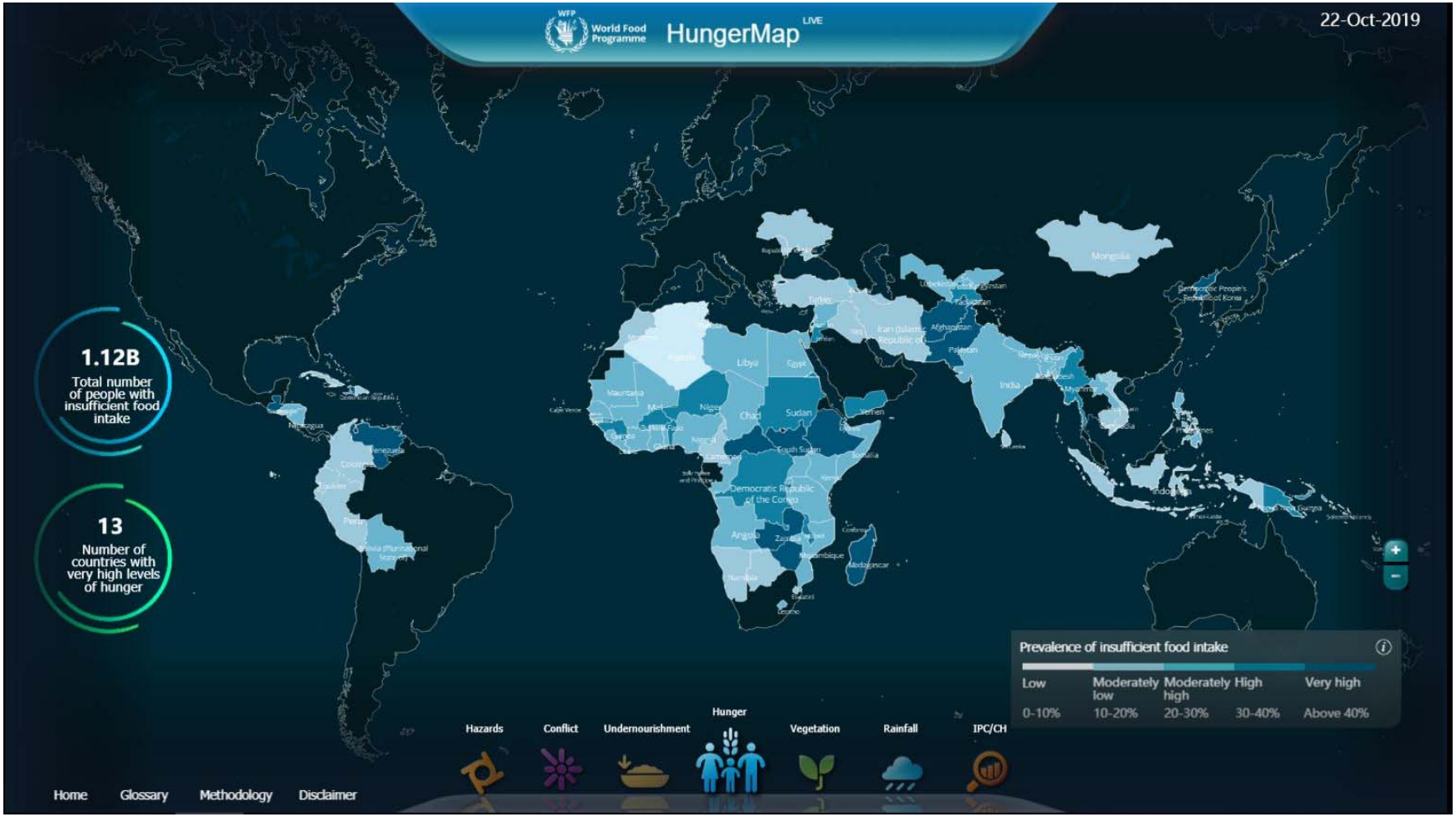
https://www.worldhunger.org/africa-hunger-poverty-facts-2018/

World Hunger



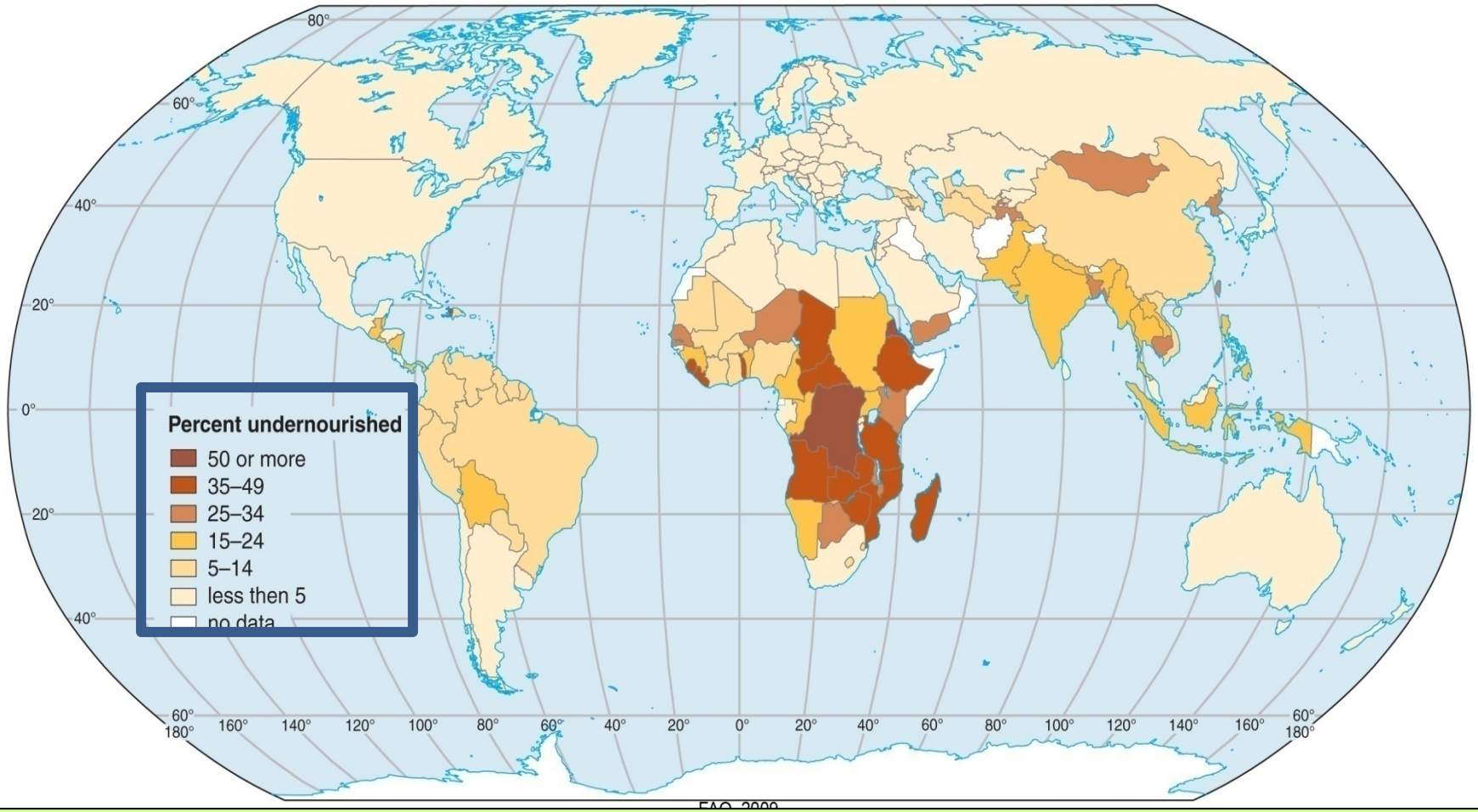
http://www.fao.org/sustainable-development-goals FAO‘s goals to alleviate hunger

World Food Programme Hunger Map
(2019)



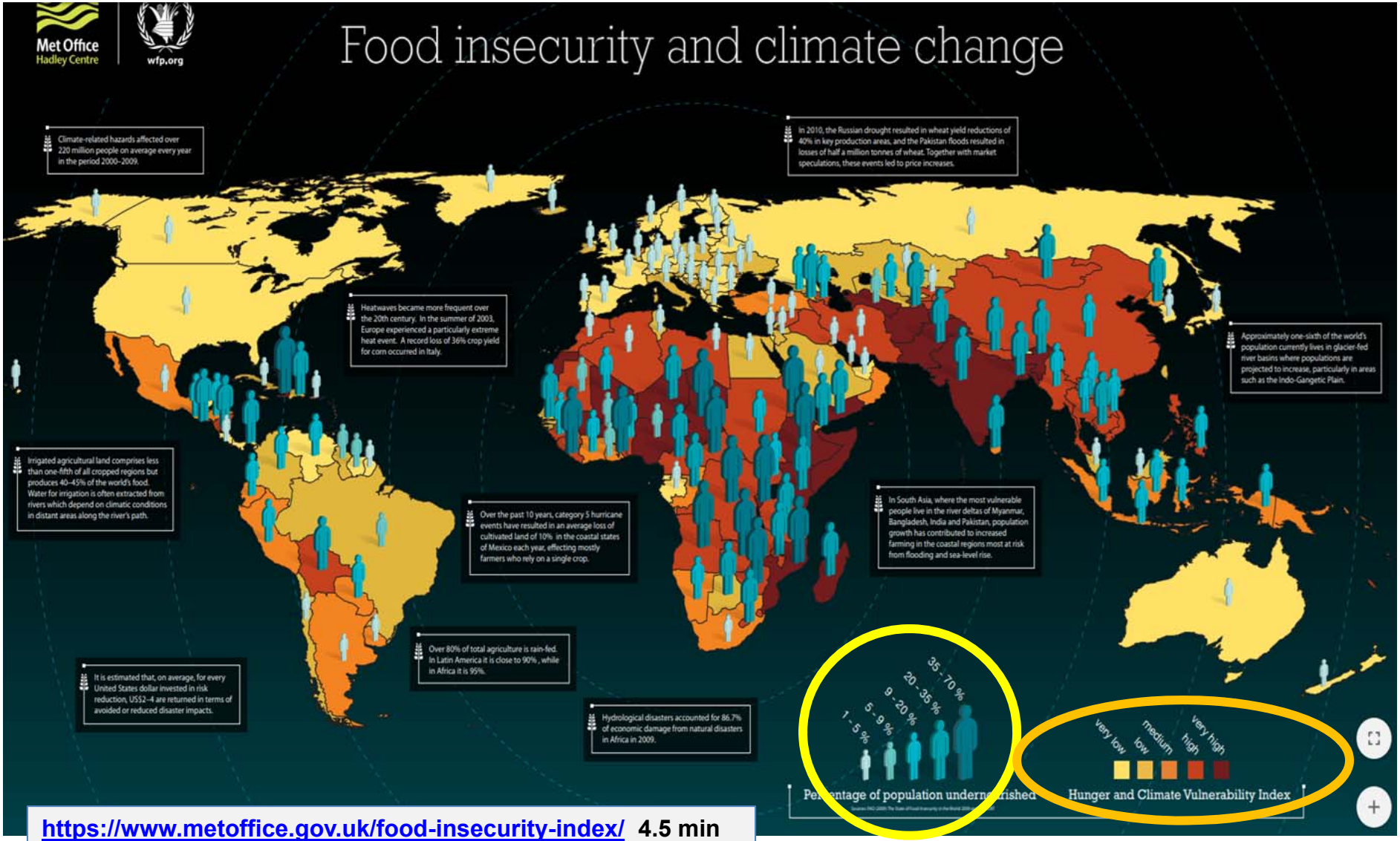
http://mvam.org/wp-content/uploads/2019/10/HM-screenshot-22.10.jpg

