The Future is Coming!
Are We Prepared?

Six Mega-Trends and Their Implications for "Global Health" in the 21st Century

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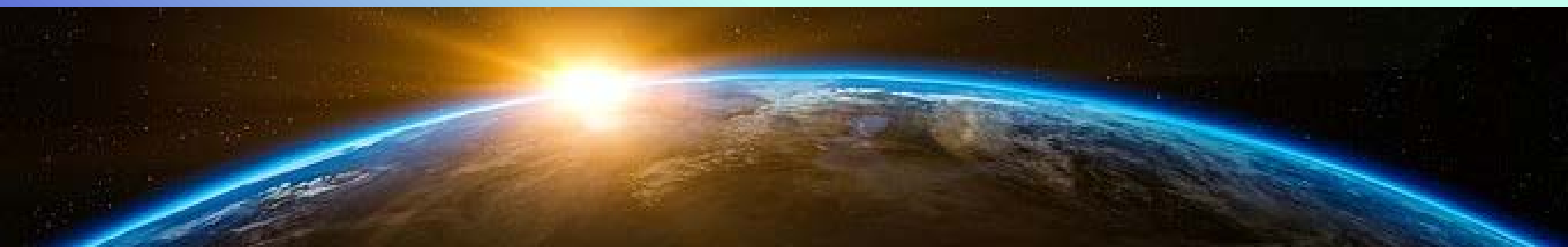
February 4, 2020



Is Our Global Health Vision Ready for the Future??

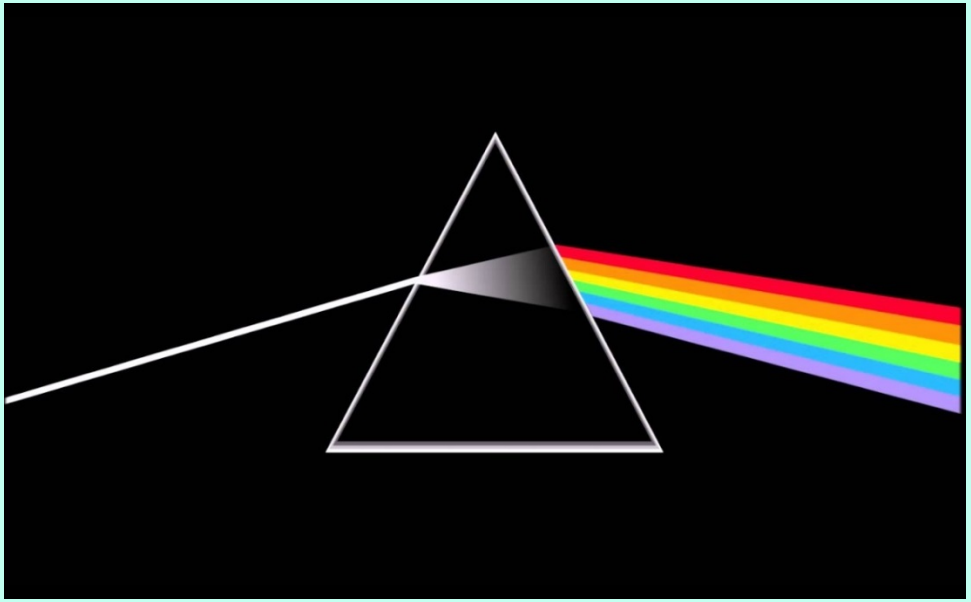
As we consider the challenges to be faced in the world of “tomorrow” is our vision for “Global Health” adequate?

- What are future trends?
- What are their likely consequences?
- What are the implications for “Global Health”?

Peering into the Future:

Six Mega-Trends Thru 2100

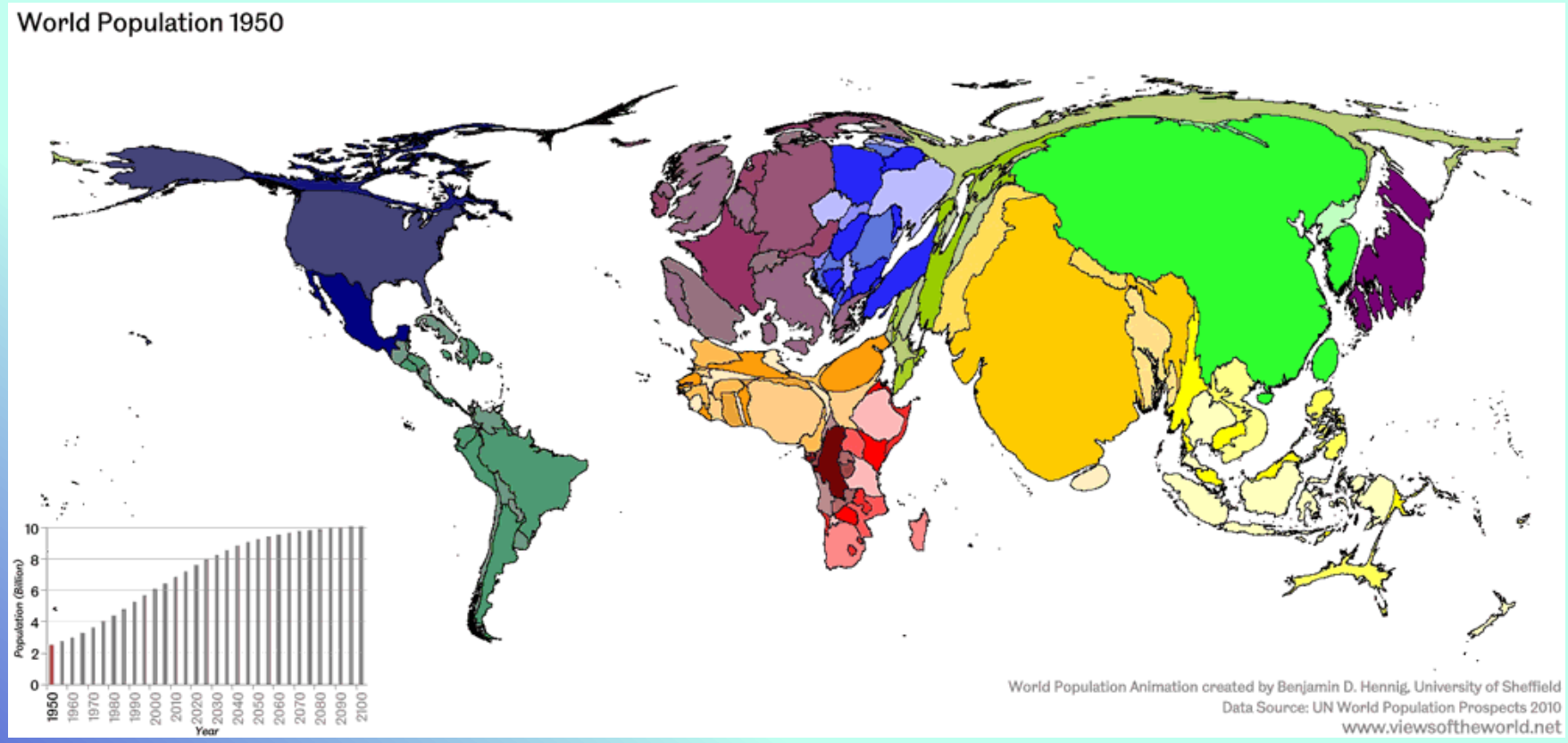
- Population Change
- Changing Demographics
- Urbanization
- Climate Change
- Land Use Change
- Transformative Technologies



And what they mean for the world we live in and our futures?

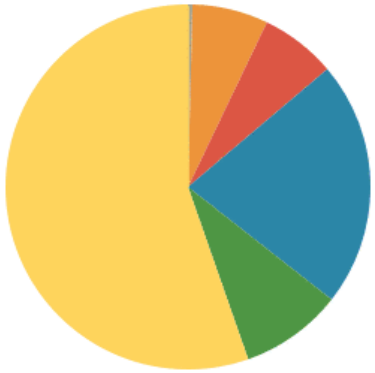
Population Change

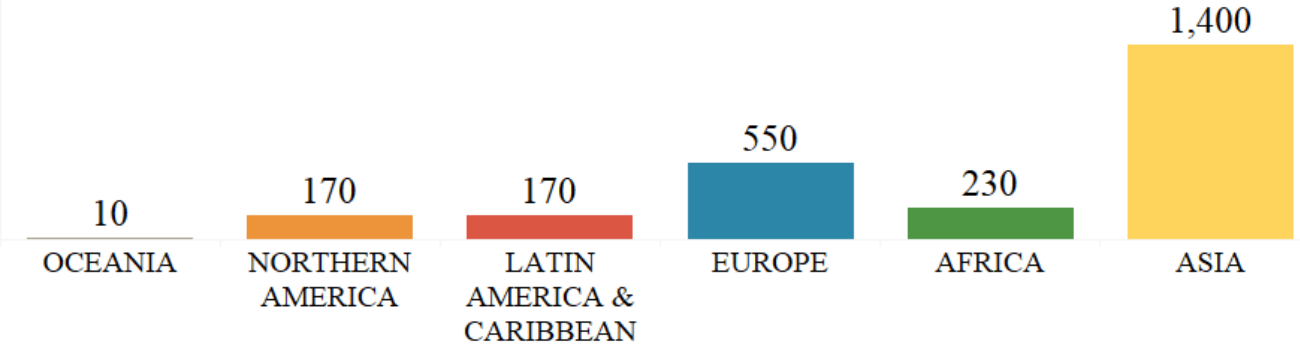
World Population 1950 - 2100



Population in millions by region 1950

Share of world population **2.5B**

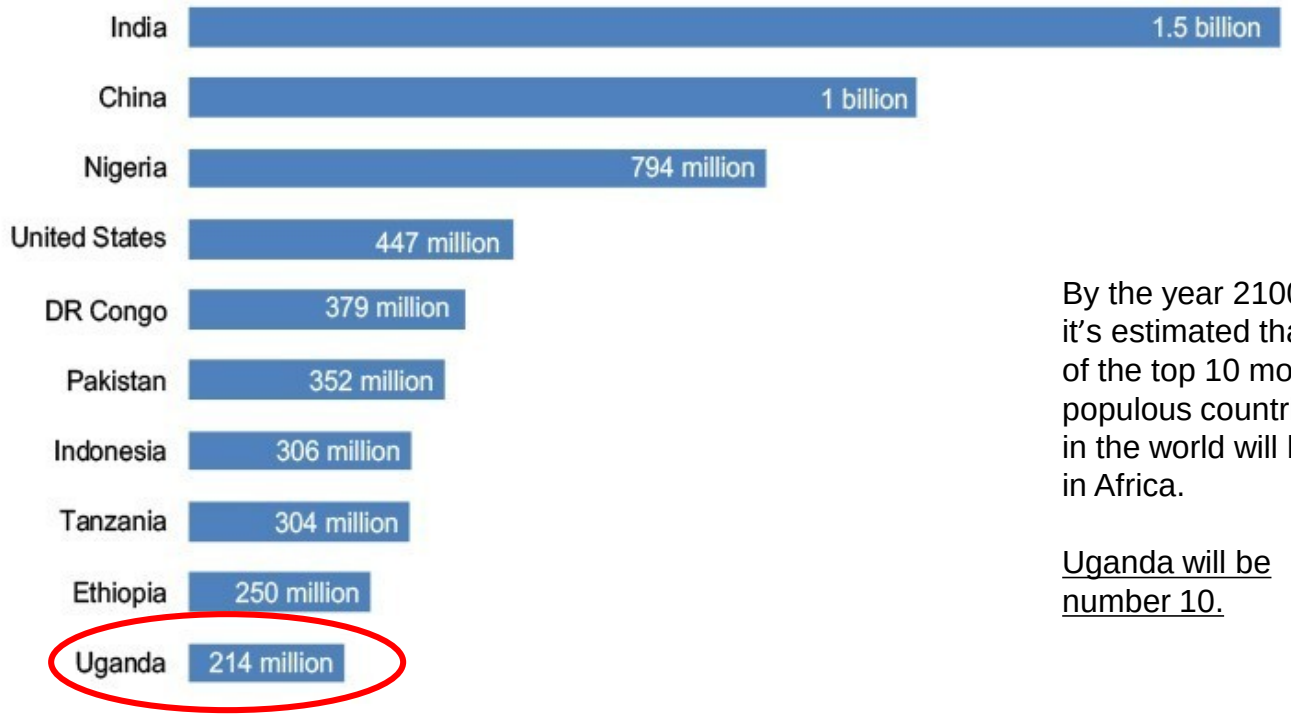




These will be the world's biggest countries by population in 2100

Figures are rounded to the nearest million based on UN data

WORLD ECONOMIC FORUM
COMMITTED TO IMPROVING THE STATE OF THE WORLD



Source: UN

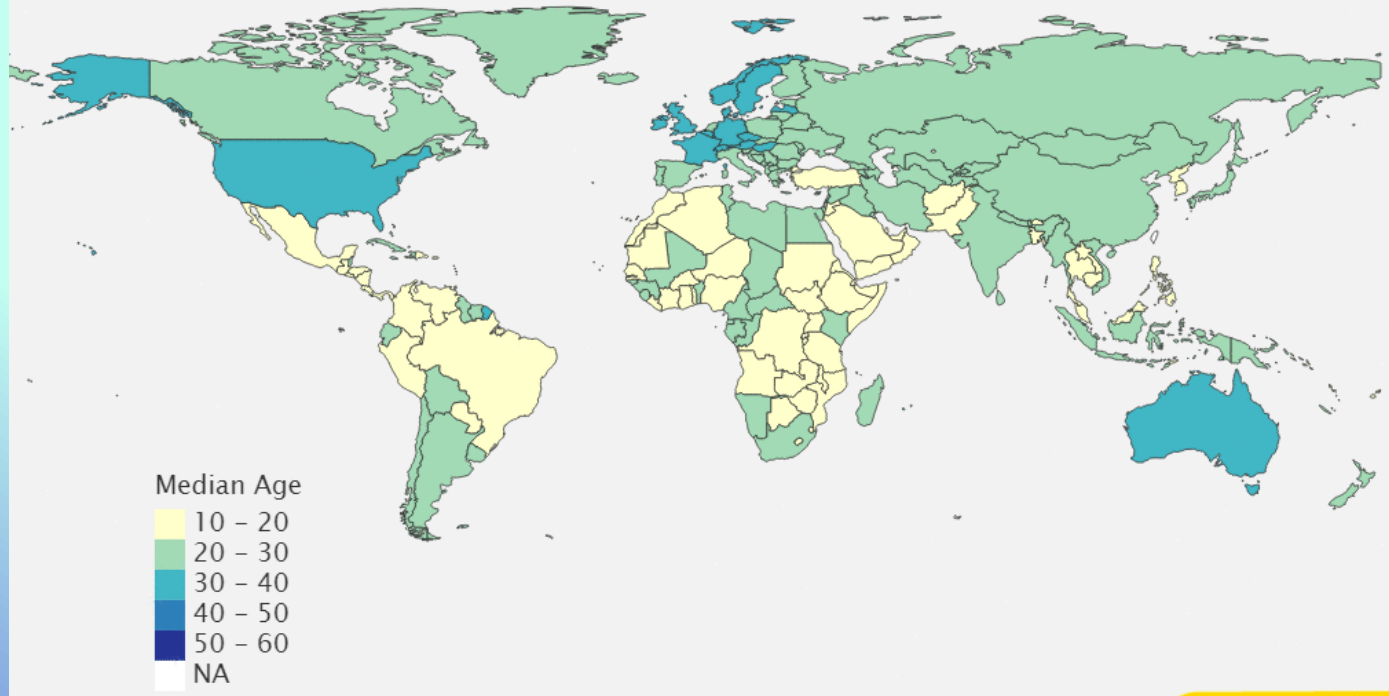
By the year 2100, it's estimated that 5 of the top 10 most populous countries in the world will be in Africa.

