

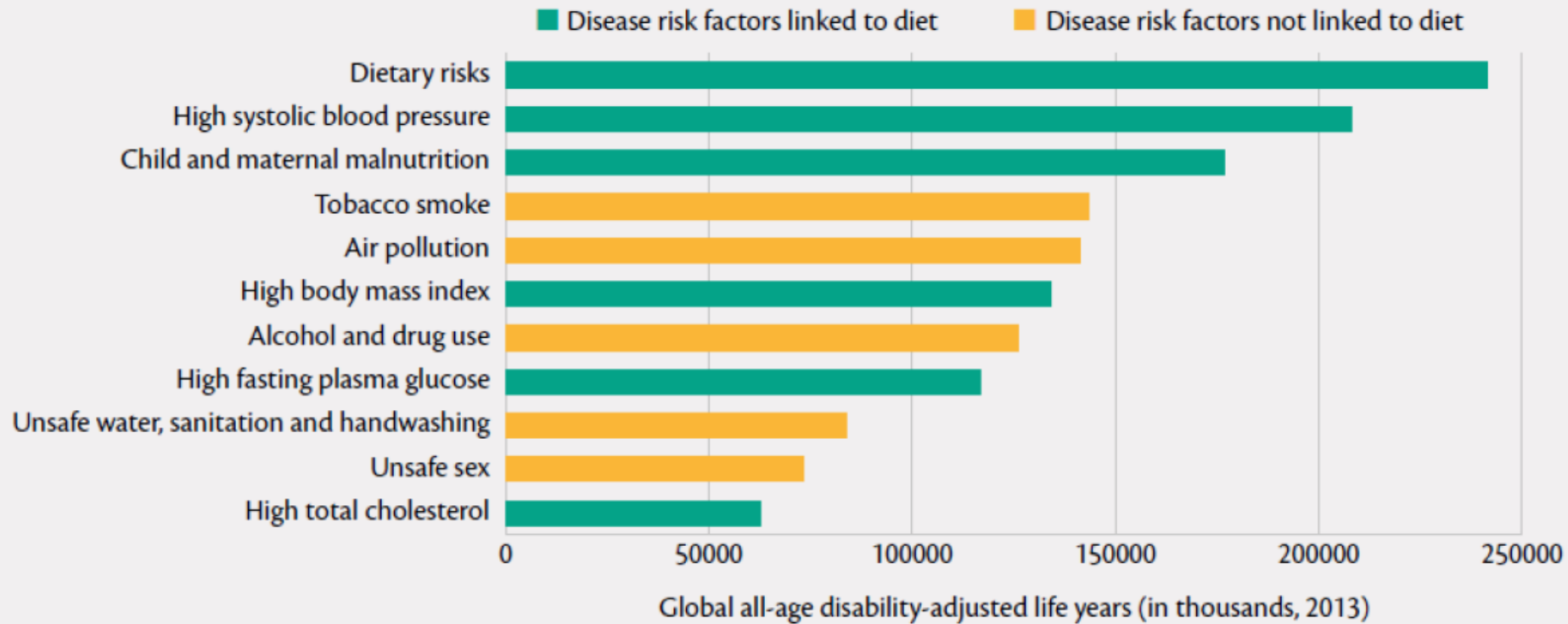


# Food and Nutrition Security in a Climate-Changed World: Health, Socioeconomic, and Environmental Inputs and Impacts

Peiman Milani, MBA, MS  
Sight and Life



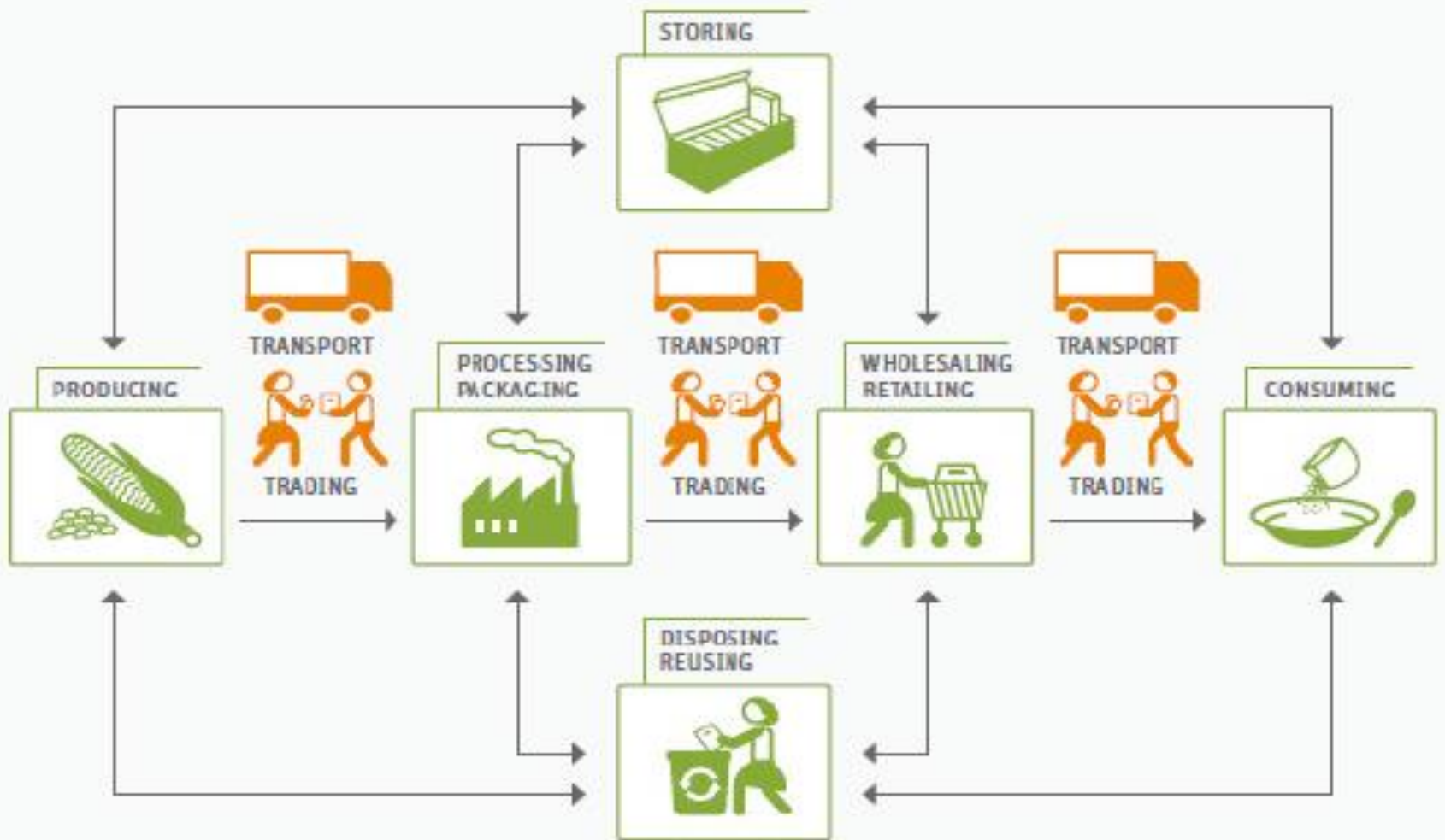
# Food and low quality diets are the most important underlying factor in the global burden of disease