World Undernourished Areas
(malnutrition)



https://www.globalhungerindex.org/results/ **Interactive Global Hunger Index site for 2019. Get data on all countries.**

Future Food Supplies and Well-being



https://www.metoffice.gov.uk/food-insecurity-index/ **4.5 min video embedded on second page (click see the possibilities)**

KEY to colors and icons

Geographical Issues Facing Food Supplies and the Well-being of People

PHYSICAL ENVIRONMENT CHANGES

1. Worldwide mean temp. is increasing.
2. Regional mean precipitation will vary off the norm (some higher/some lower).
3. Increase in carbon dioxide levels will effect crop growth.
4. Drought, heat waves and severe flooding will reduce crop yield.
5. Heavy rainfall and flooding will devastate food storage/distribution.
6. Melting glaciers will first cause valley flooding, then water shortages.
7. Tropical storms will be more frequent, intense and destructive.
8. Sea level will rise, flooding farm land.

EFFECT ON PEOPLE

- Very high percent of world's people live/farm in river deltas/ coastal plains which are the first to be impacted by sea level rise and salt water intrusion.
- About 15% of world's people live and farm in glacier meltwater-fed river valleys.
- Over 80% of the world's agricul-tural land is rain-dependent.
- About 50% of the world's food supply comes from irrigated land
- 220+ mil people are affected by severe weather events each yr.

Decreased food supplies will result in changes in health and nutrition.

Medical Definition of Disease

- **DISEASE: An impairment of the normal state of the living human, animal or plant body or its parts that interrupts/modifies the performance of vital functions, and is typically manifested by distinguishing signs and symptoms.**
  - Also called a SICKNESS or ILLNESS
- **It is a response to:**
  - ✓ **environmental factors** (as malnutrition, hazards, climate);
  - ✓ **specific infective agents** (as worms, bacteria, or viruses);
  - ✓ **inherent defects of the organism** (as genetic anomalies);
  - ✓ **or combinations of these factors**.

Spatial Labeling of Diseases

DISEASE: disorder of the normal structure or function that has specific signs and symptoms. **A disease may have breeding conditions, a transmission route and a spatial range influenced by geographic parameters.**

❖ **ENDEMIC:**

a disease that is character-istic of a particular area or limited to a host population.

- May affect many people locally.
- Can be confined to a small cohort of people.
- Usually not transferrable to other regions.

❖ **EPIDEMIC:**

a disease that affects many people in a local or regional area.

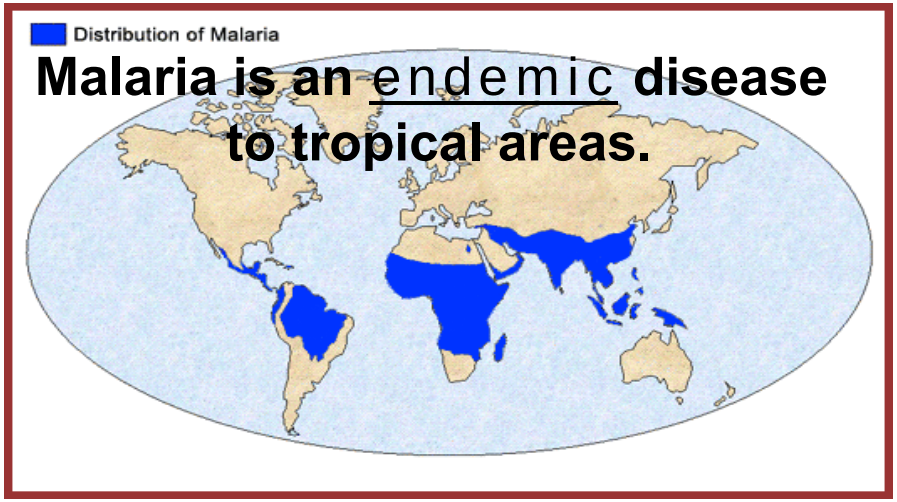
- It is contagious
- It can spread to other areas

❖ **PANDEMIC:**

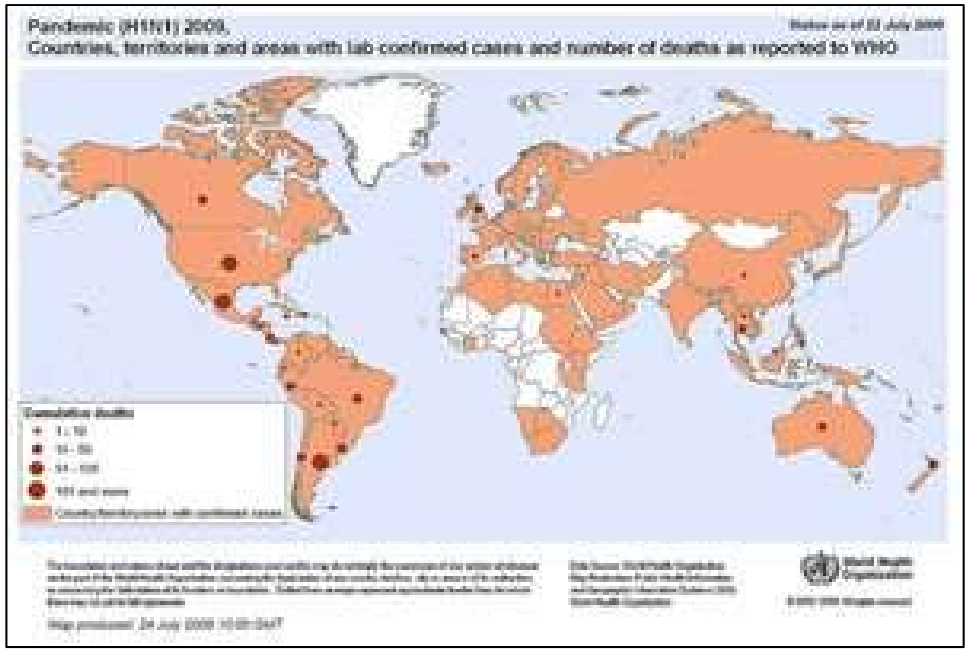
a disease with a large regional or a worldwide scope.

- Requires an international response to control its spread and treat its victims.

Examples of Disease Types

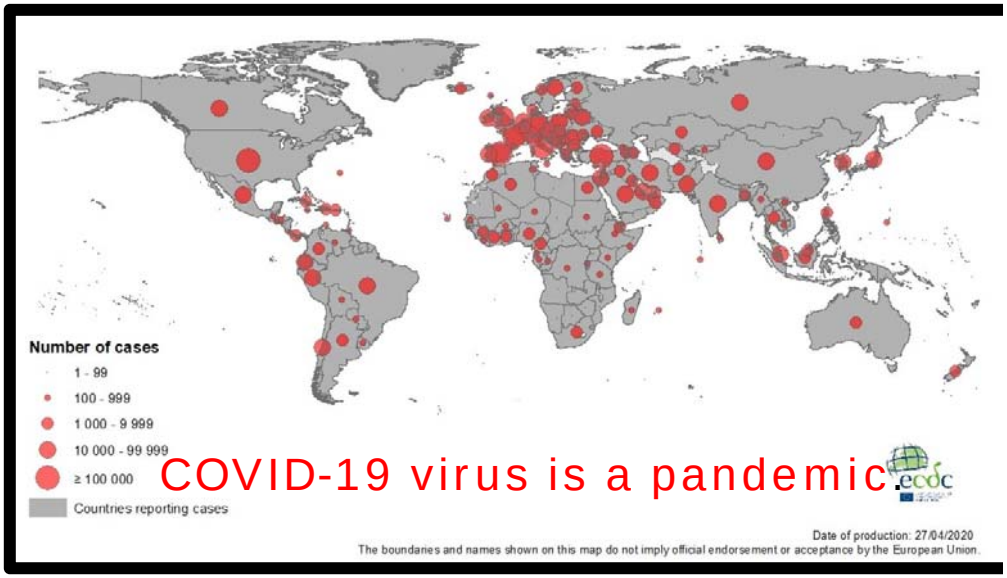


Malaria is an endemic disease to tropical areas.



H1N1 Virus occurred world wide. It was a pandemic.

Swine flu is locally an epidemic.

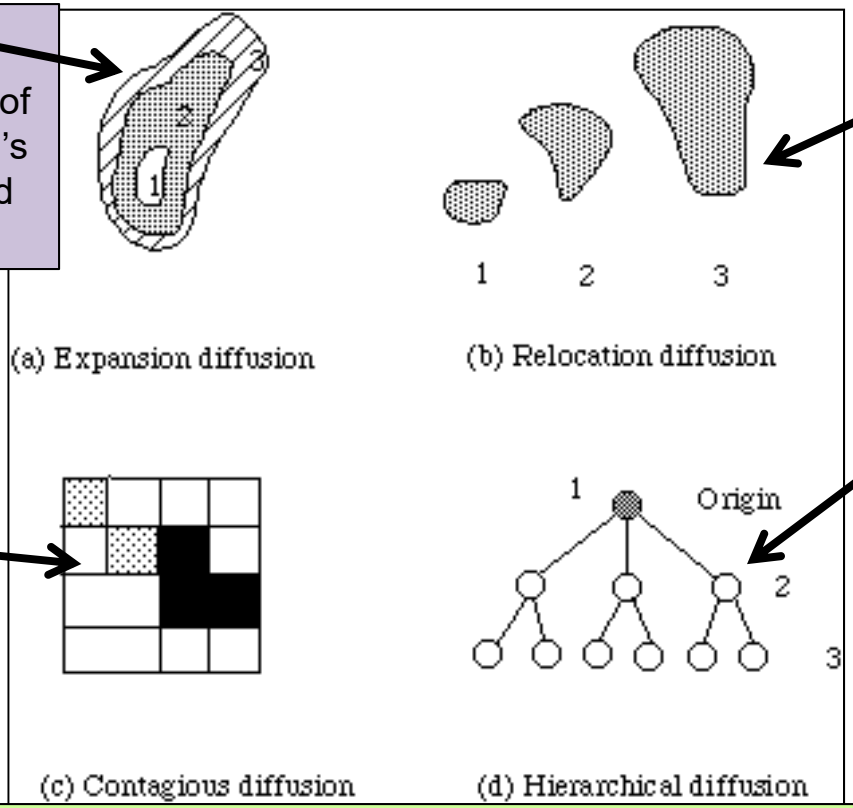


COVID-19 virus is a pandemic

REFRESHER: Types of Diffusion

a) EXPANSION
Movement away from point of highest concentration; there's an increase in both area and numbers.

b) RELOCATION
Migration; actual movement away to another location.