Uganda will be number 10.

Changing Demographics

1950

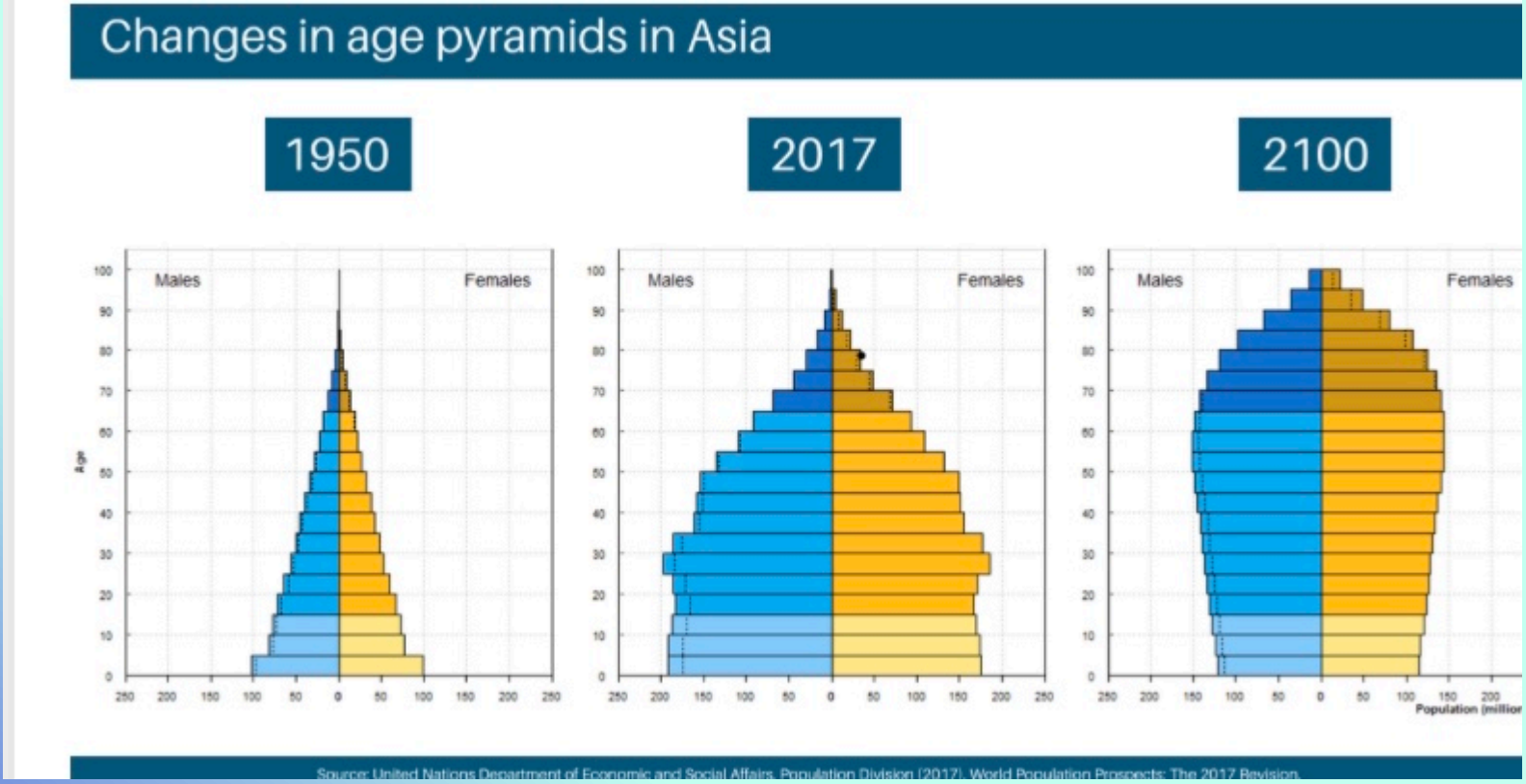
How Is the World Aging?



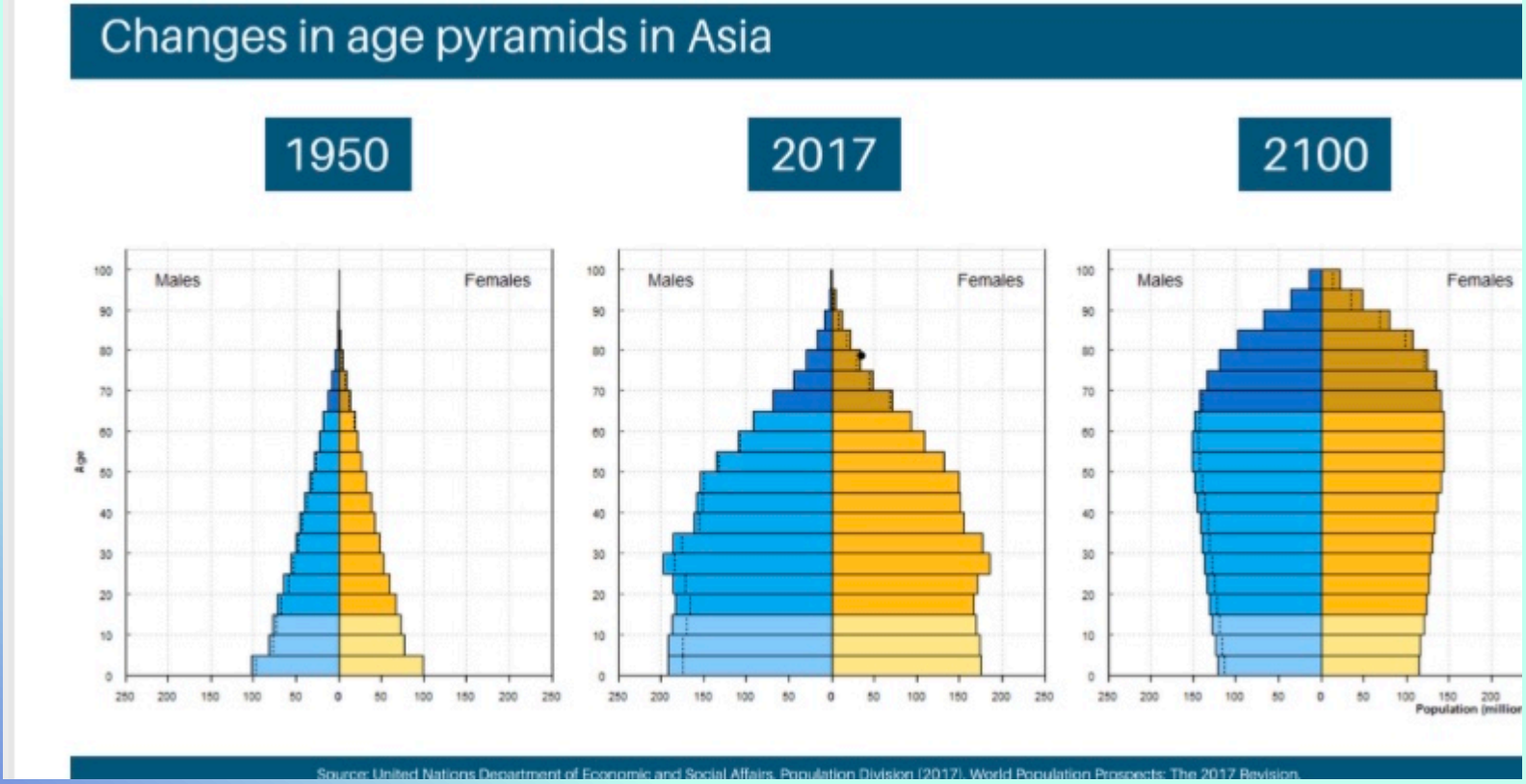
Data Source: Department of Economic and Social Affairs, United Nations