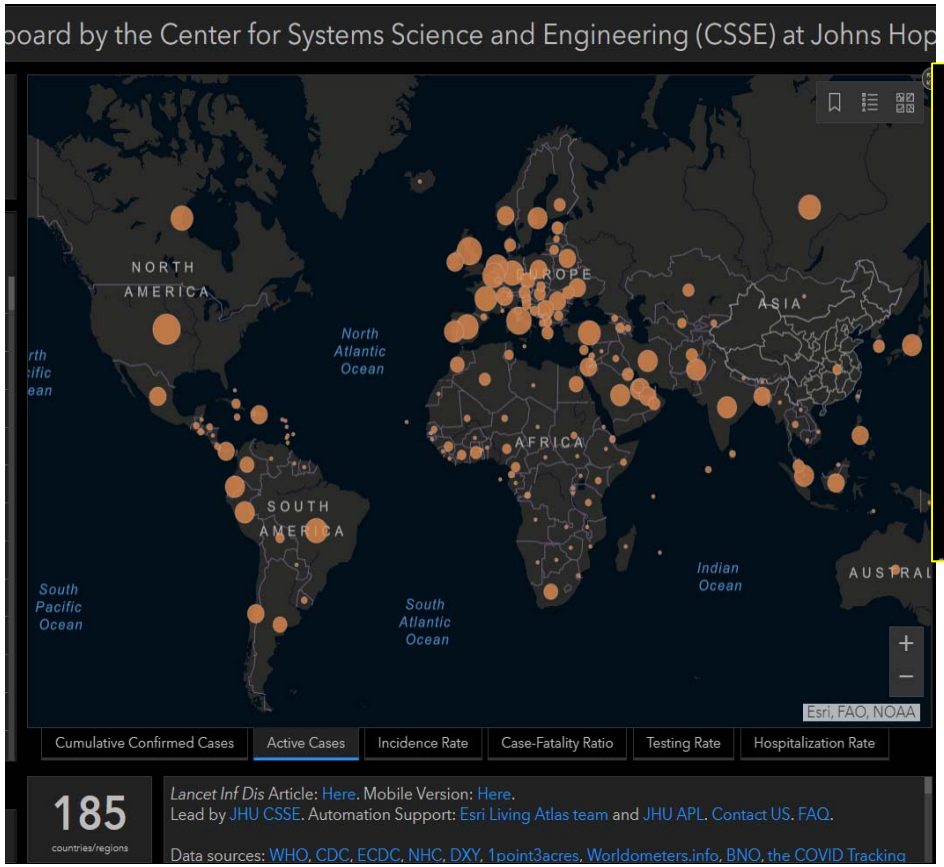


c) CONTAGIOUS
Contact and exchange between adjoining areas; person-to-person contact, blending.

d) HIERARCHICAL
Movement between levels: "up the ladder"; skipping areas in between (as moving from the small town to big city without stopping at the smaller cities).

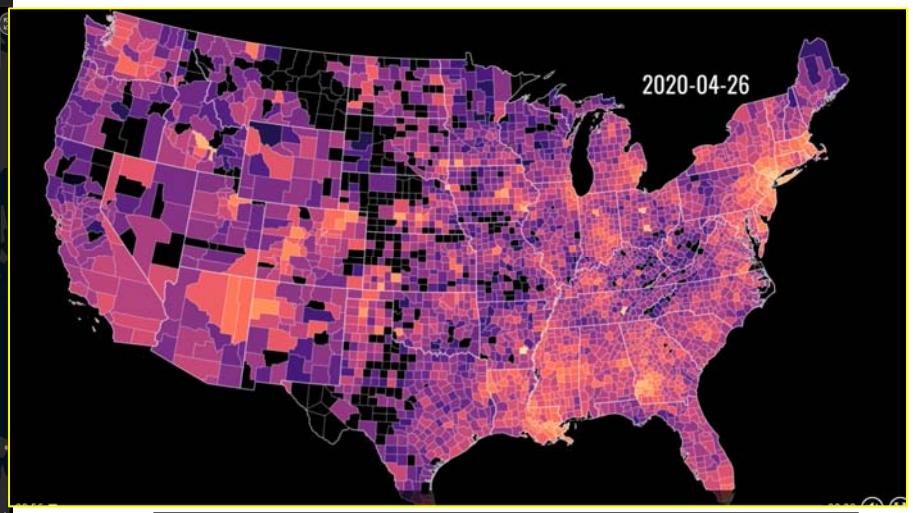
COVID-19 virus's spread has been likened to the sparks of a starburst firework: launching from its point of origin (Wuhan), **spreading out over an area** (first Wuhan area, then China) **and when the sparks return to earth** (airline passengers) **creating new hot spots from which it now spreads to other areas and from the new hot spots expands in area.**

COVID-19 Trackers using GIS



https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6

Johns Hopkins University



https://www.sharedgeo.org/COVID-19/img/percapita/covid19-conus.webm?1588006273

Sharedgeo.org

Dr. John Snow's Cholera Map

The cholera pandemic reached London in 1842.

- **Dr. John Snow began to map each case and death.**
- **He was convinced contaminated water was to blame and he associated new cases with people getting water from tainted wells.**
- **In 1854, when officials refused to shut down wells, he removed the pump handles to prevent the wells' use.**

➢ **New cases decreased immediately!**

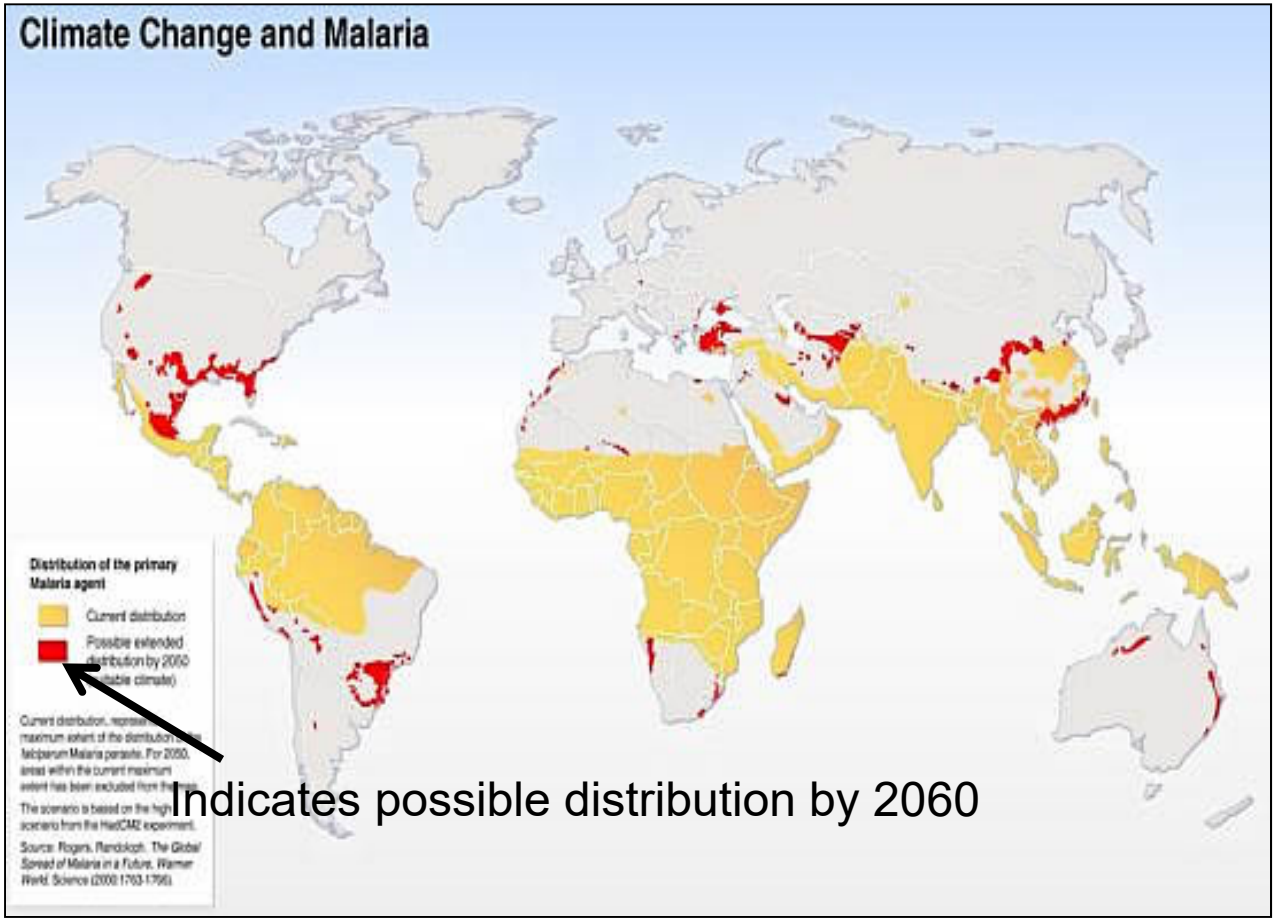
Climate Change and the Spread of Disease

Results of changing climates:

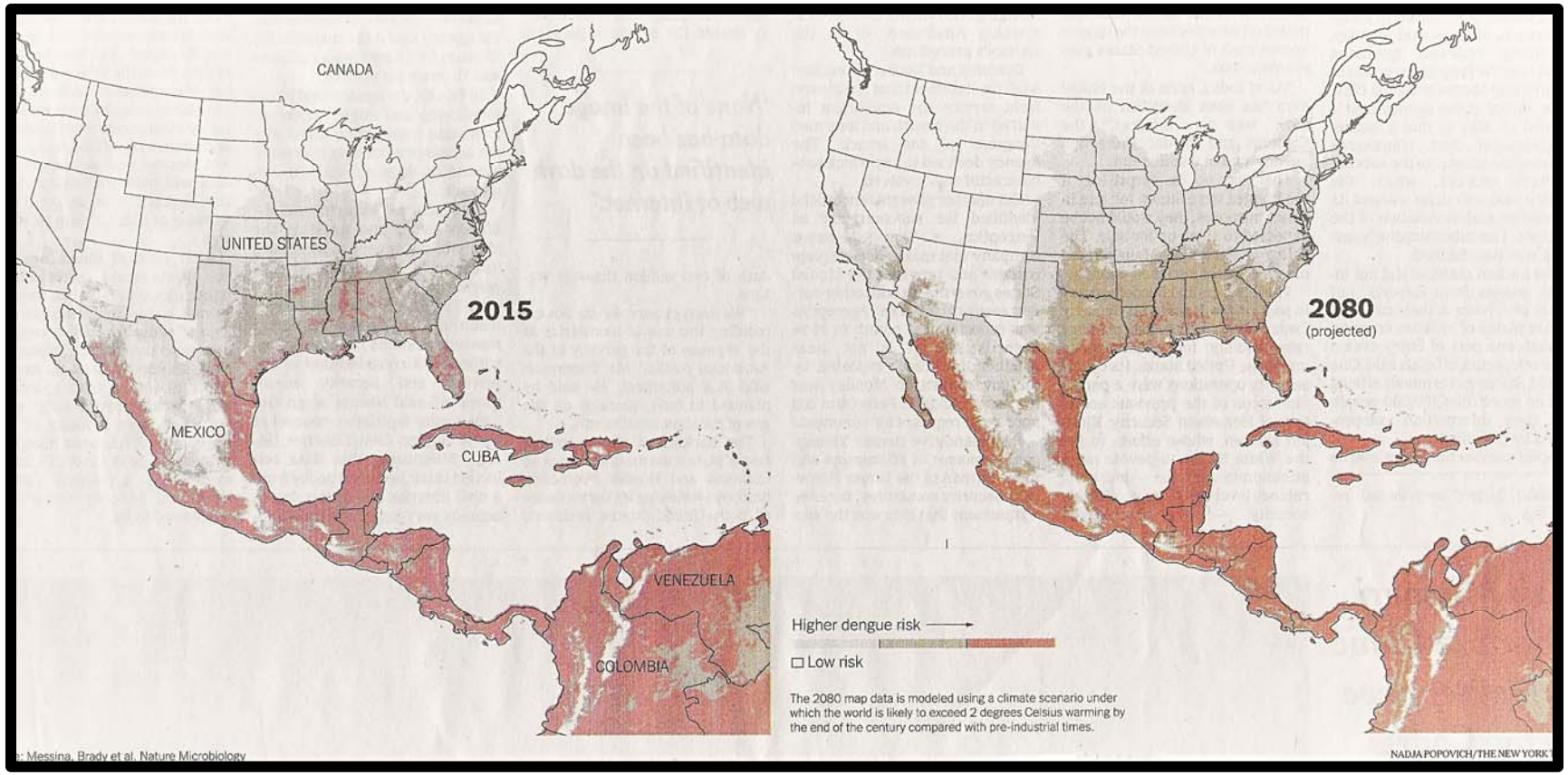
Drought (wind-borne dust diseases)

Increased Rainfall (water-borne diseases)

Warmer Temps (increase range of mosquitoes and other heat-sensitive insects

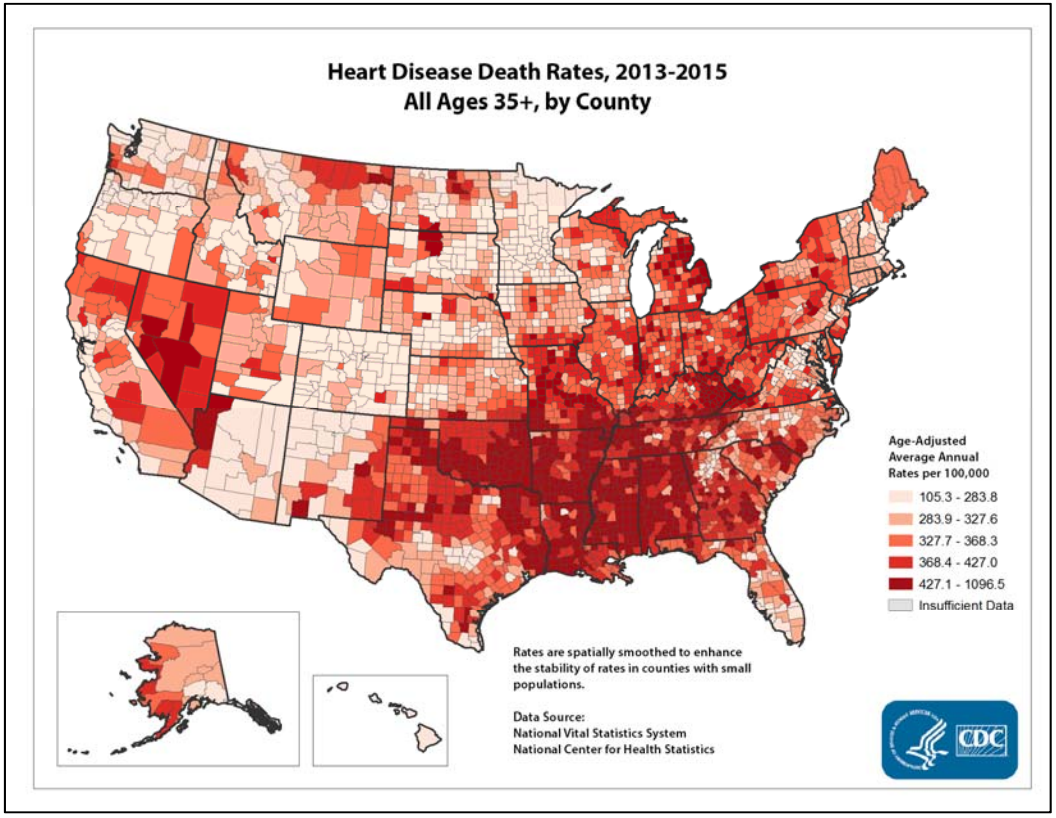


Dengue Fever and Global Warming

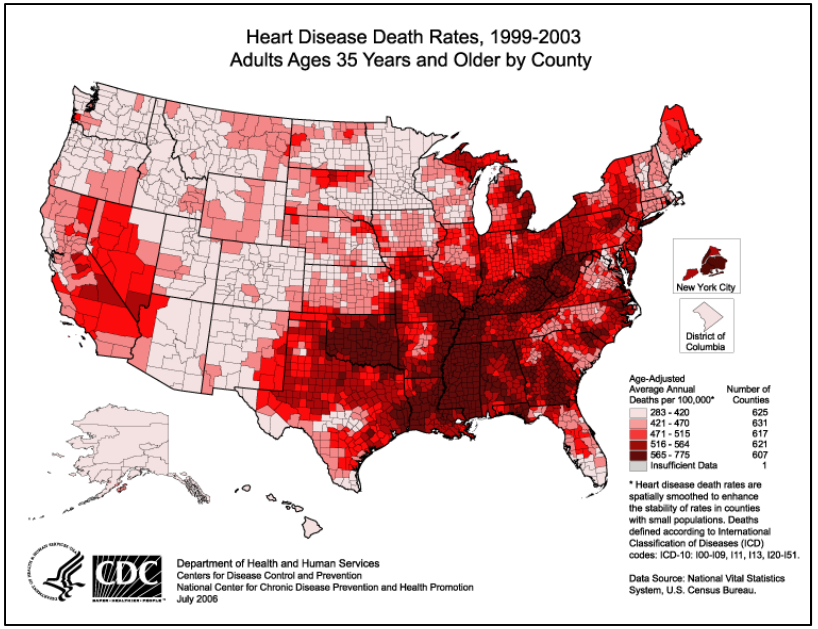


https://www.nytimes.com/interactive/2019/06/10/climate/dengue-mosquito-spread-map.html