socialcops

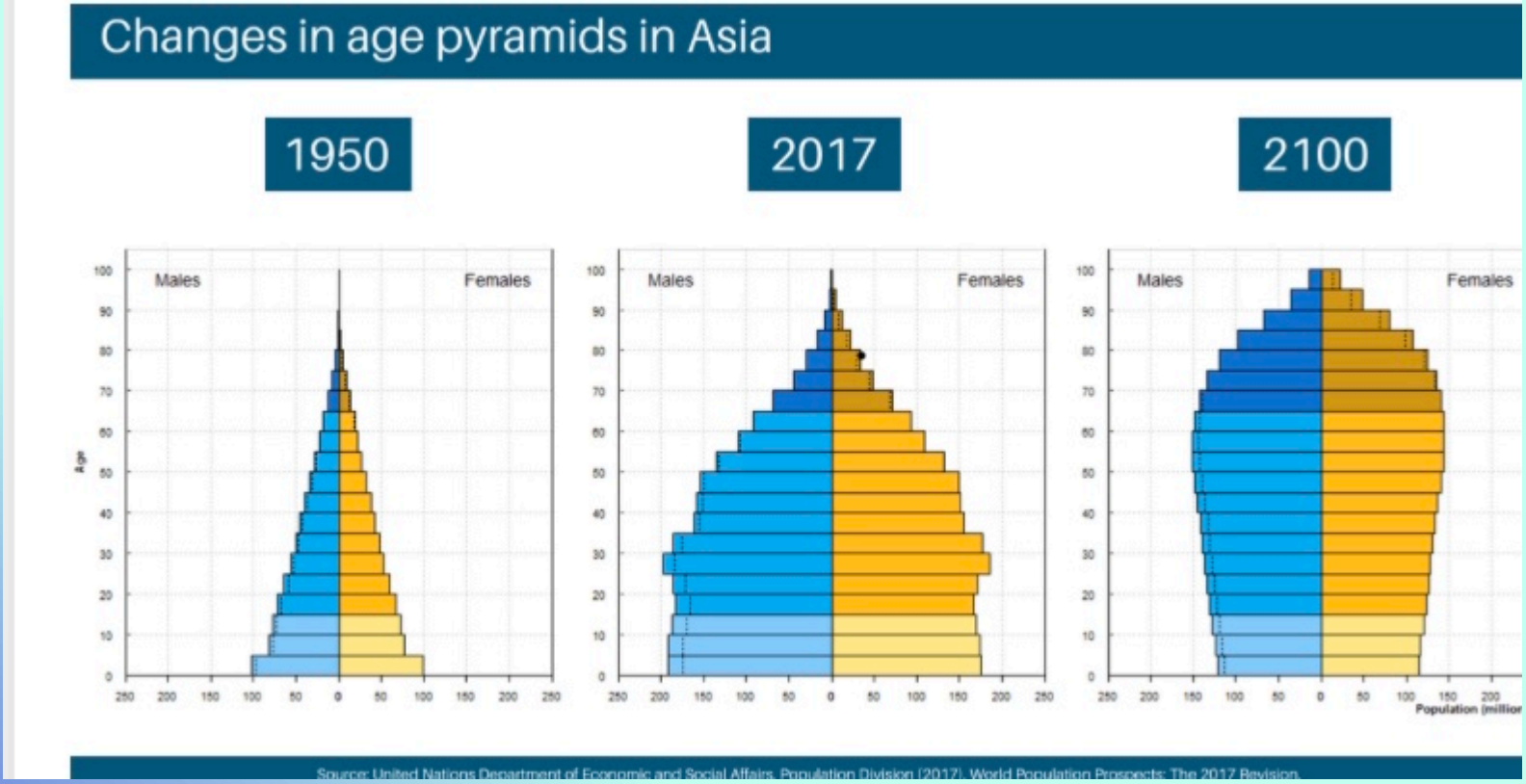
Asia’s Aging Population



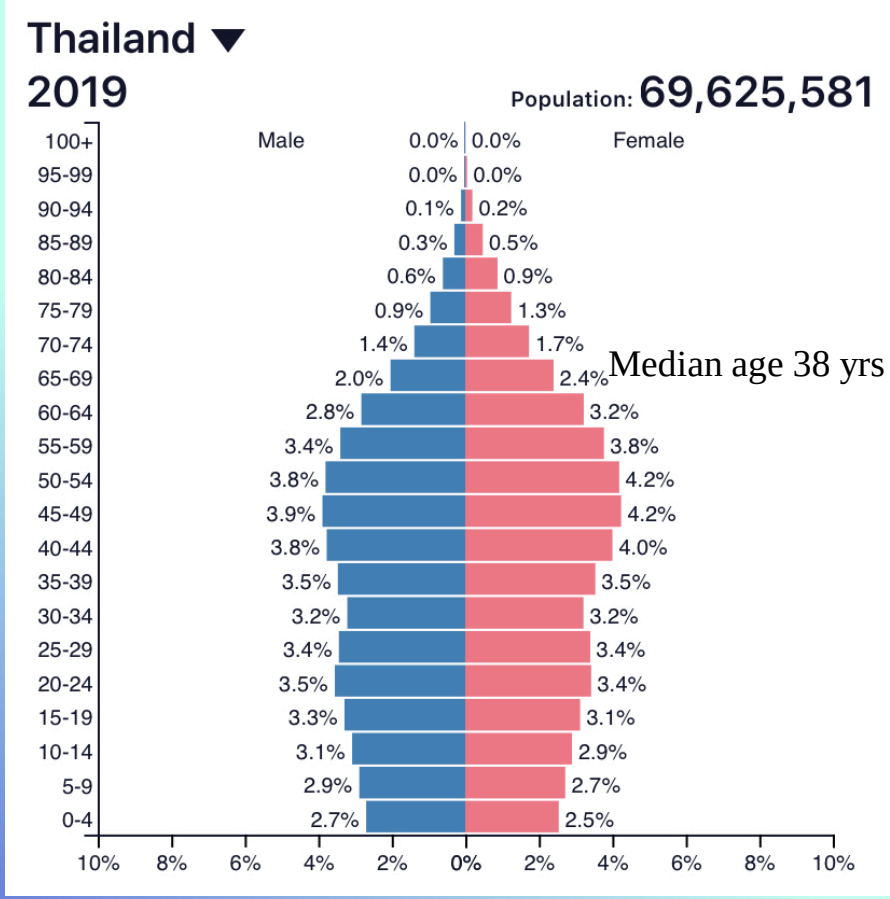
Asia’s Aging Population



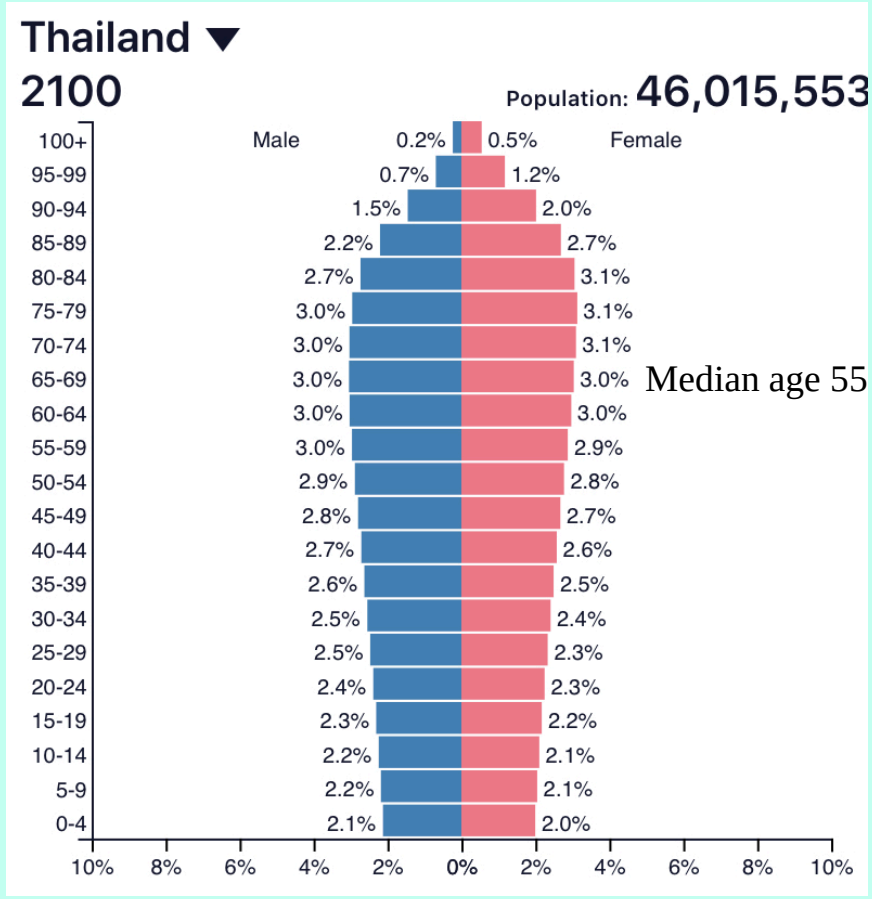
Asia’s Aging Population



Thailand's Aging Population

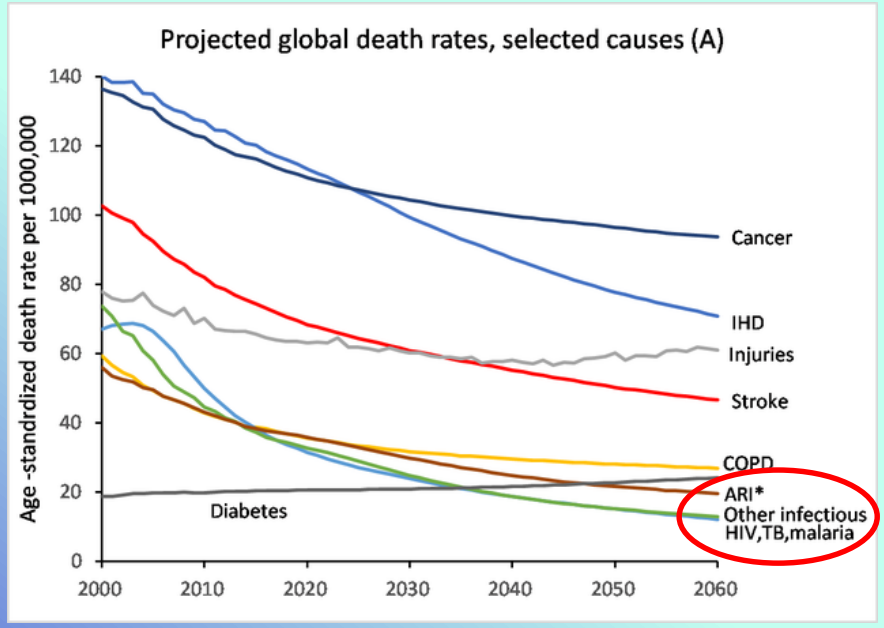


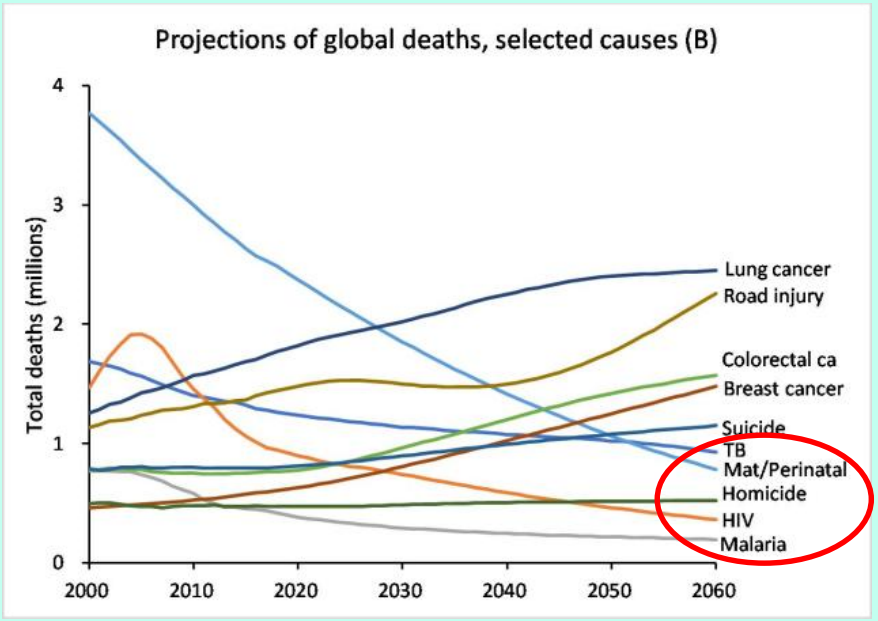
Median age 38 yrs



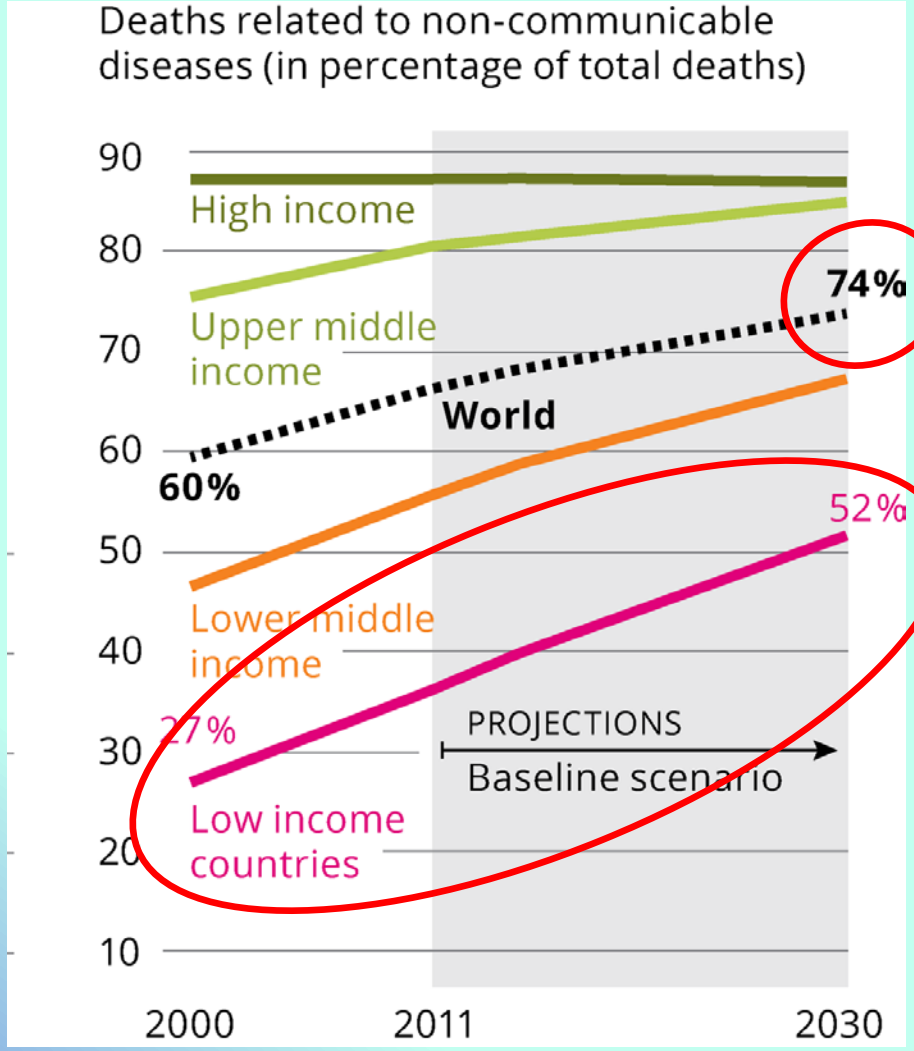
Median age 55 yrs

Causes of Global Mortality Changing – The Rise of Non-Communicable Diseases



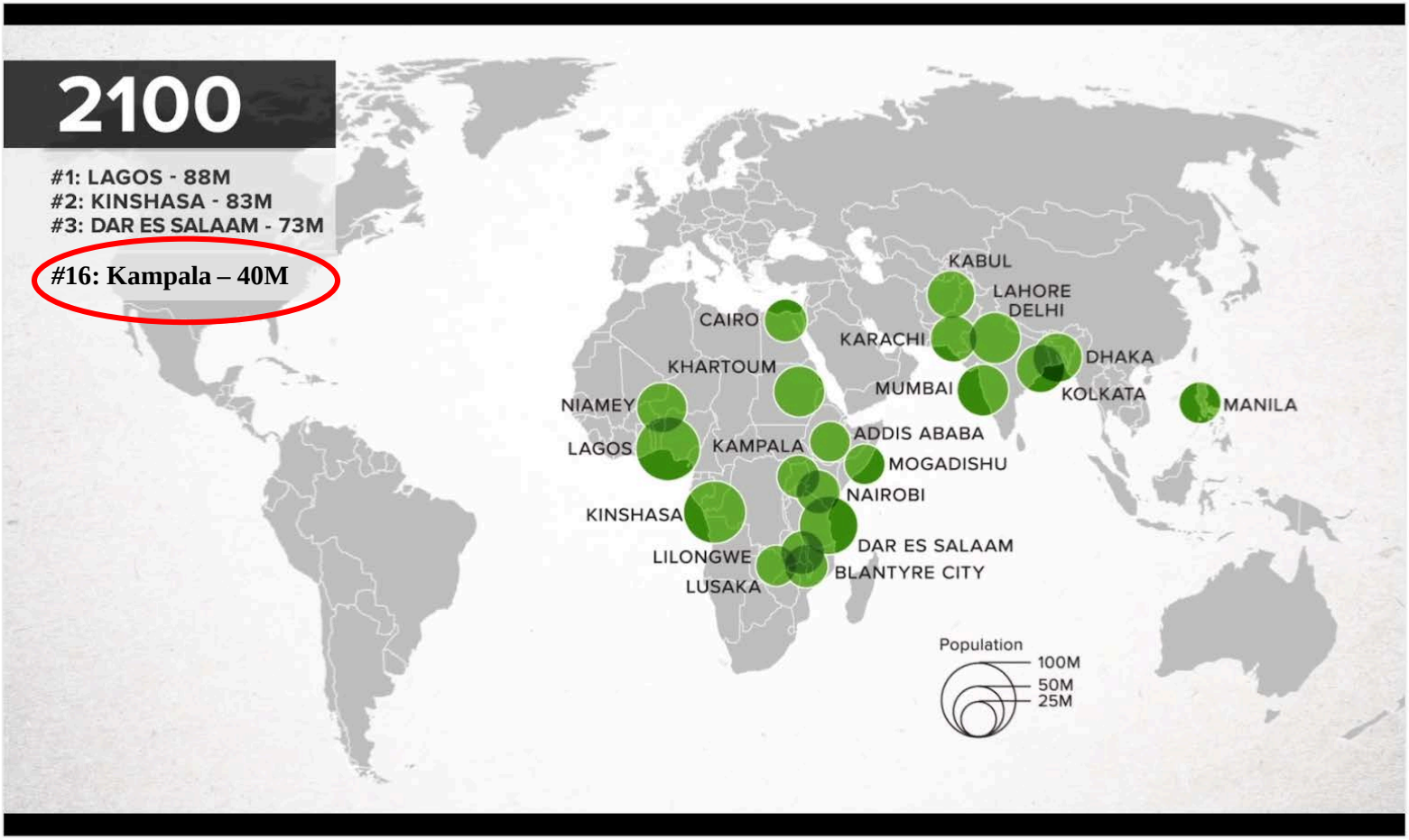


Colin Mathers: New projections of Mortality and Causes of death to year 2060 (Nov 2018)



"Life Style Diseases" are closely associated with increased GDP

Urbanization


2100
#1: LAGOS - 88M
#2: KINSHASA - 83M
#3: DAR ES SALAAM - 73M
#16: Kampala – 40M
KABUL
LAHORE
DELHI
CAIRO
KARACHI
DHAKA
KHARTOUM
MUMBAI
KOLKATA
MANILA
NIAMEY
ADDIS ABABA
LAGOS
KAMPALA
MOGADISHU
NAIROBI
KINSHASA
DAR ES SALAAM
LILONGWE
BLANTYRE CITY
LUSAKA
Population
100M
50M
25M

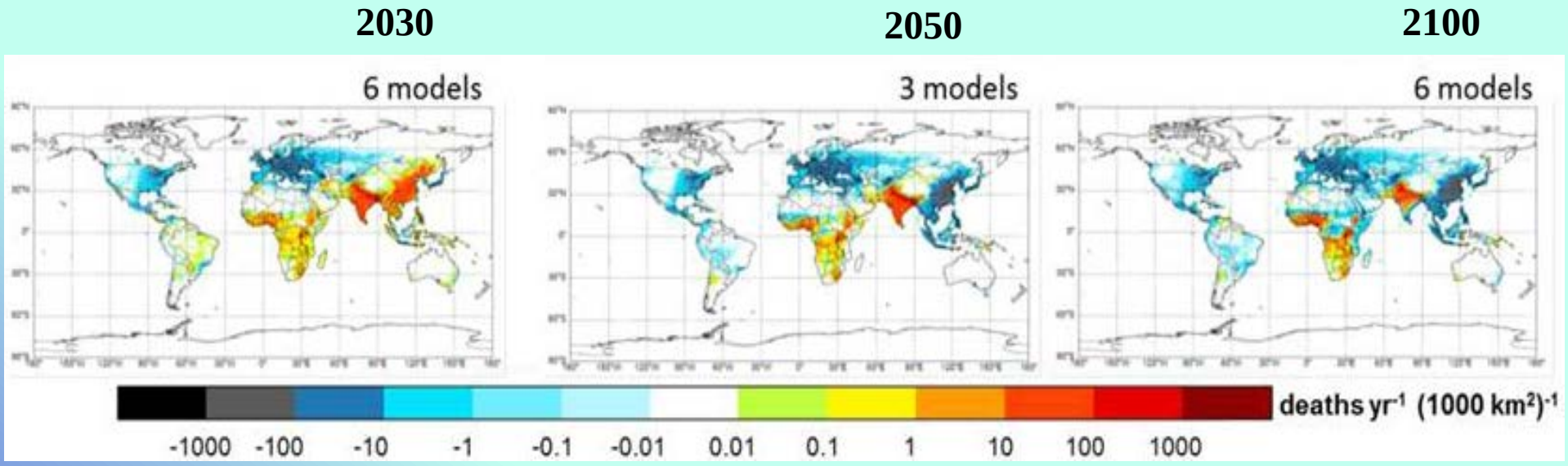
The Twenty Largest Megacities in 2100

Rank	Population (2100)	City	Country
#1	88.3 million	Lagos	Nigeria
#2	83.5 million	Kinshasa	DRC
#3	73.7 million	Dar Es Salaam	Tanzania
#4	67.2 million	Mumbai	India
#5	57.3 million	Delhi	India
#6	56.6 million	Khartoum	Sudan
#7	56.1 million	Niamey	Niger
#8	54.3 million	Dhaka	Bangladesh
#9	52.4 million	Kolkata	India
#10	50.3 million	Kabul	Afghanistan
#11	49.1 million	Karachi	Pakistan
#12	46.7 million	Nairobi	Kenya
#13	41.4 million	Lilongwe	Malawi
#14	40.9 million	Blantyre City	Malawi
#15	40.5 million	Cairo	Egypt
#16	40.1 million	Kampala	Uganda
#17	40.0 million	Manila	Philippines
#18	37.7 million	Lusaka	Zambia
#19	36.4 million	Mogadishu	Somalia
#20	35.8 million	Addis Ababa	Ethiopia

By the year 2100, it's estimated that **13 of the world's largest megacities will be located in Africa.**

Meanwhile, India will hold three of them – and there will be zero of them found in the Americas, China, or Europe.