Heart Disease in the **US** by **Region** and **Over Time**



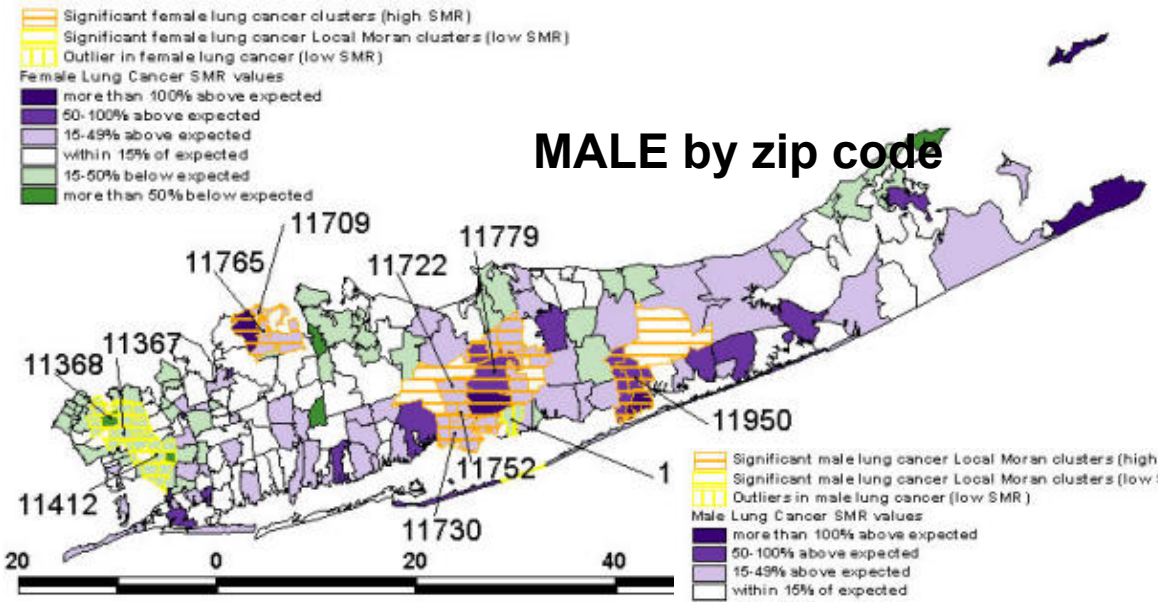
2013-2015



1999-2003

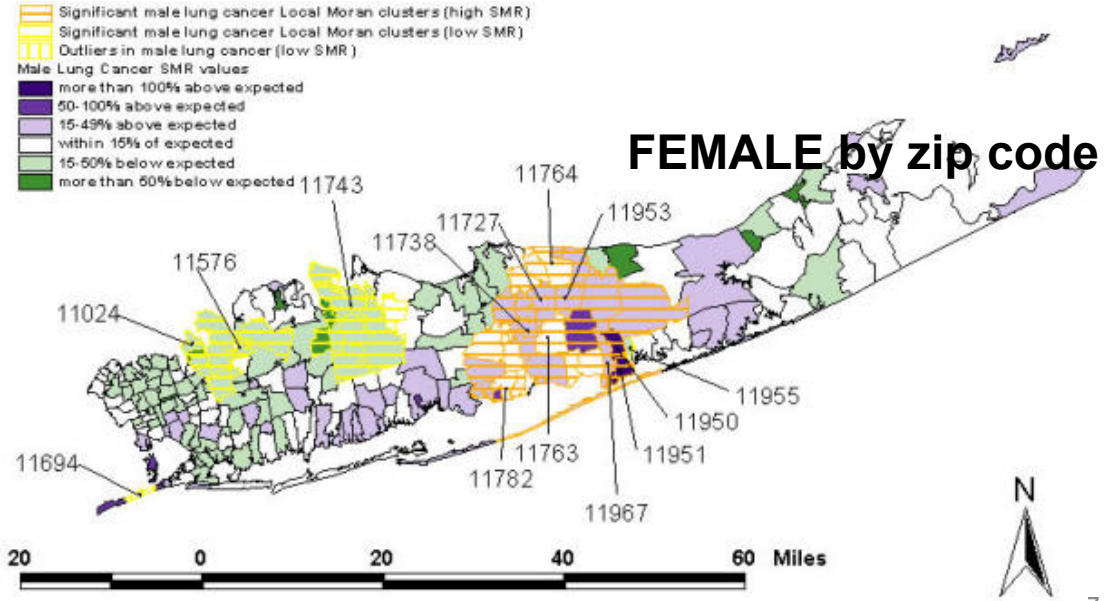
Note the change in distribution and concentration between 1999 and 2015.

Lung Cancer Occurrence
on Long Island, NY

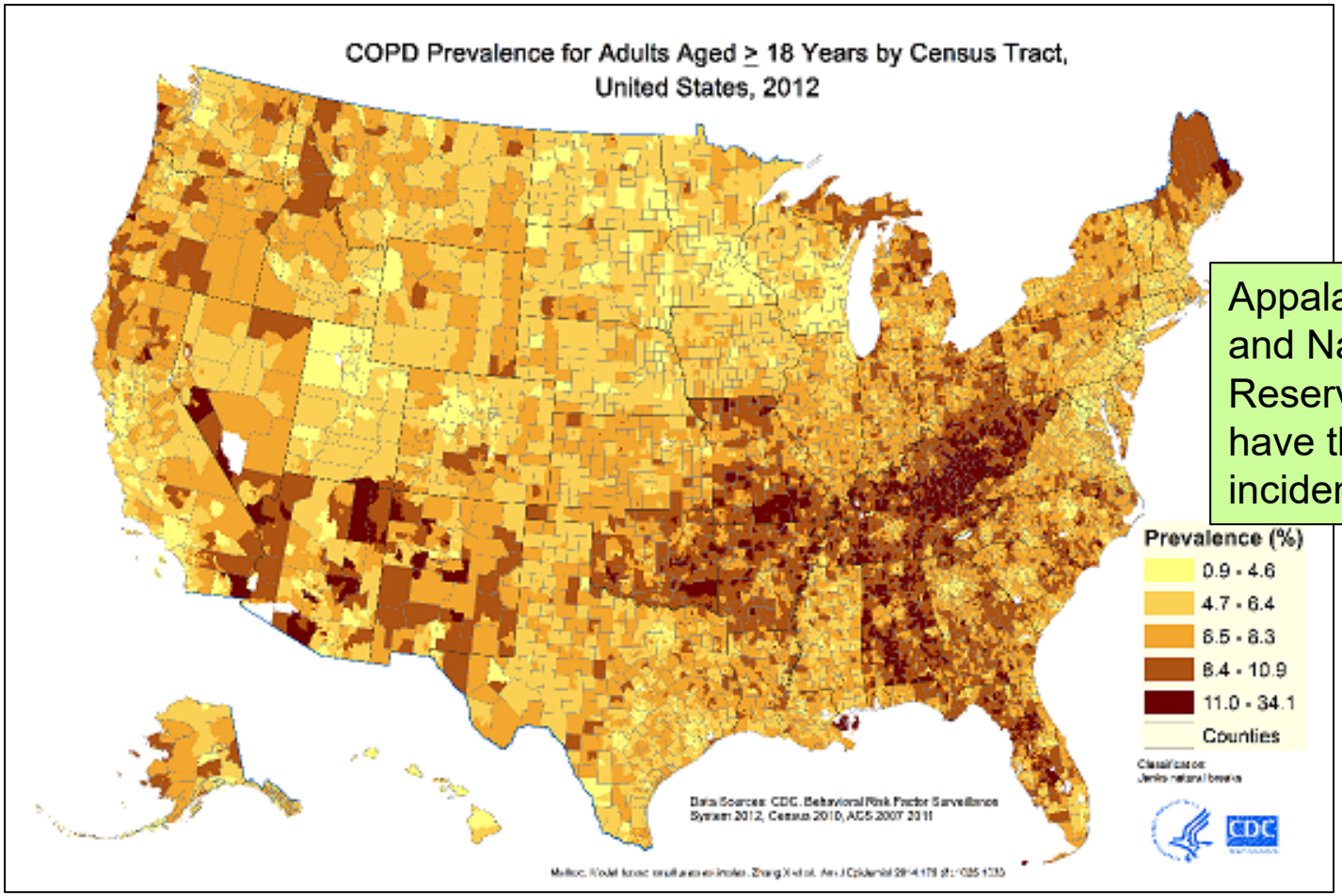


Dilemma: Why are there concentrations (geographic cancer clusters) in certain areas of Nassau and Suffolk counties?

Green = low
Purple = high



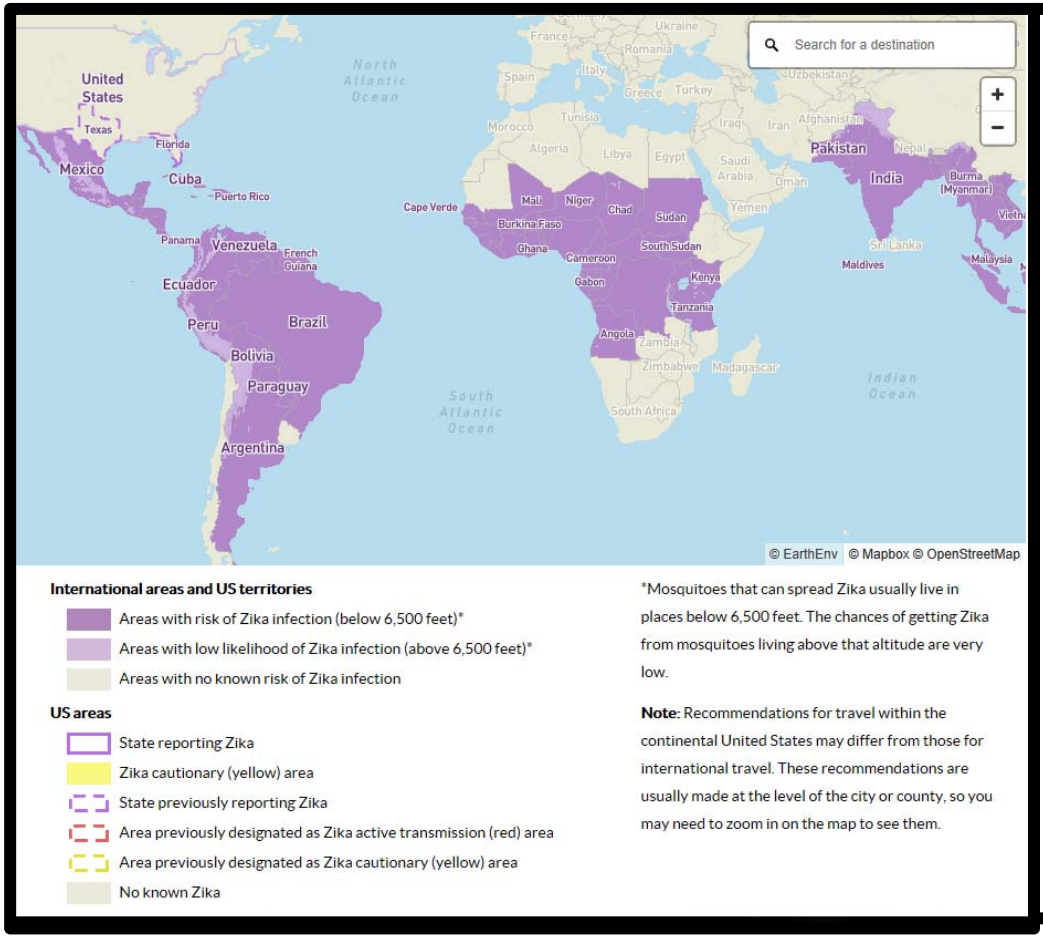
COPD in the USA



Appalachia, the Ozarks and Native American Reservations appear to have the highest incidence of COPD.

Risk Maps: Zika and Yellow Fever

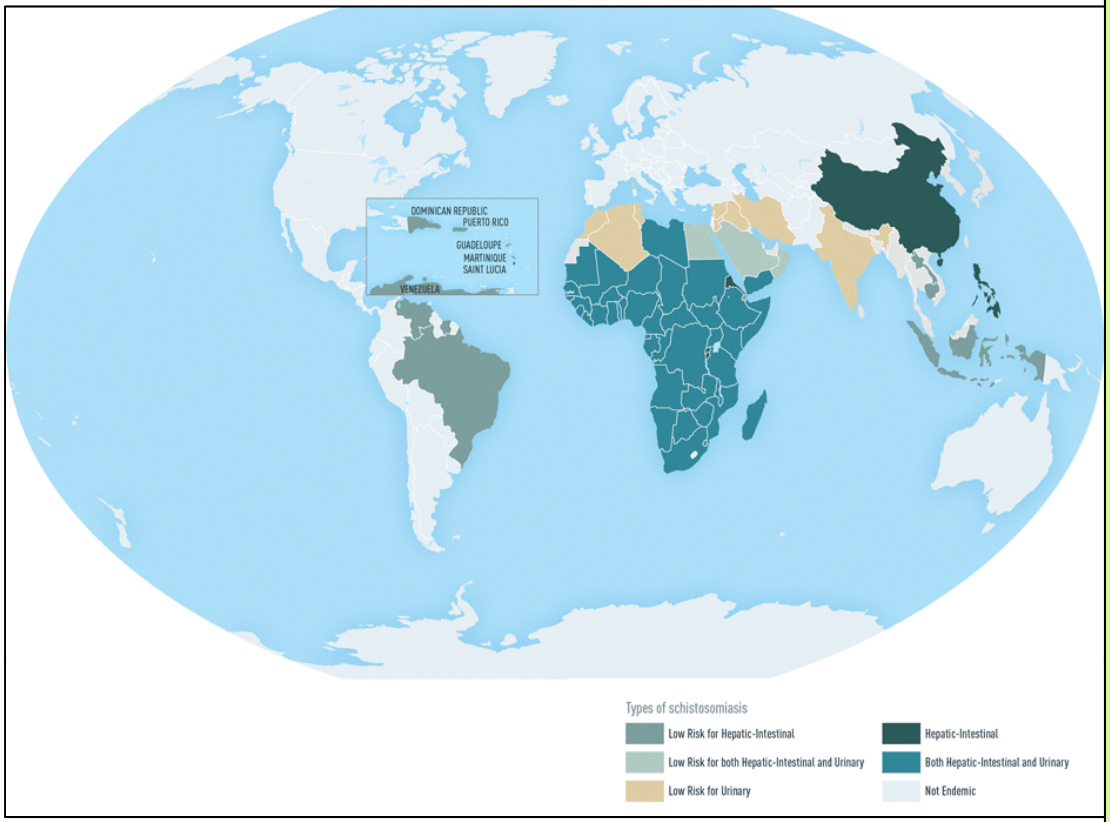
https://wwwnc.cdc.gov/travel/yellowbook/2018/list/maps



https://wwwnc.cdc.gov/travel/page/world-map-areas-with-zika

https://wwwnc.cdc.gov/travel/notices/alert/yellow-fever-brazil

Distribution of Schistosomiasis



https://wwwnc.cdc.gov/travel/yellowbook/2018/infectious-diseases-related-to-travel/schistosomiasis

Schistosomiasis (bilharzia) **is caused by flatworm larva.**

Waterborne transmission occurs when larva found in contamin-ated freshwater, penetrate the skin and lodge in the bladder and intestines where they grow and mature. Worm eggs are passed out of the body through urination and defecation.

There are no vaccines or drugs for preventing infection.

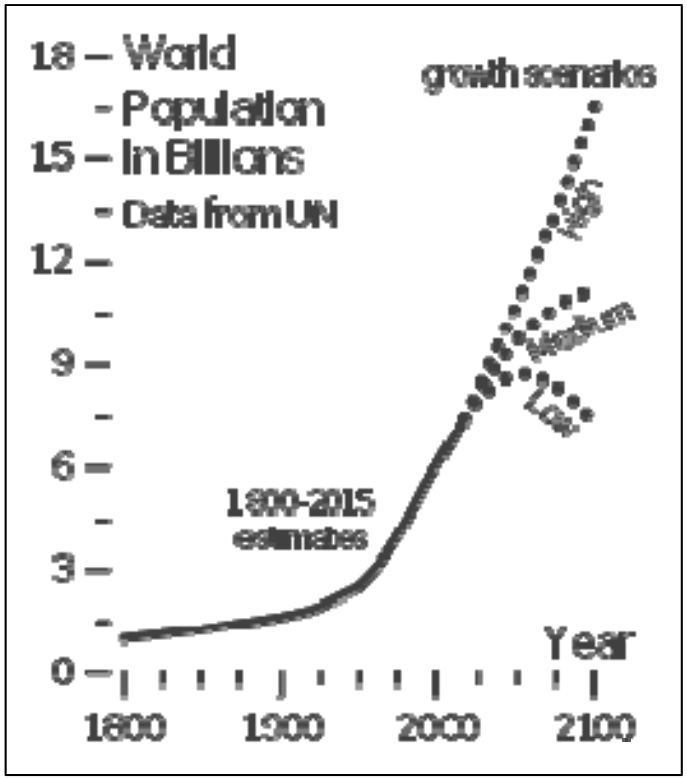
Preventive measures are avoiding wading, swimming, bathing or other contact with freshwater in disease-endemic countries.

Untreated piped water coming directly from freshwater sources may contain these parasites.

https://www.youtube.com/watch?v=leeeWD59D9Q: **5 min overview**

Health, Nutrition and Numbers of People

- If humanity addresses and deals with this important part of the population question by making people healthier and therefore living longer --- what affect will this have on the earth's ability to support its growing population?



Population Growth and Overpopulation

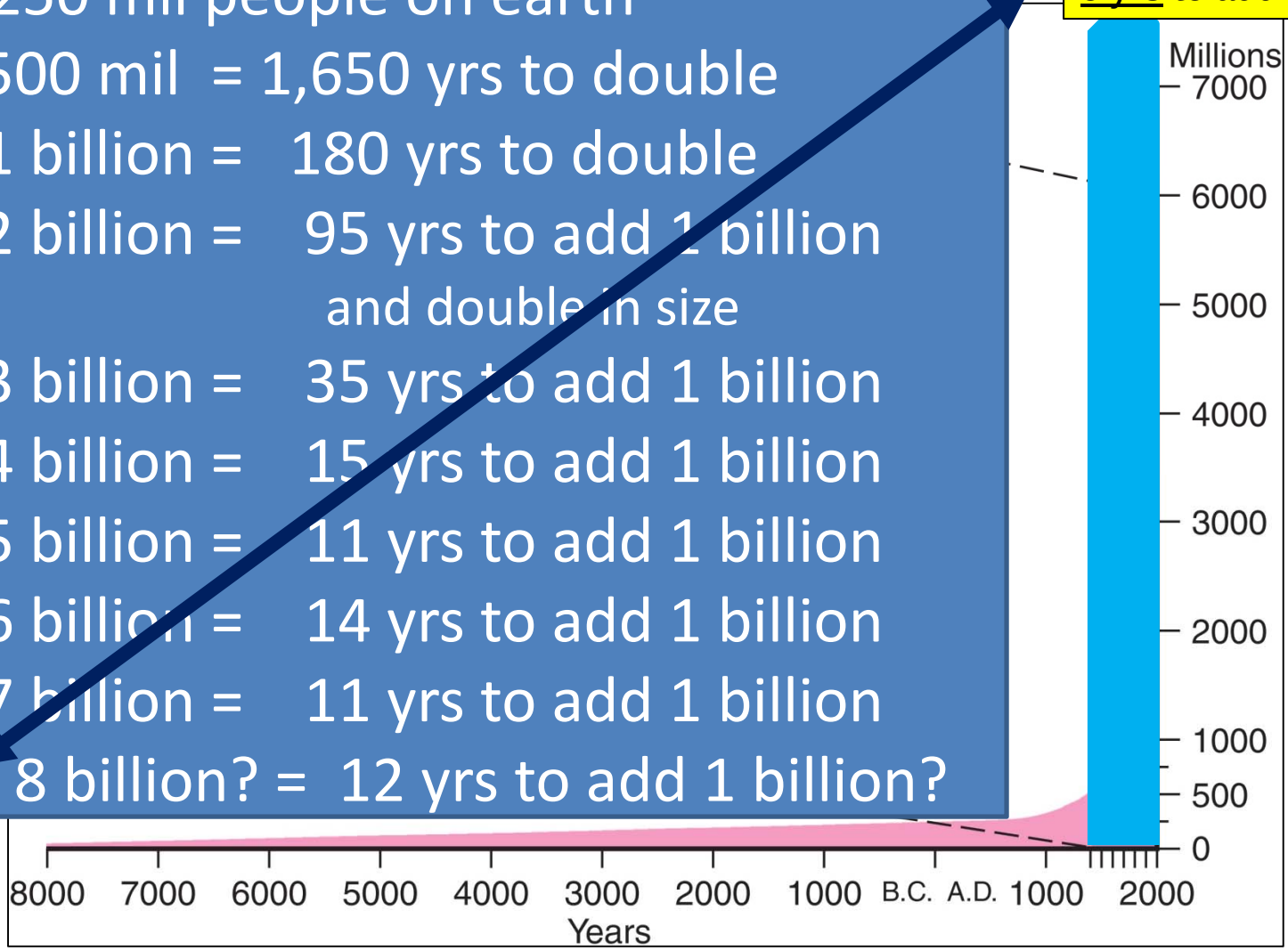
The world needs to deal with the present rate of population growth and overpopulation.

- There is a need to either **increase the carrying capacity** of an area (habitat quality) **or reduce the stress** of a population on the habitat.
- Can this be done? How can this be done?

Population Growth

1 AD: 250 mil people on earth
1650: 500 mil = 1,650 yrs to double
1830: 1 billion = 180 yrs to double
1925: 2 billion = 95 yrs to add 1 billion
and double in size
1960: 3 billion = 35 yrs to add 1 billion
1975: 4 billion = 15 yrs to add 1 billion
1986: 5 billion = 11 yrs to add 1 billion
2000: 6 billion = 14 yrs to add 1 billion
2011: 7 billion = 11 yrs to add 1 billion
>2023: 8 billion? = 12 yrs to add 1 billion?

2020 = c.7.79 billion
8 yrs to add ¾ billion



Dealing with Population Growth

How can this be done?

There are 5 general scenarios:

1. **Expand the resource base**
2. **Emigration**
3. **Economic change**
4. **Education**
5. **Natural population controls**

Dealing with Population Growth

How can this be done?

1. **Expand the resource base** (carrying capacity).

   A. Use of technology (existing and/or new).

   B. Creation of artificial environments.

   C. Make new discoveries.

Dealing with Population Growth

How can this be done?

2. Emigration.

A. Encourage movement away (emigration)

B. Discourage in-migration (immigration)

C. Relocate people to other areas (transmigration)

Dealing with Population Growth

How can this be done?

3. **Economic change** (demographic transition model)
   - A. Shift from an agrarian to an industrial economy
   - B. Shift from rural to urban settlement (may have a negative impact if cities take over farmland)
   - C. Use of technology

Dealing with Population Growth

How can this be done?

4. Education

A. Knowledge of the local situation

B. Ability to read and follow instructions (male and female; understanding package labeling; employment)

C. Training in the use of modern technology

D. Changing the attitudes and philosophies of people (i.e., culture) regarding family size through dialogue, reasoning and teaching.