Urbanization and the effect of future ambient air pollution on human premature mortality



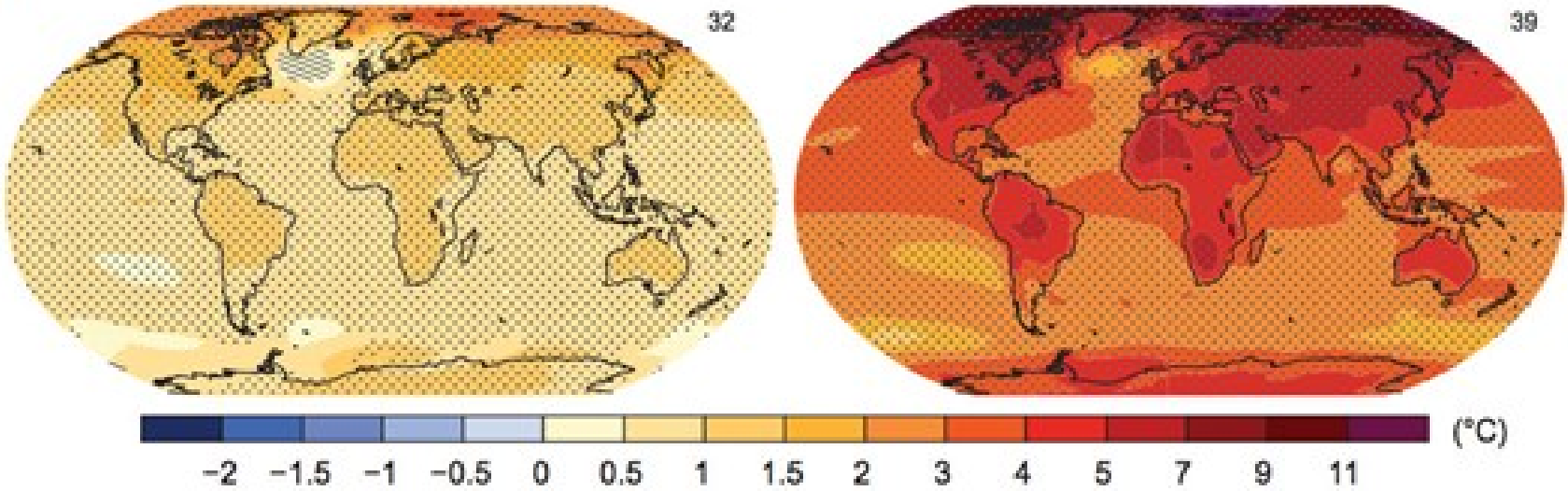
Future premature mortality

Climate Change

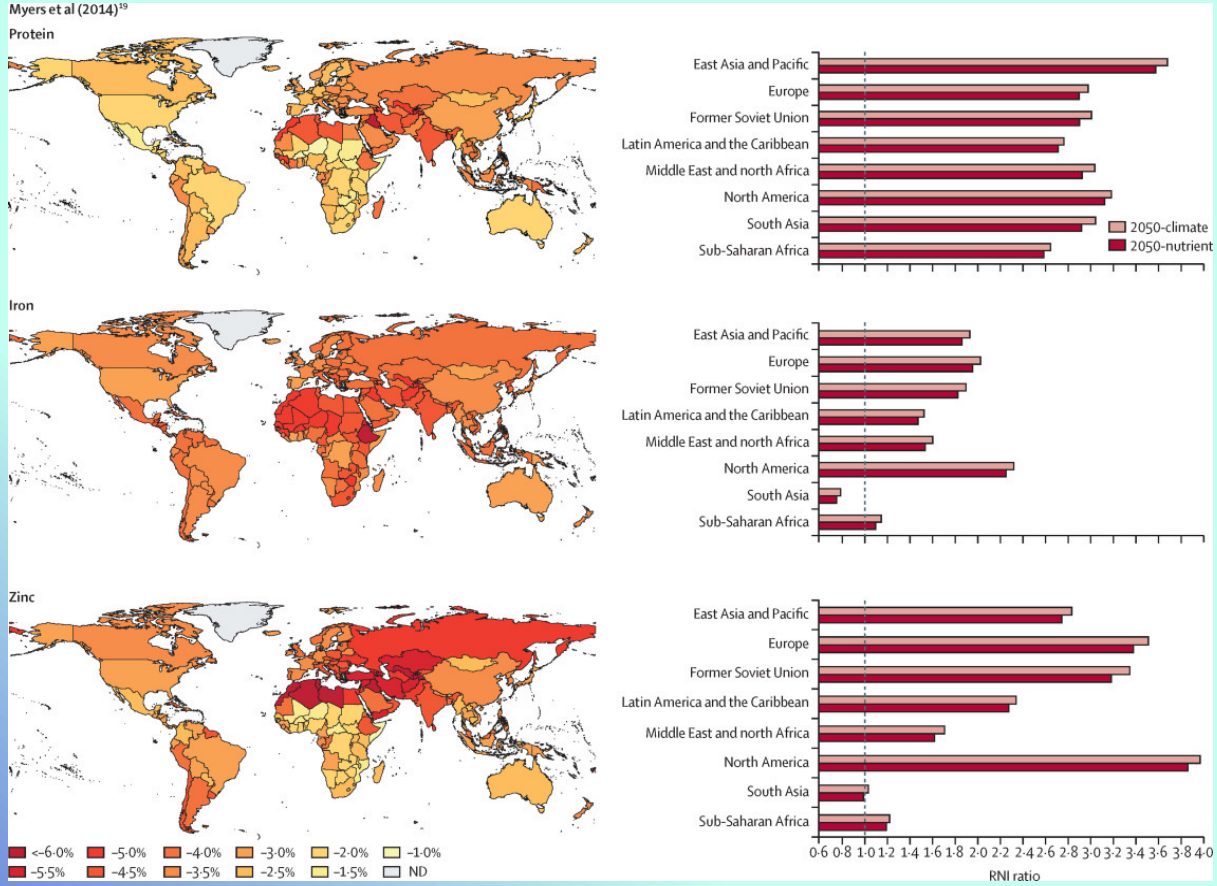
Change in Average Surface Temperature thru 2100

Paris Climate Change Accord Target: +1.5 ℃

Current Trajectory >4 ℃



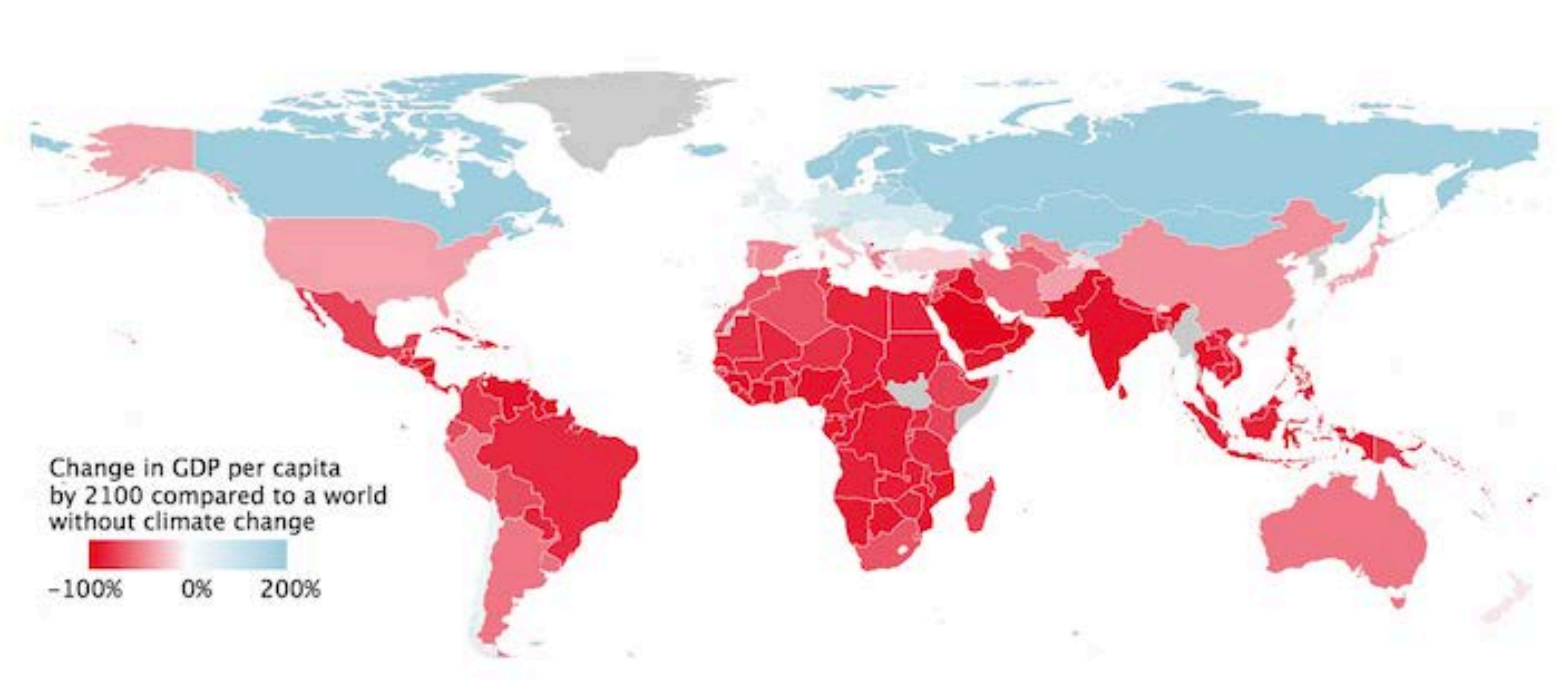
Net Effect of CO2 and Climate Change on Nutritional Availability



Elevated CO2 and Temperature negatively impact on crop protein and micronutrient yields

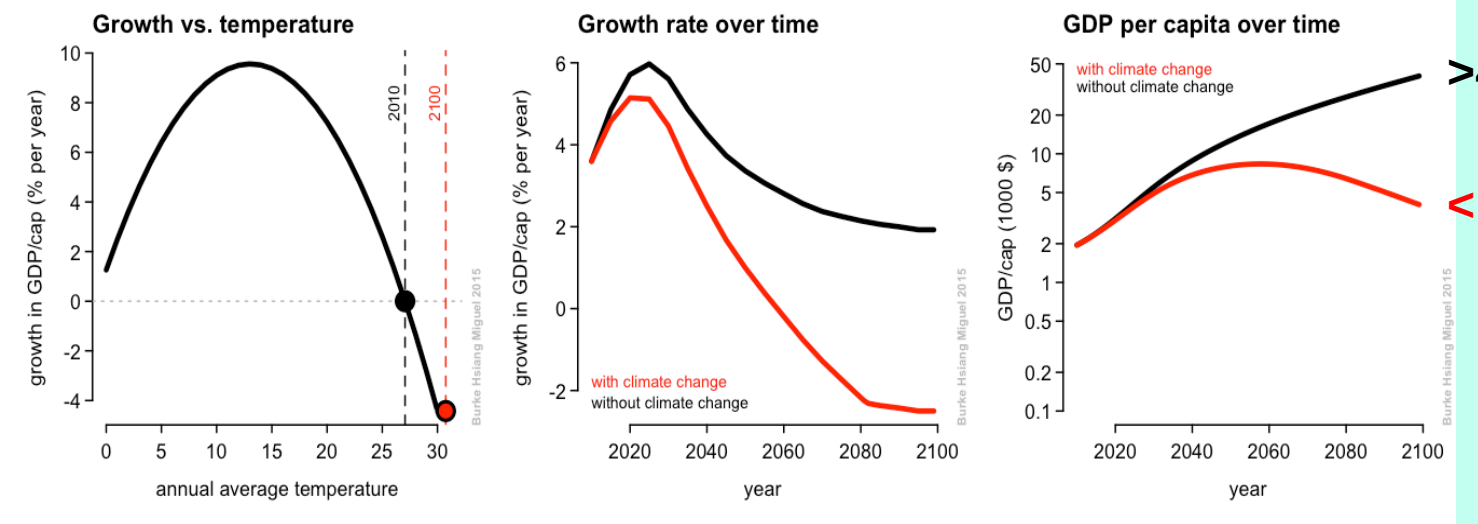
R Beach, Lancet, July,2019

Economic Impact of Climate Change



Interactive map

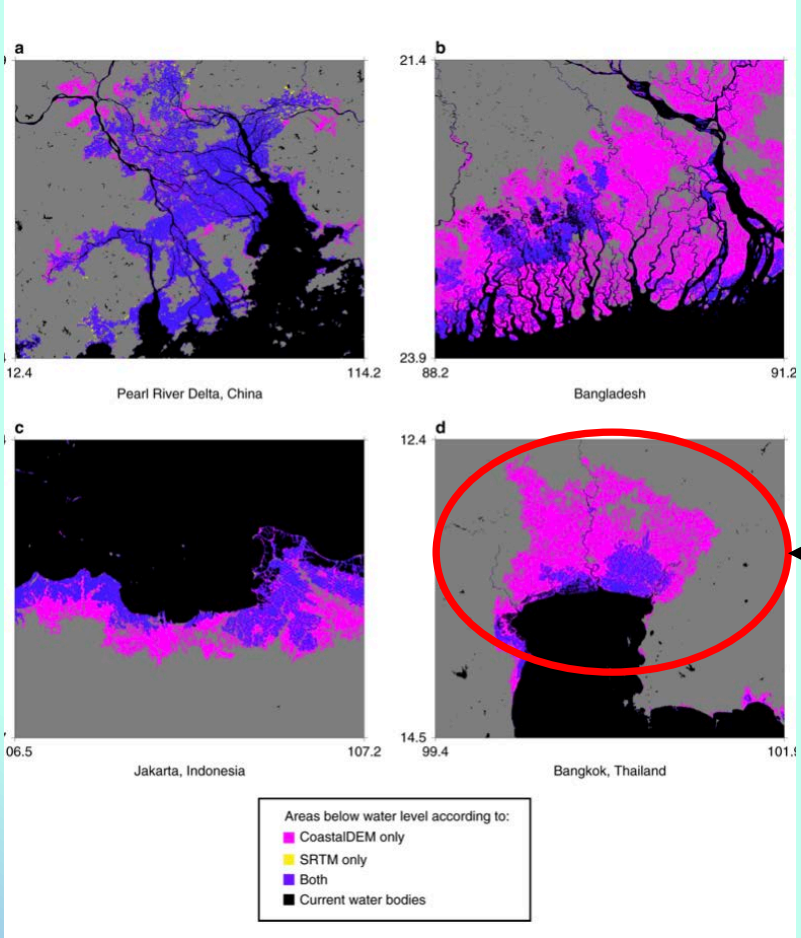
Temperature vs Growth Rate, and GDP per Capita for Thailand - 2100



>40,000 USD

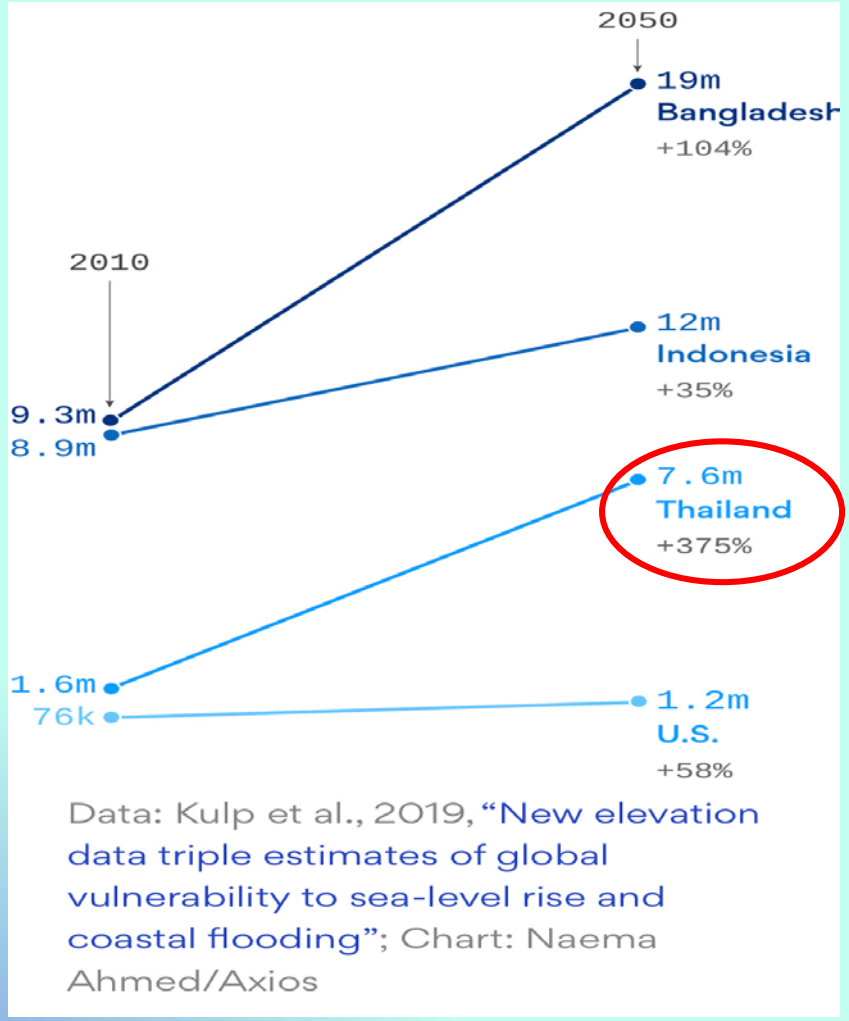
< 4,000 USD

Vulnerability to Sea-Level Rise and Coastal Flooding - 2050



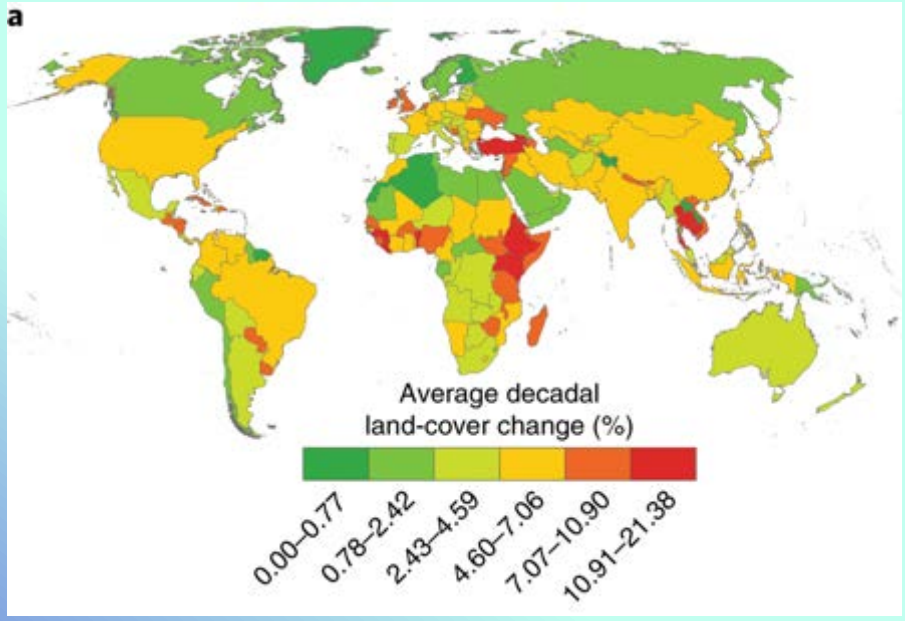
Greater Bangkok

Populations Projected to be Below High Tides - 2050



Land Use Change

Projected Land Use Change for 2015 - 2100



Projected Land Use Change for 2015 - 2100

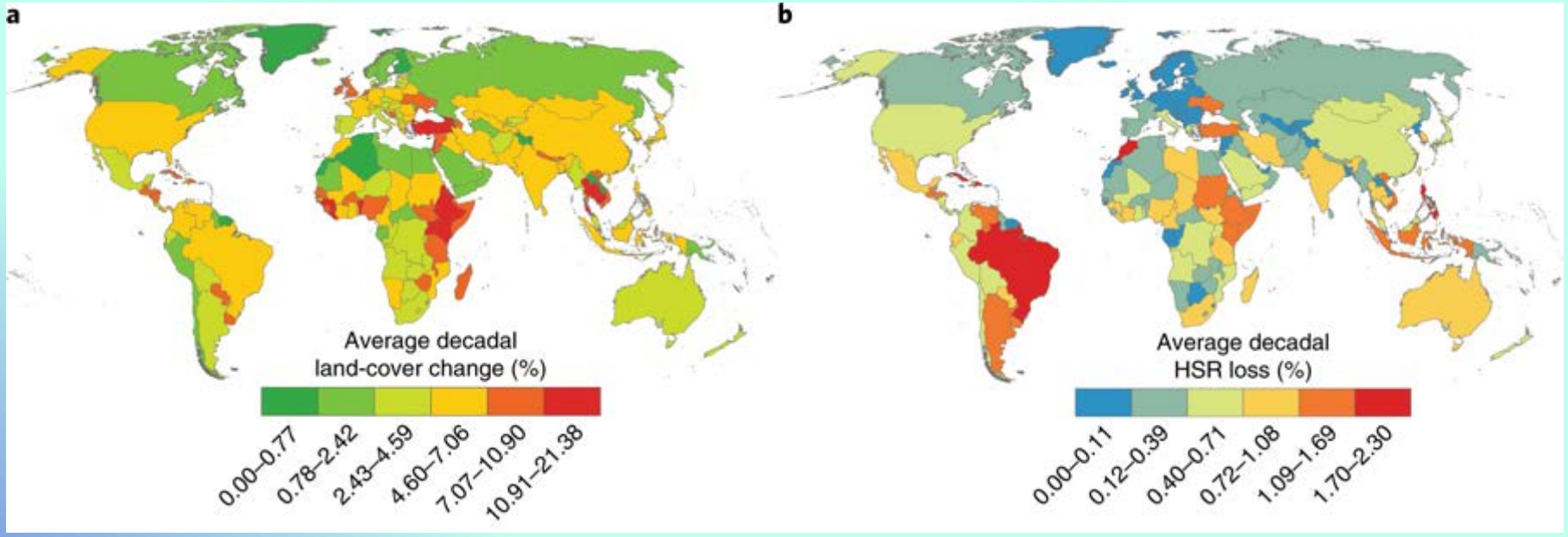
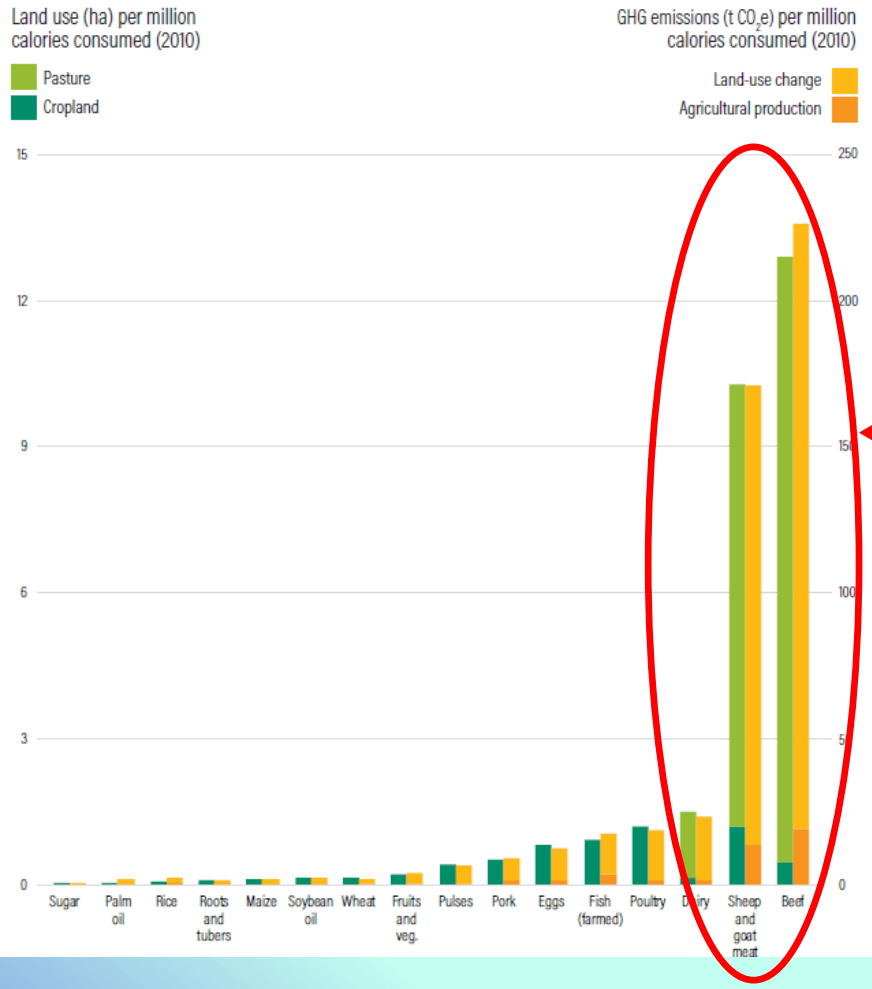


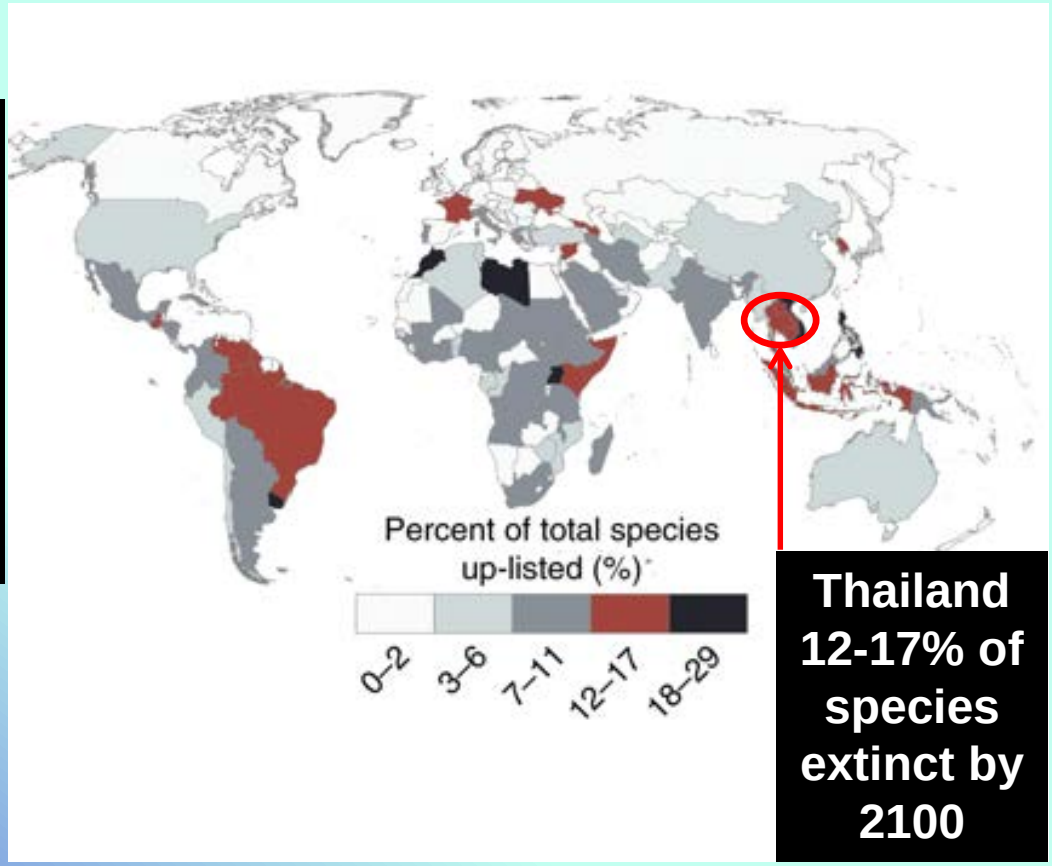
Figure 5 | Animal-based foods are more resource-intensive than plant-based foods



The biggest drivers behind land use change

Species Extinction: Impact of Projected Land Use Change by 2100

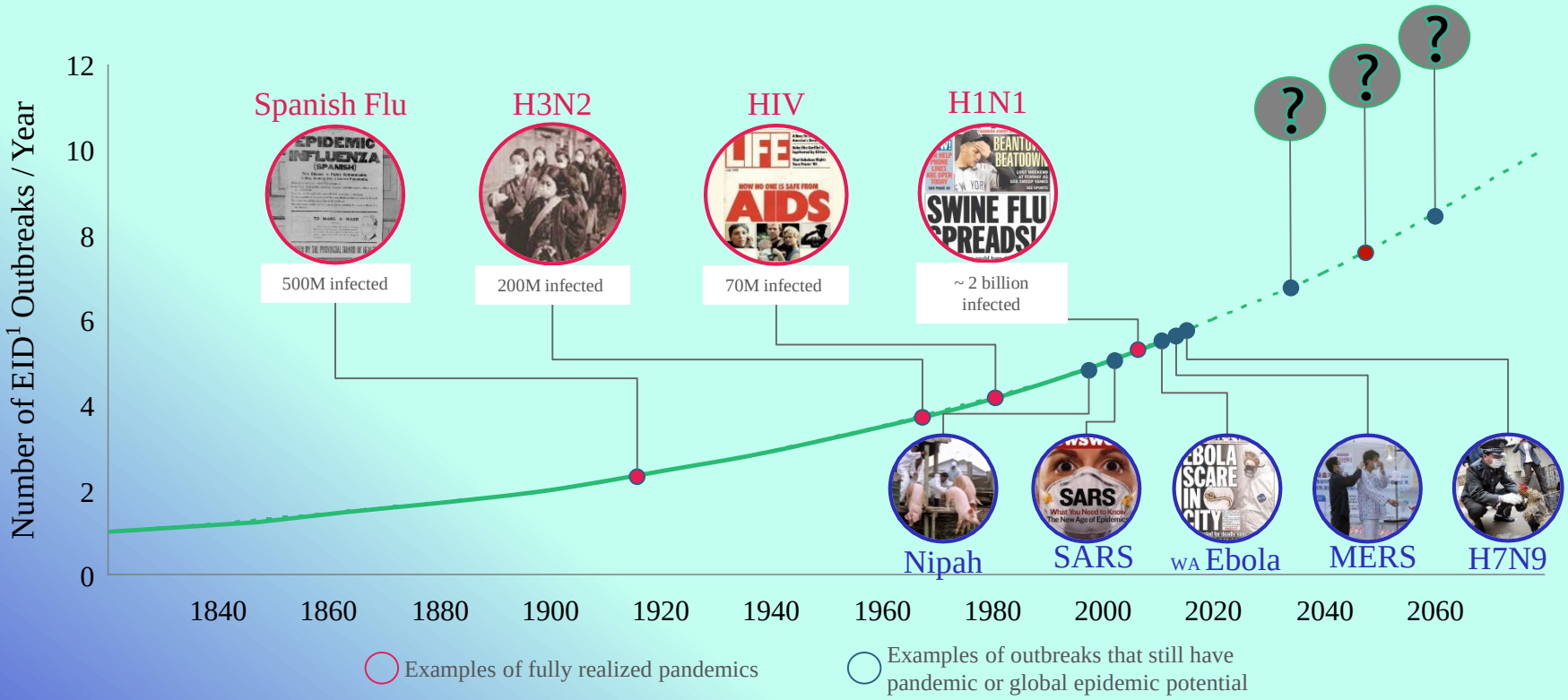
Globally, 9% of the world's 5.9 million terrestrial species are threatened with extinction by mid-century