Dealing with Population Growth

How can this be done?

5. **Natural population controls** (involves ethical and moral issues)

   A. Famine

   B. Disease

   C. War

   D. Poverty

   Should the world community help borderline areas by providing aid for hunger and disease prevention or provide rescue services after a natural disaster?

Biogeography

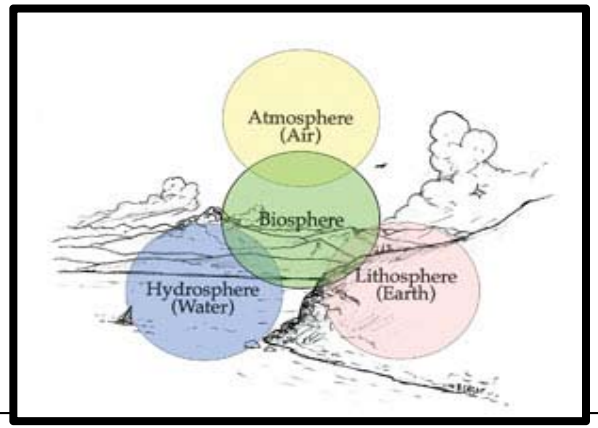
- **Studies the spatial aspects of plant and animal life.**
  - ✓The relationship between a life forms and the physical environment.
  - ✓Looks at the composition of biomes, habitats, ranges, etc.
  - ✓Migrations.

Biogeography

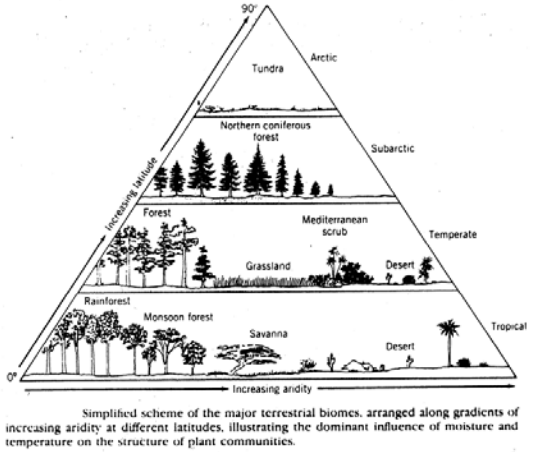
Tundra Swan Range in North America

Migratory pattern

Location of dinosaur fossils

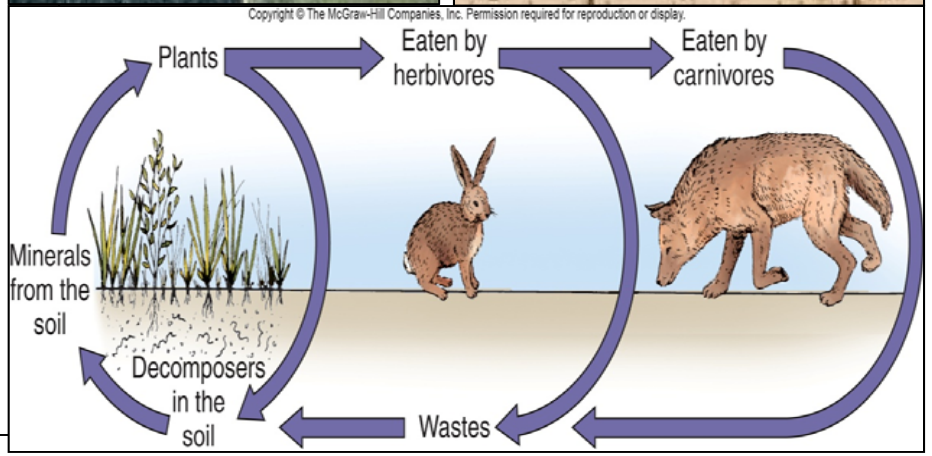


Ecology

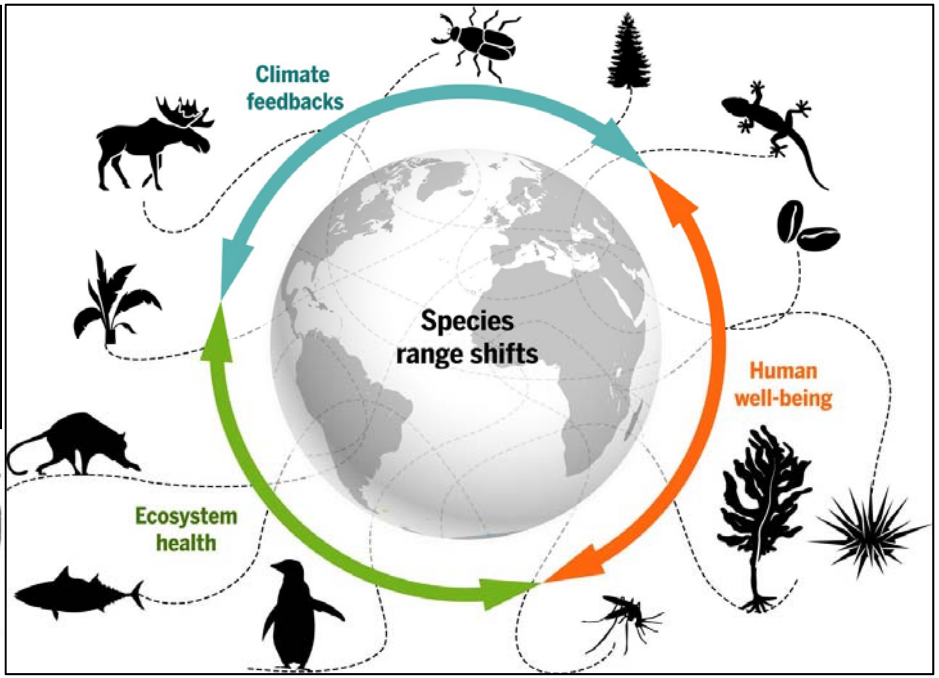


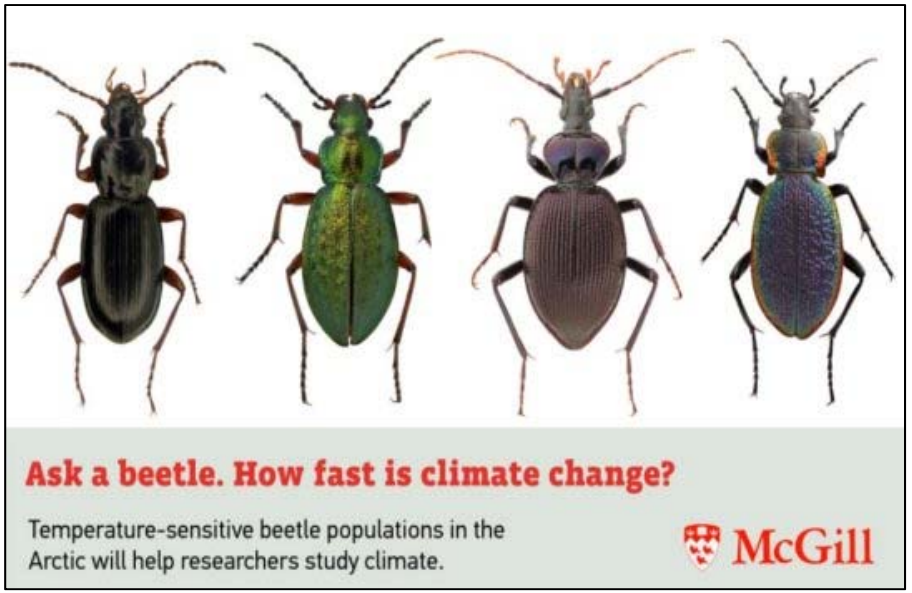
Simplified scheme of the major terrestrial biomes, arranged along gradients of increasing aridity at different latitudes, illustrating the dominant influence of moisture and temperature on the structure of plant communities.

- **Studies how living things affect each other and what determines their distribution and abundance** (habitat).
  - ✓ Biosphere, ecosystems, biomes and niches.
  - ✓ Quality of habitat and carrying capacity.
  - ✓ Food chain.
  - ✓ Human interaction.



Biodiversity: Both Temperature and Moisture Sensitive



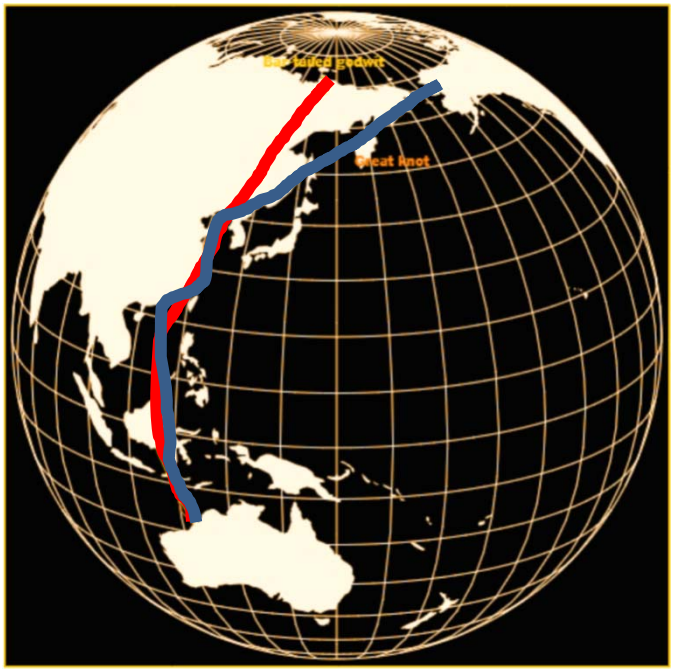


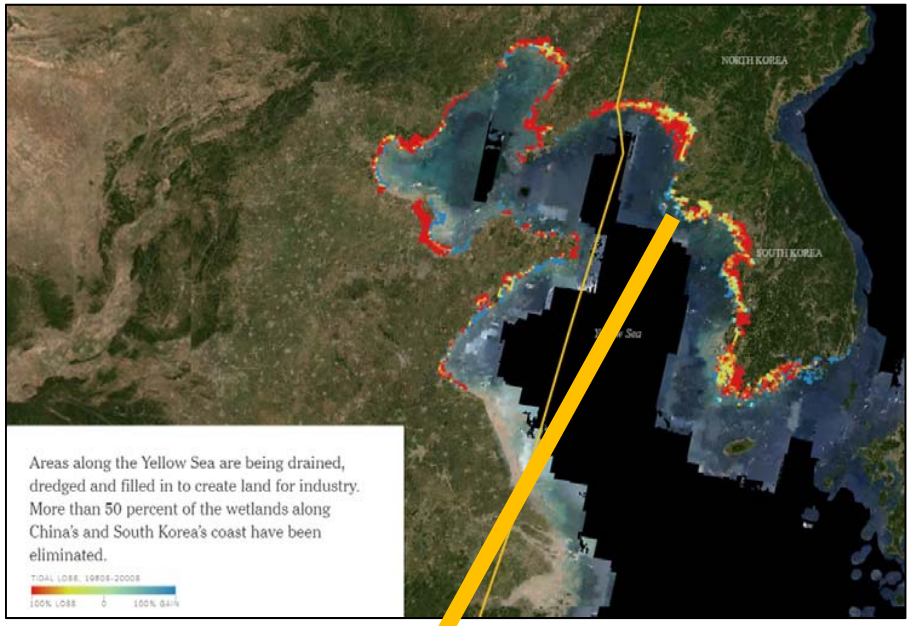
"Humans Are Speeding Extinction and Altering the Natural World at an 'Unprecedented' Pace"