Thailand 12-17% of species extinct by 2100

Other Consequence:
The threat of viral outbreaks is growing rapidly…

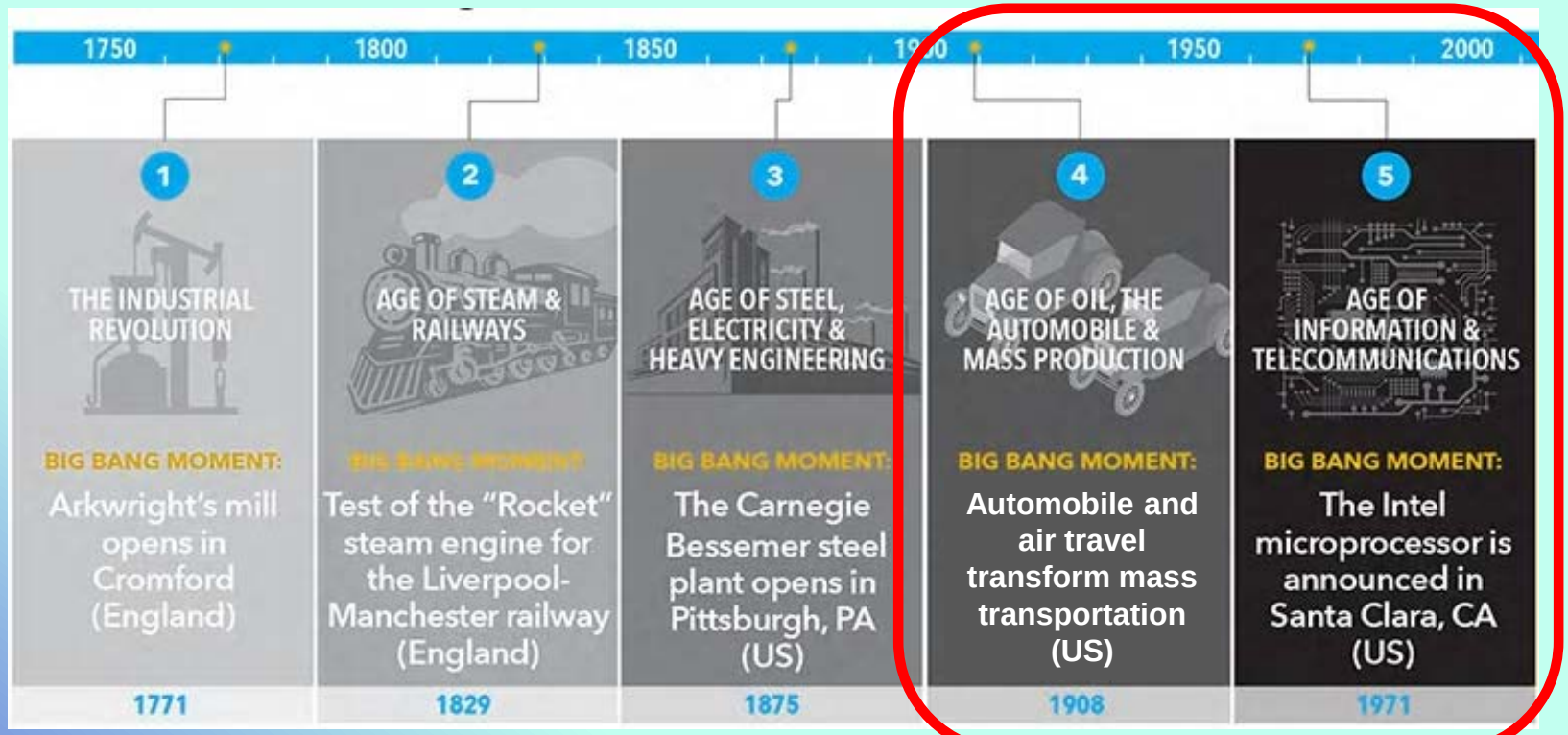
Driven by population growth, land use change, and globalization



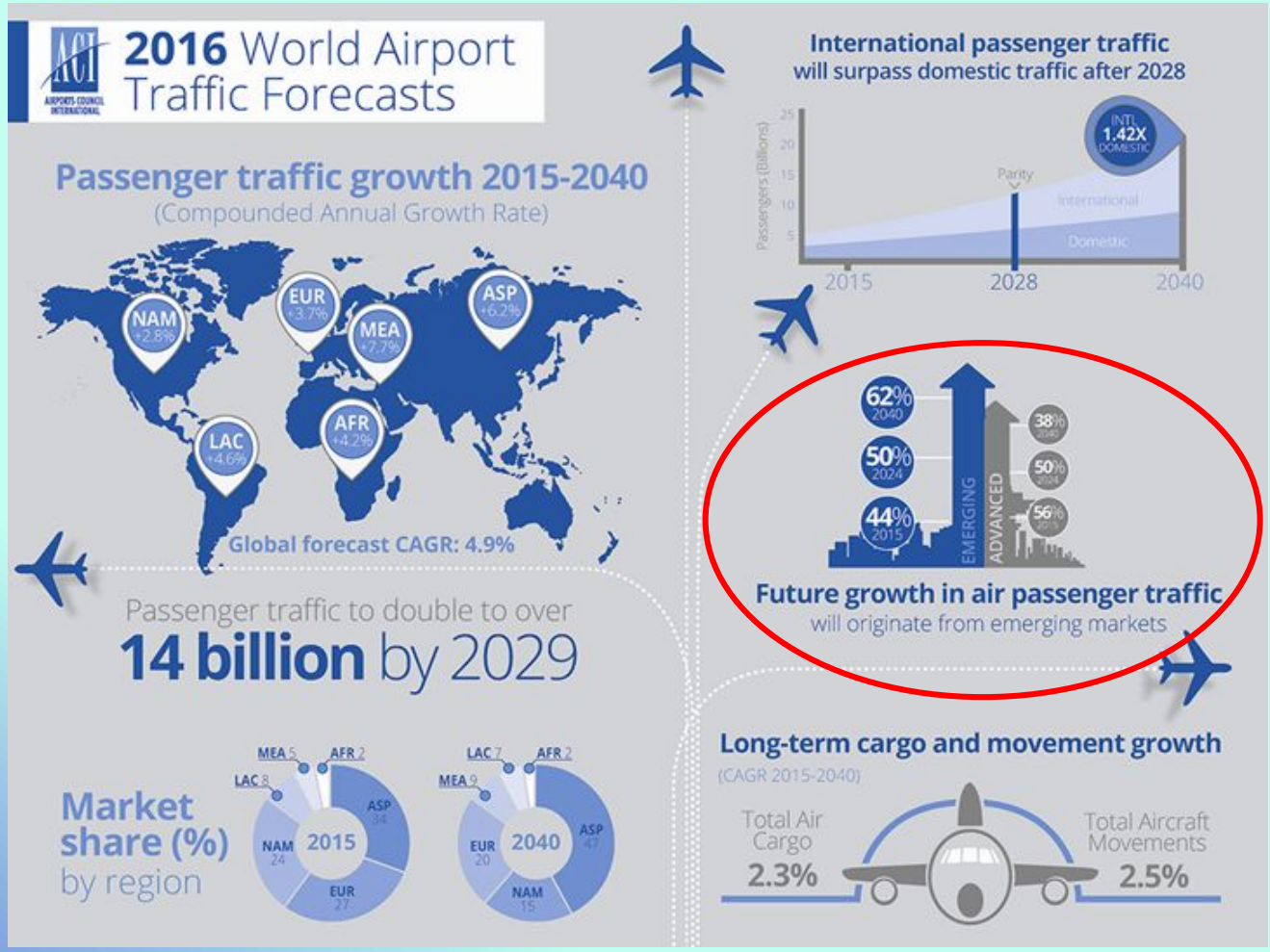
1. EID: emerging infectious disease; only diseases with zoonotic emergence are included; Reference for graph: Allen et al. (2017) Nature Communications