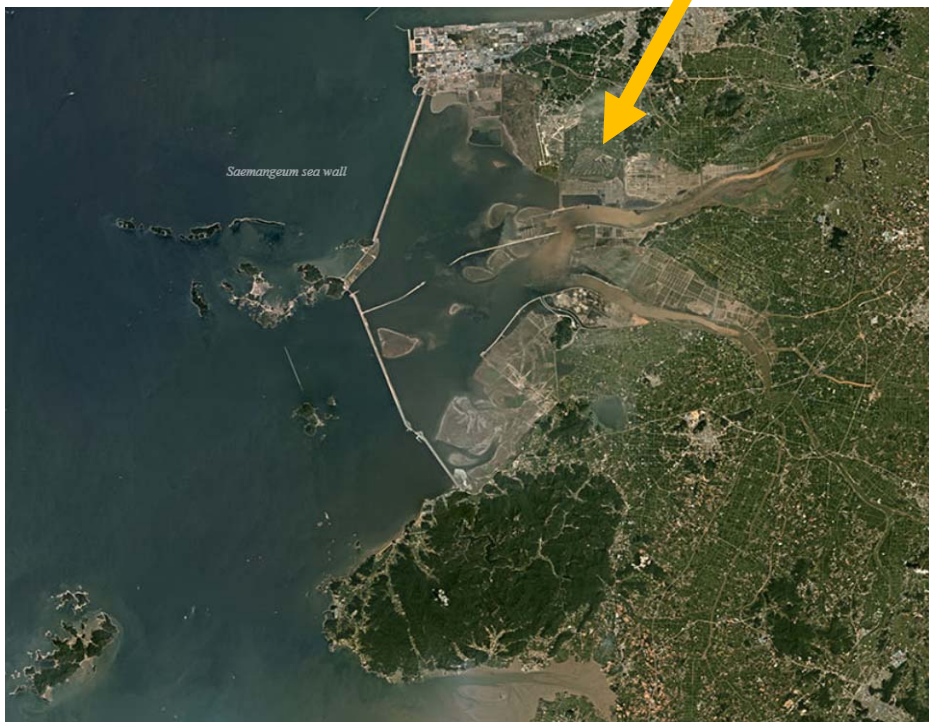
- https://www.nytimes.com/2019/05/06/climate/biodiversity-extinction-united-nations.html
- https://www.theguardian.com/environment/2019/may/06/human-society-under-urgent-threat-loss-earth-natural-life-un-report?CMP=Share_iOSApp_Other

Plight of Migratory Shorebirds

Bar-tailed Godwit and Great Knot migratory routes. These shorebirds, tracked by GPS, migrate more than 6,000 mi in each direction. **They rely on tidal mudflats to rest and eat.**



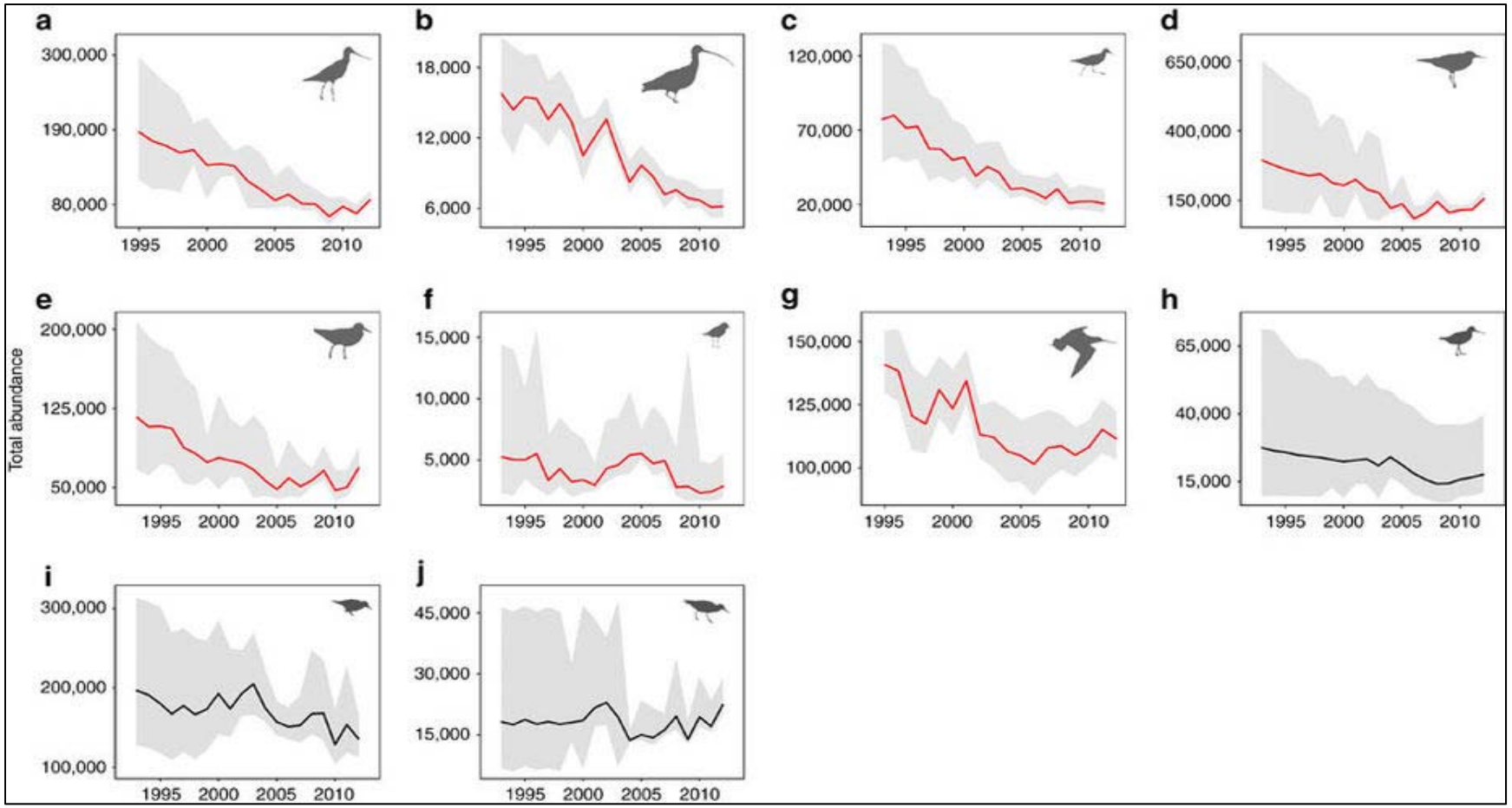




https://www.nytimes.com/interactive/2018/04/27/opinion/shorebirds-extinction-climate-change.html

Declining Migratory Bird Populations

relying on Yellow Sea mud flat stopovers sites



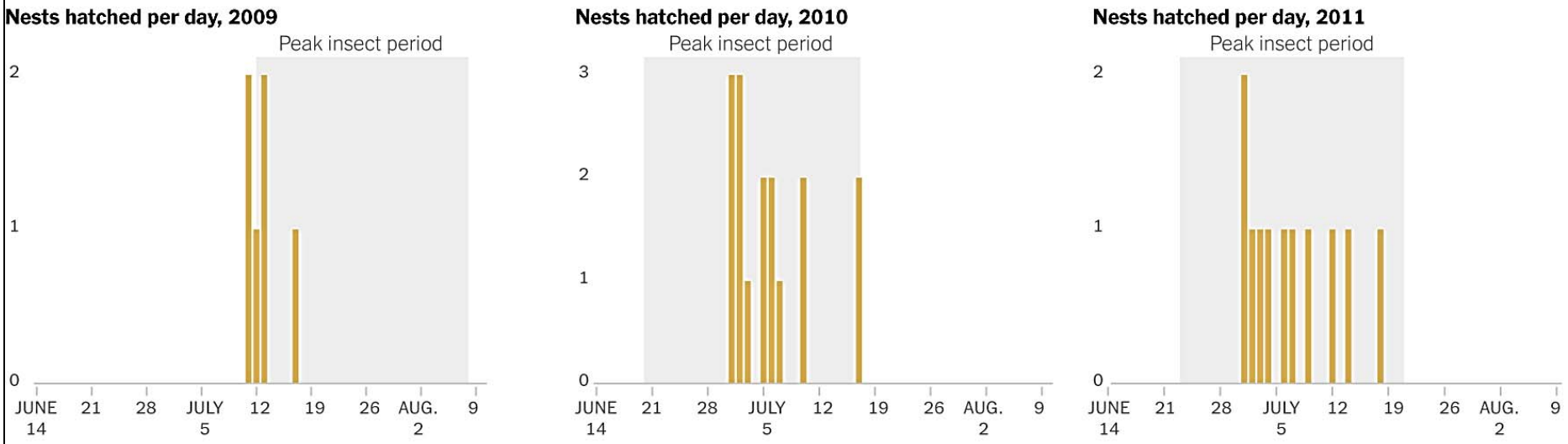
Climate Change, Hatching and Insect Season

In 2009, Hudsonian godwit nests hatched closer to the start of insect season ...

Bird populations thrive when nests hatch before peak insect season.

... but in warmer years, nests hatched closer to the tail end.

When this happens, there is not enough food for hatchlings.



Note: Peak insection period based on the highest average insect abundance. Source: Nathan R. Senner, Maria Stager and Brett K. Sandercock/*Oikos*

N E X T

GEOGRAPHY of ECONOMICS:

Economy, development and sustaining a population with food.

Chapters 9 and 12