Transformative Technologies

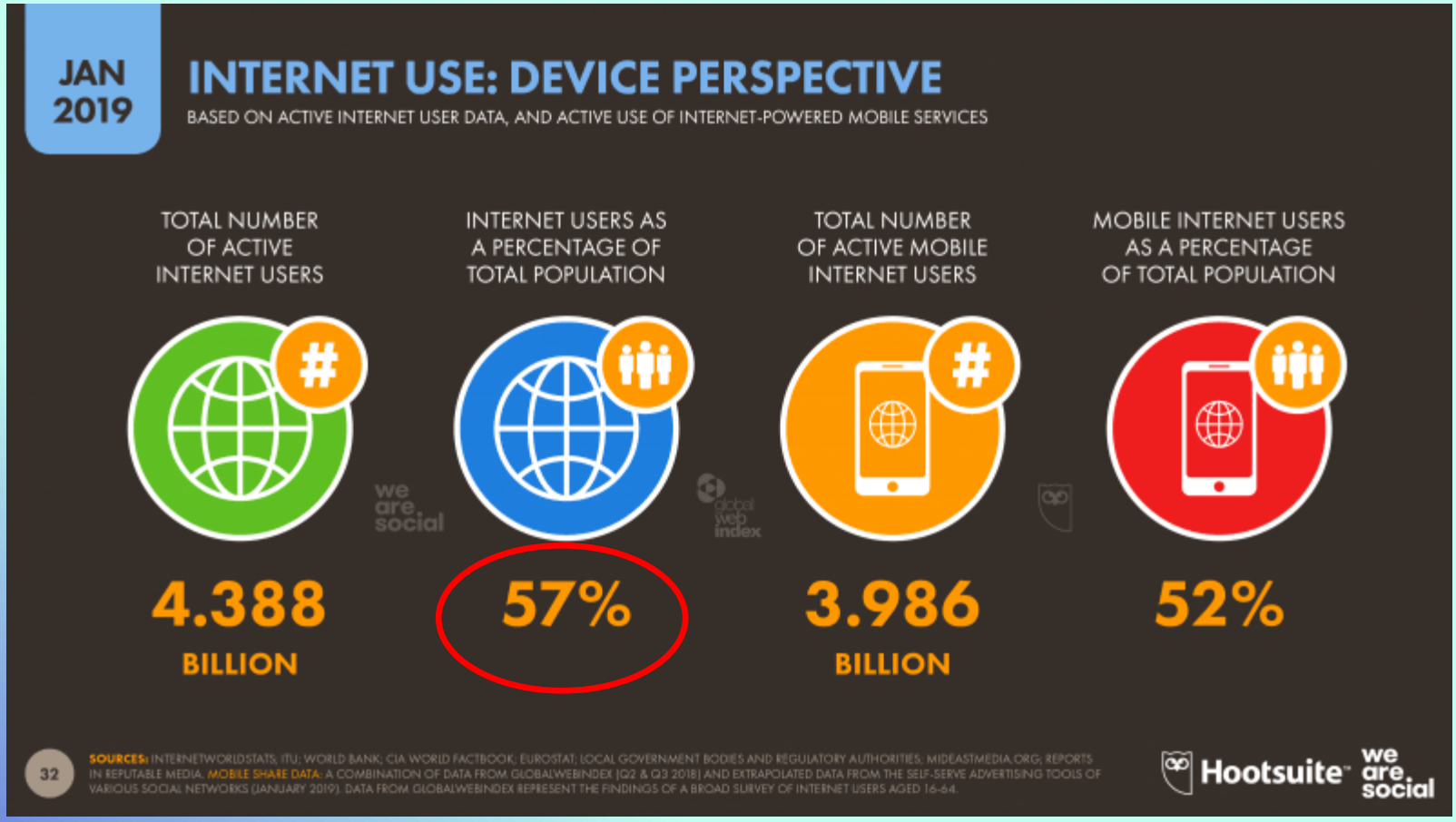
Successive Technological Revolutions



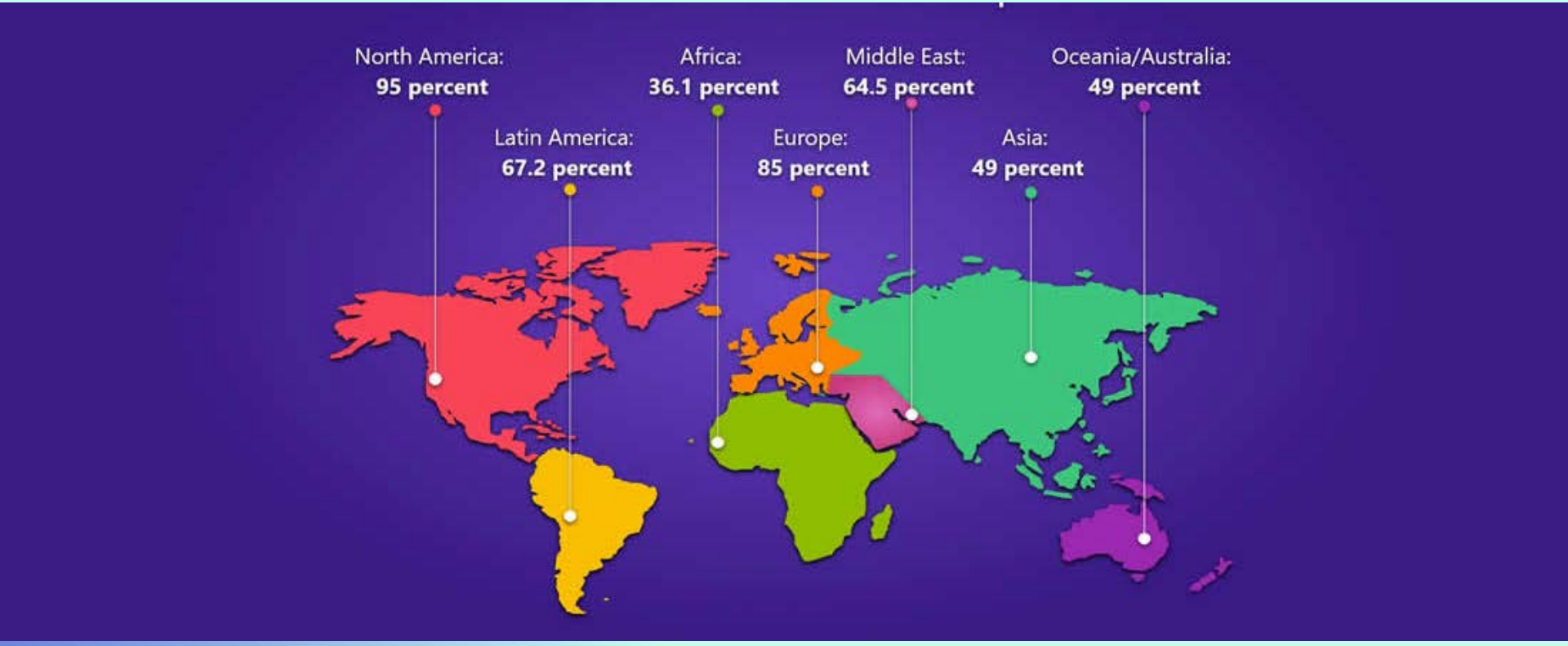
Air Travel thru 2040

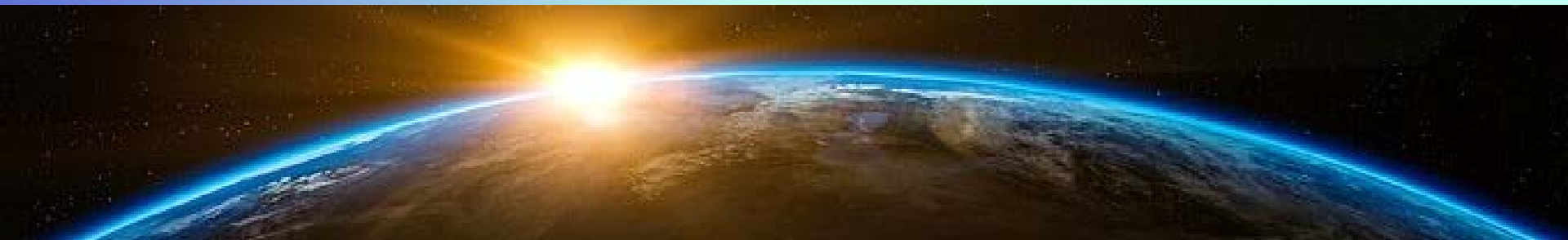


IT Revolution: We are Increasingly Connected



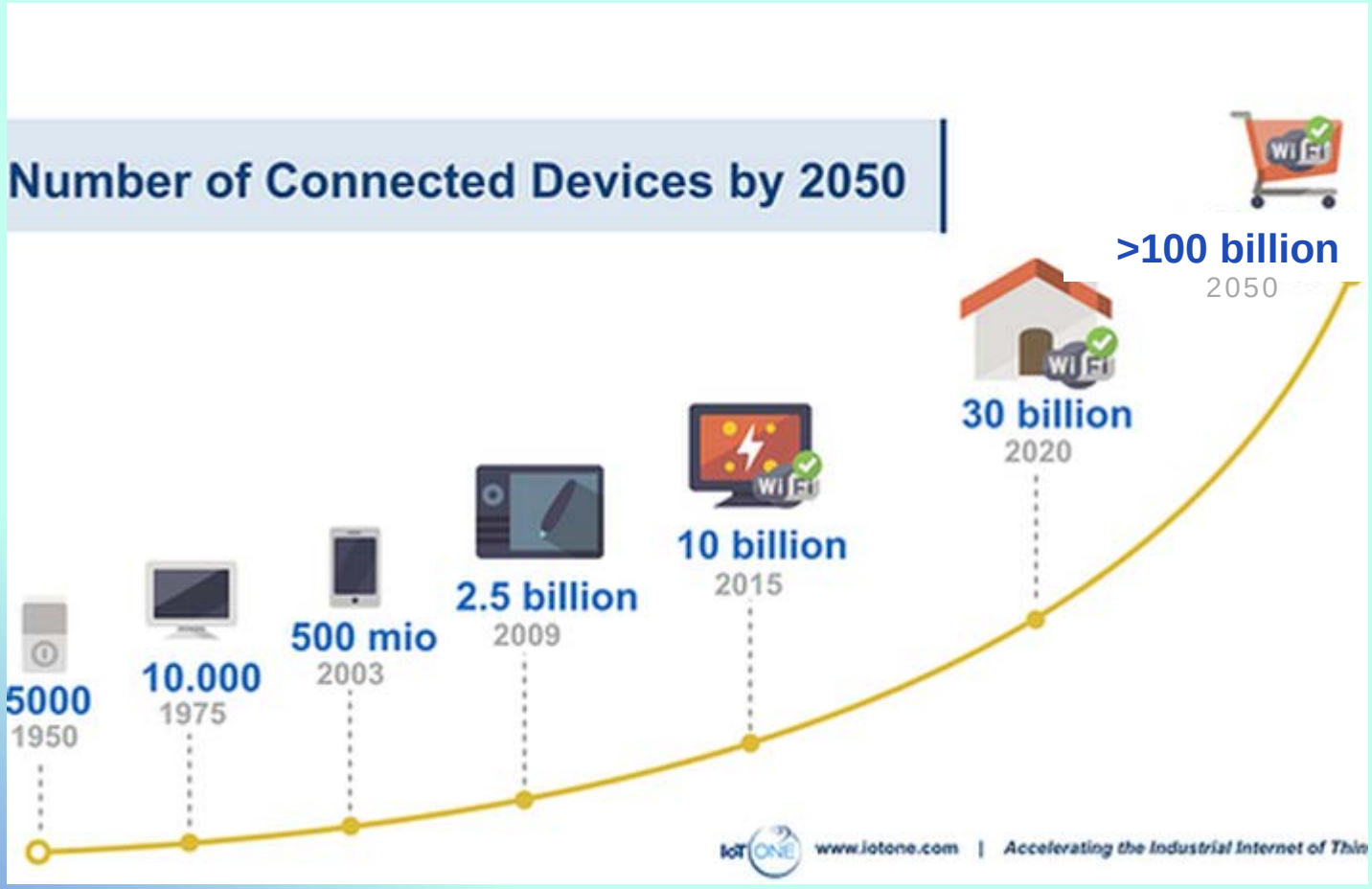
Global Internet Penetration Map

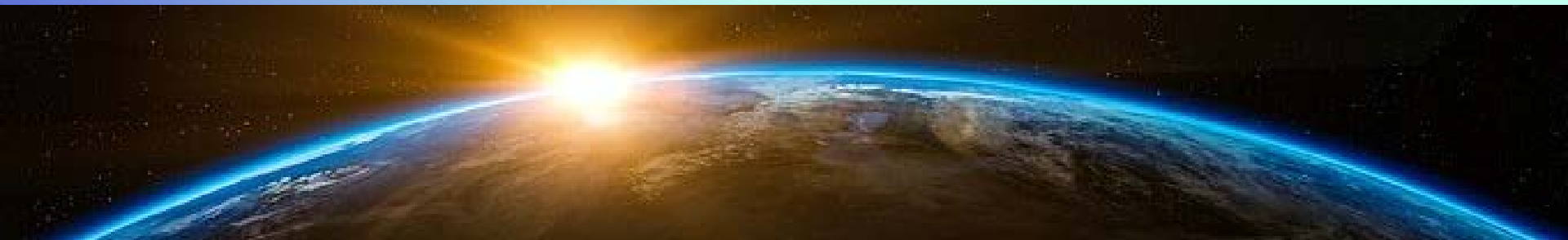




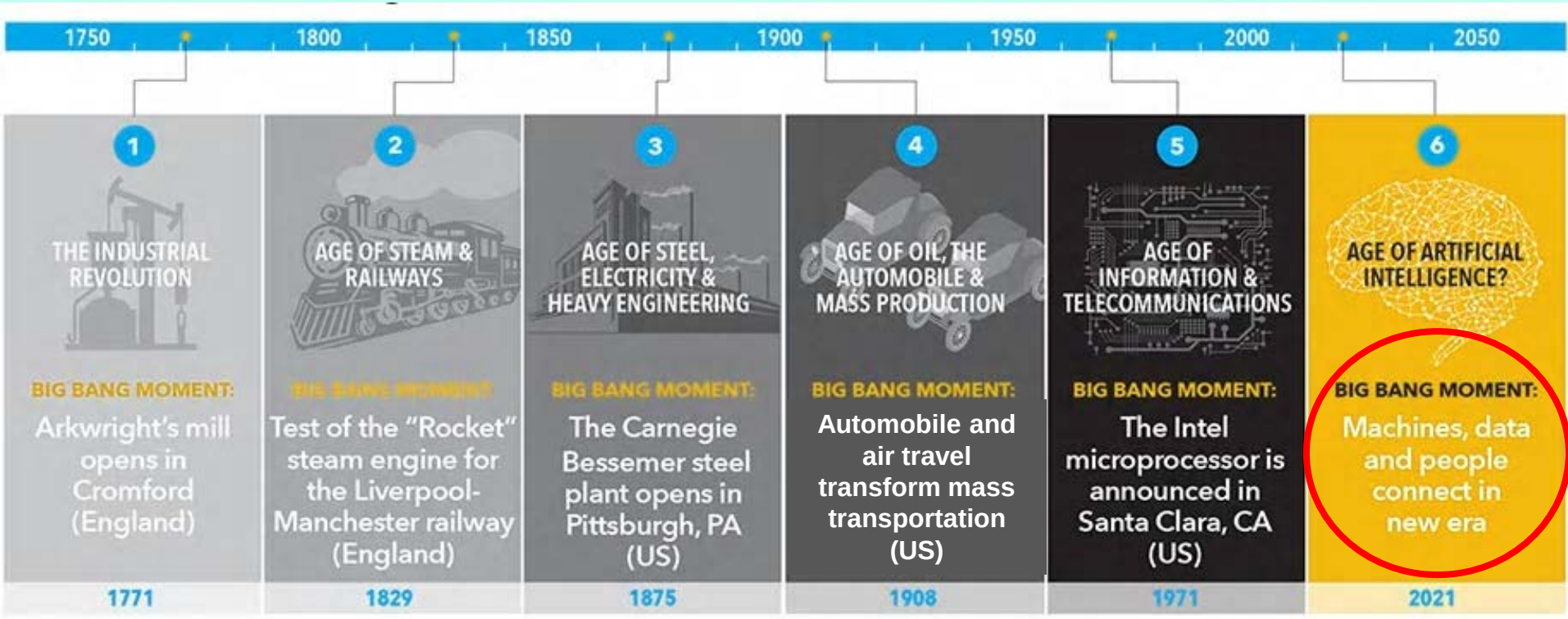
Global Growth of the Internet of Things

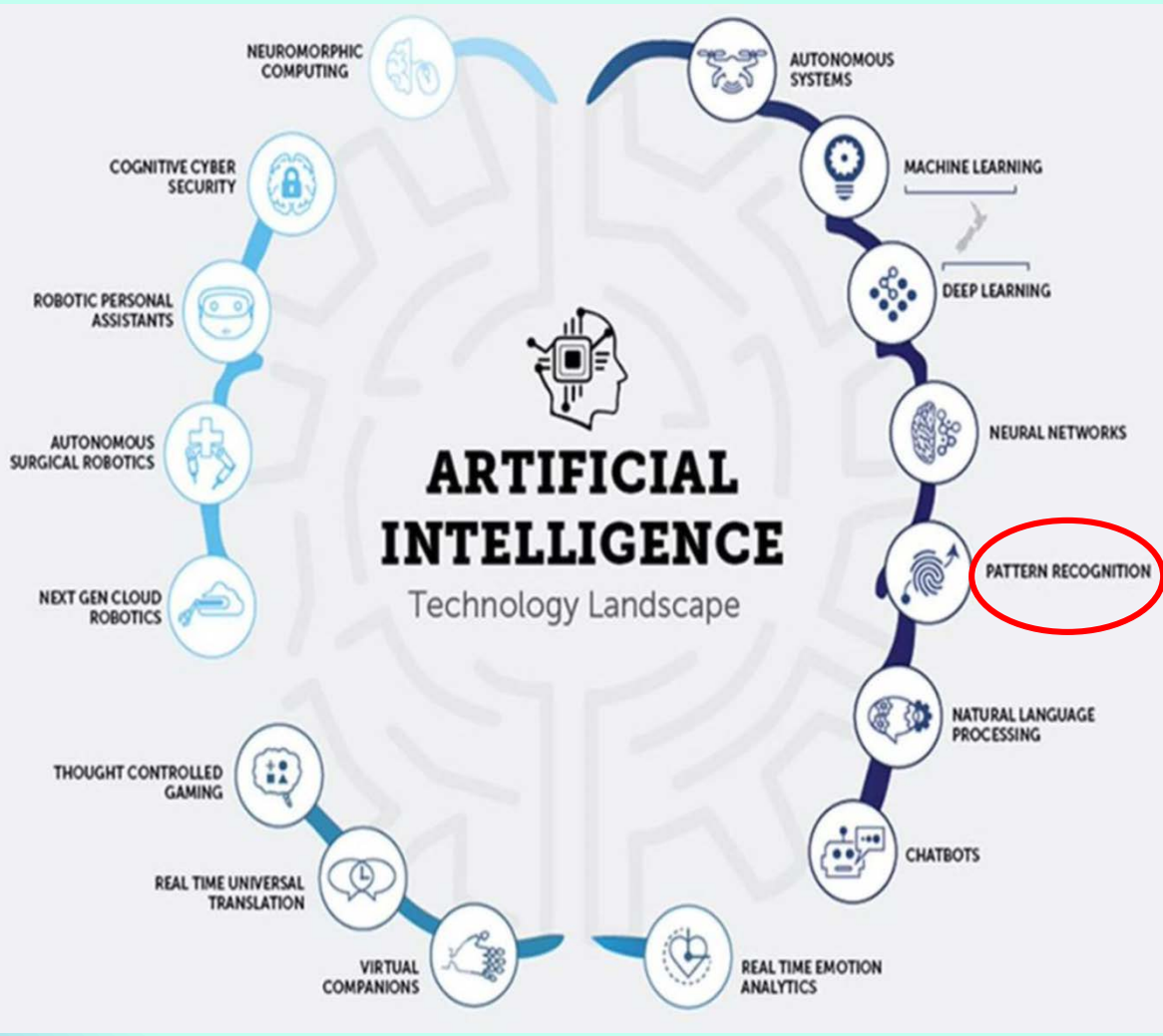
97.5% of the world connected





The Sixth Technological Revolution: AI

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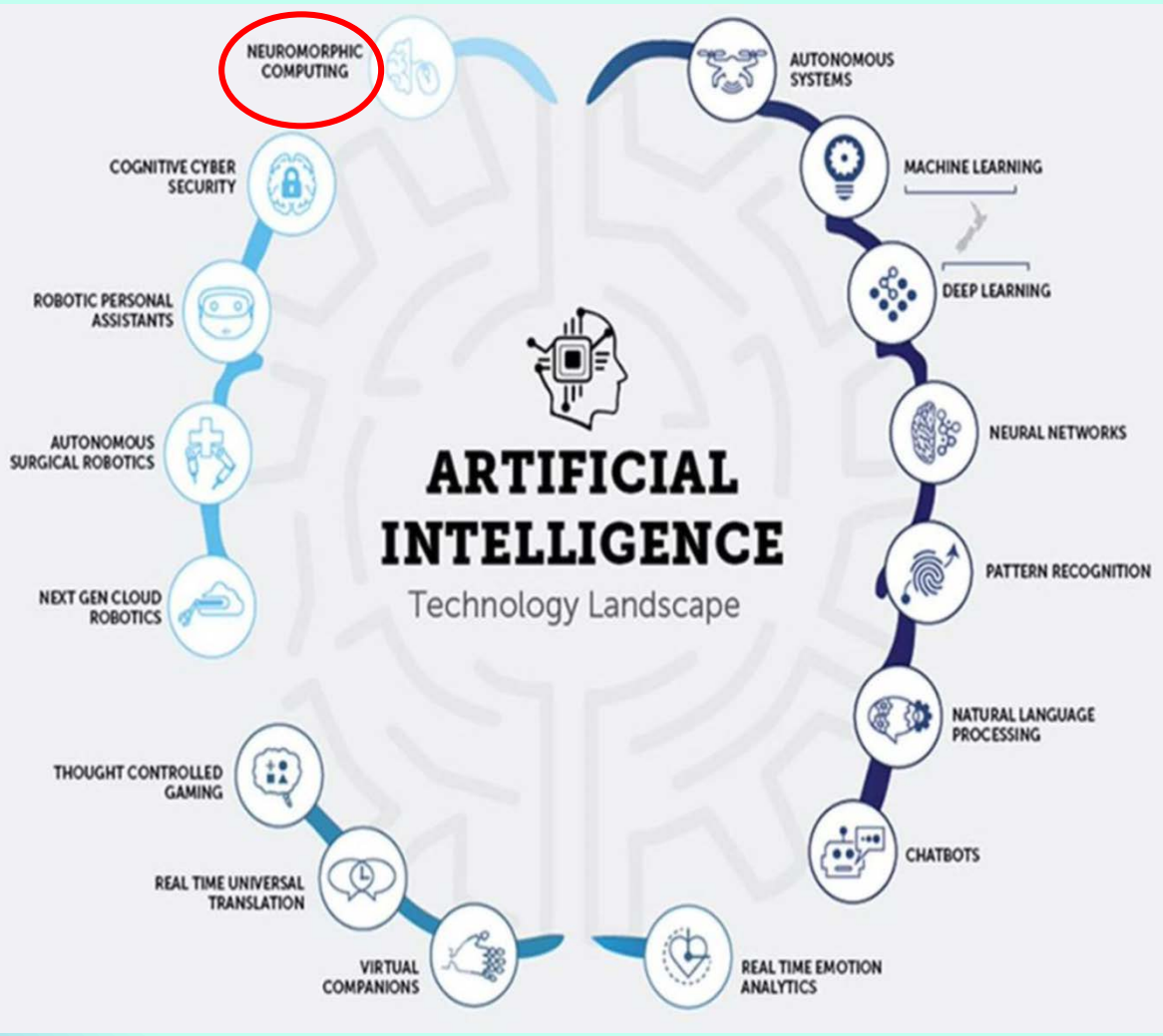
ARTIFICIAL INTELLIGENCE
Technology Landscape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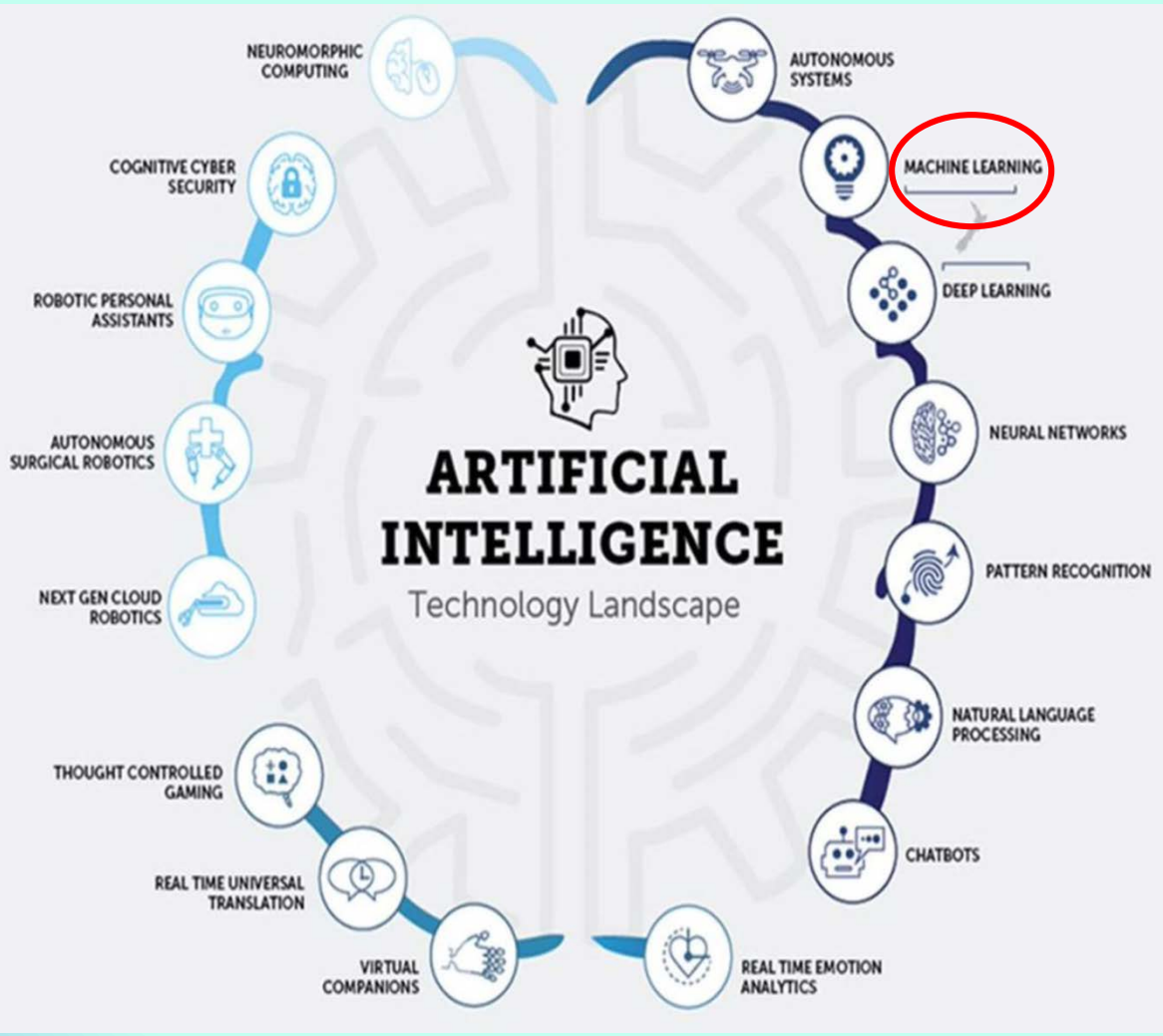
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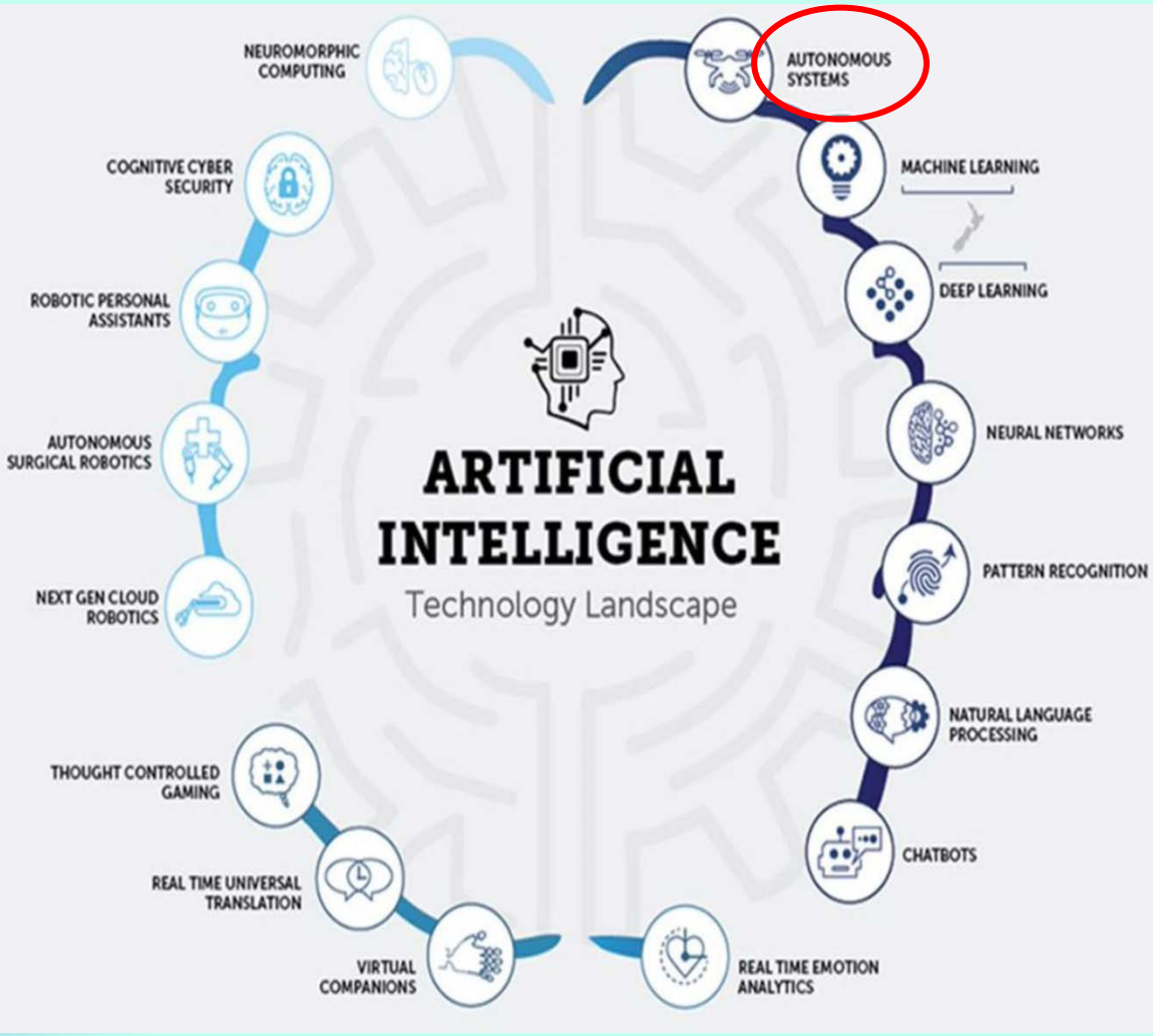
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Artificial Intelligence: Implications for “Global Health”

Public Health

- Designer Medicines
- Transformative technologies
- Predictions and forecasting
- Resilient Infrastructure
- Power of big data

Climate change

- Clean power
- Smart transport options
- Sustainable production and consumption
- Sustainable land-use
- Smart cities and homes

Biodiversity and conservation

- Habitat protection and restoration
- Sustainable trade
- Pollution control
- Invasive species and disease control
- Realising natural capital

Healthy Oceans

- Fishing sustainably
- Preventing pollution
- Protecting habitats
- Protecting species
- Impacts from climate change (including acidification)

Water security

- Water supply
- Catchment control
- Water efficiency
- Adequate sanitation
- Drought planning

Clean air

- Filtering and capture
- Monitoring and prevention
- Early warning
- Clean fuels
- Real-time, integrated, adaptive urban management

Weather and disaster resilience

- Prediction and forecasting
- Early warning systems;
- Resilient infrastructure
- Financial instruments
- Resilience planning

Consequences

What are the Consequences?

By 2100

- 5 Mega-Trends will totally transform the world we live in:
  - More of us, particularly in Africa
  - Older with new health and life style challenges
  - Urbanized with elevated air pollution
  - Hotter with extreme weather
  - Collapsing habitat loss and mass extinction

- Transformative technologies will:
  - Bring us closer together – in space and thought
  - Revolutionize our ability to solve our problems

- Africa and South Asia will be at the center of these trends

Can Our "Global Health" Vision Meet the Challenge?

- The drivers underlying all these Mega-Trends span multiple sectors
  - **Changing Demographics**: health, urban planning, labor
  - **Urbanization**: health, water/sanitation, energy, transportation
  - **Climate Change**: energy, agriculture, health, environment
  - **Land Use Change**: agriculture, water management, environment

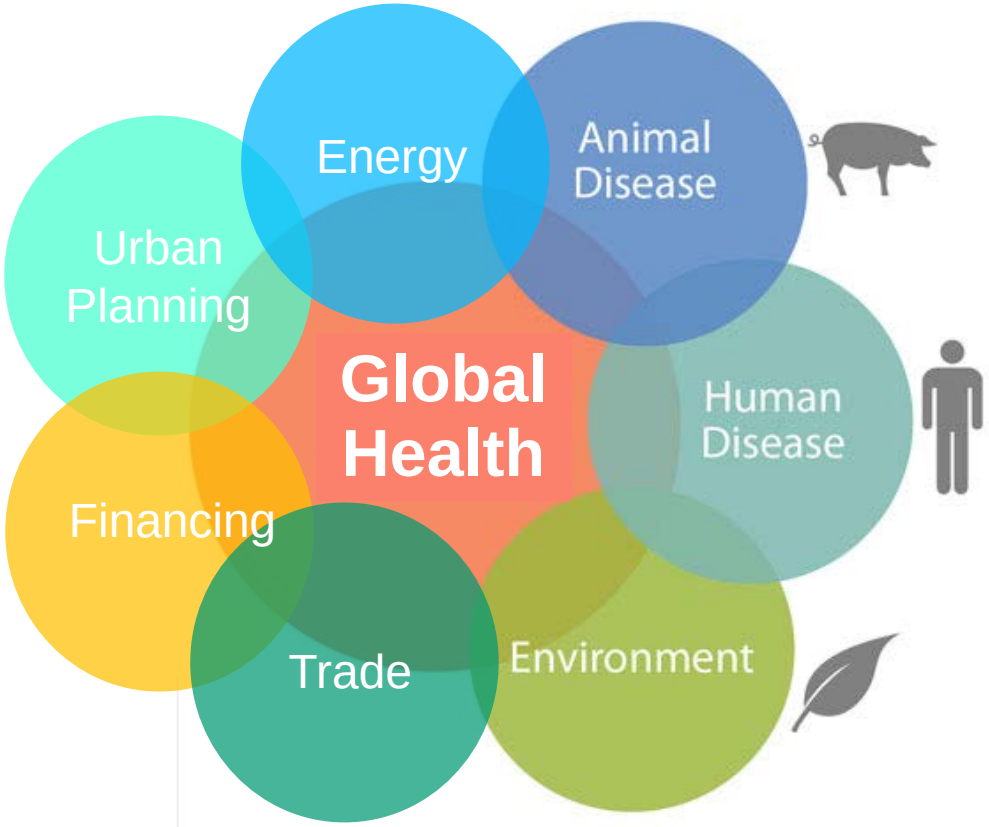
- Likewise, the "solutions" will need to be multi-sectoral

- Global Health will need to broaden its vision and scope to be even more inclusive – and learn from One Health

The Origins of the One Health Concept

The One Health concept emerged in response to the threats posed by zoonotic diseases and antimicrobial resistance – with the interrelationship between animal, human and animal health at its core

The Necessary Evolution of "Global Health" in the 21st Century



The challenges of the 21st century will require even more expansive multi-sectoral partnerships. The Next Gen leaders will only be prepared to meet these challenges if our Global Health vision is ready for the future

The “Global Health” Evolution: Powered by Artificial Intelligence

The evolution of GH will need to be powered by the transformative effect of **Artificial Intelligence** and associated technological revolution.

What are the Implications for “Global Health” and Education?

- Is our GH Workforce vision ”aligned with this future”
- What skills does the future require?
- Will GH harness the transformative power of the new technologies?
- What is the organizational framework required to empower a future GH workforce?
- What policies need to be in place to enable the success of the Work Force?
- Are government and academic communities and their private sector counterparts planning for this future together?

DON'T
PANIC