Source: Global Burden of Disease Study 2013 Collaborators (2015), Figure 5

Note: The graph shows global disability-adjusted life years (DALYs) attributed to level 2 risk factors in 2013 for both sexes combined.

# The food system straddles farm to flush...



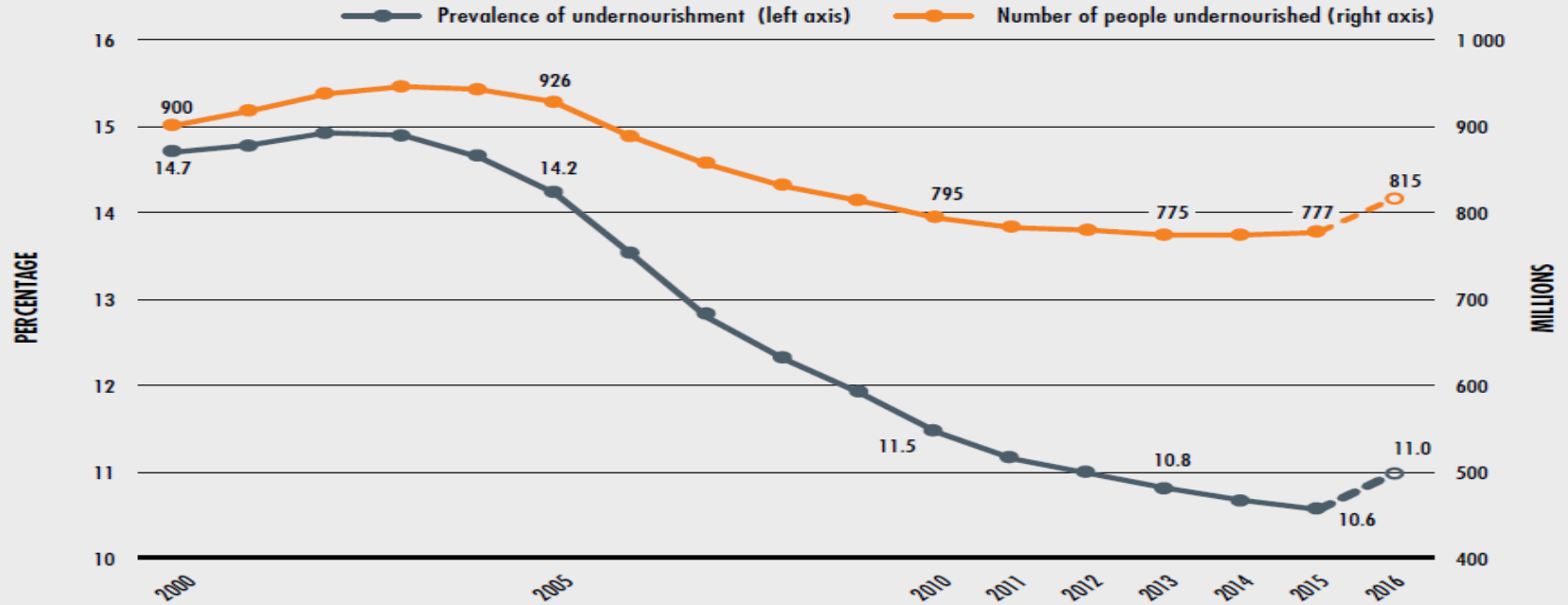
...and is a key determinant of food security, nutrition status, and food waste

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# Current food systems are failing their mission

THE NUMBER OF UNDERNOURISHED PEOPLE HAS BEEN ON THE RISE SINCE 2014, REACHING AN ESTIMATED 815 MILLION IN 2016

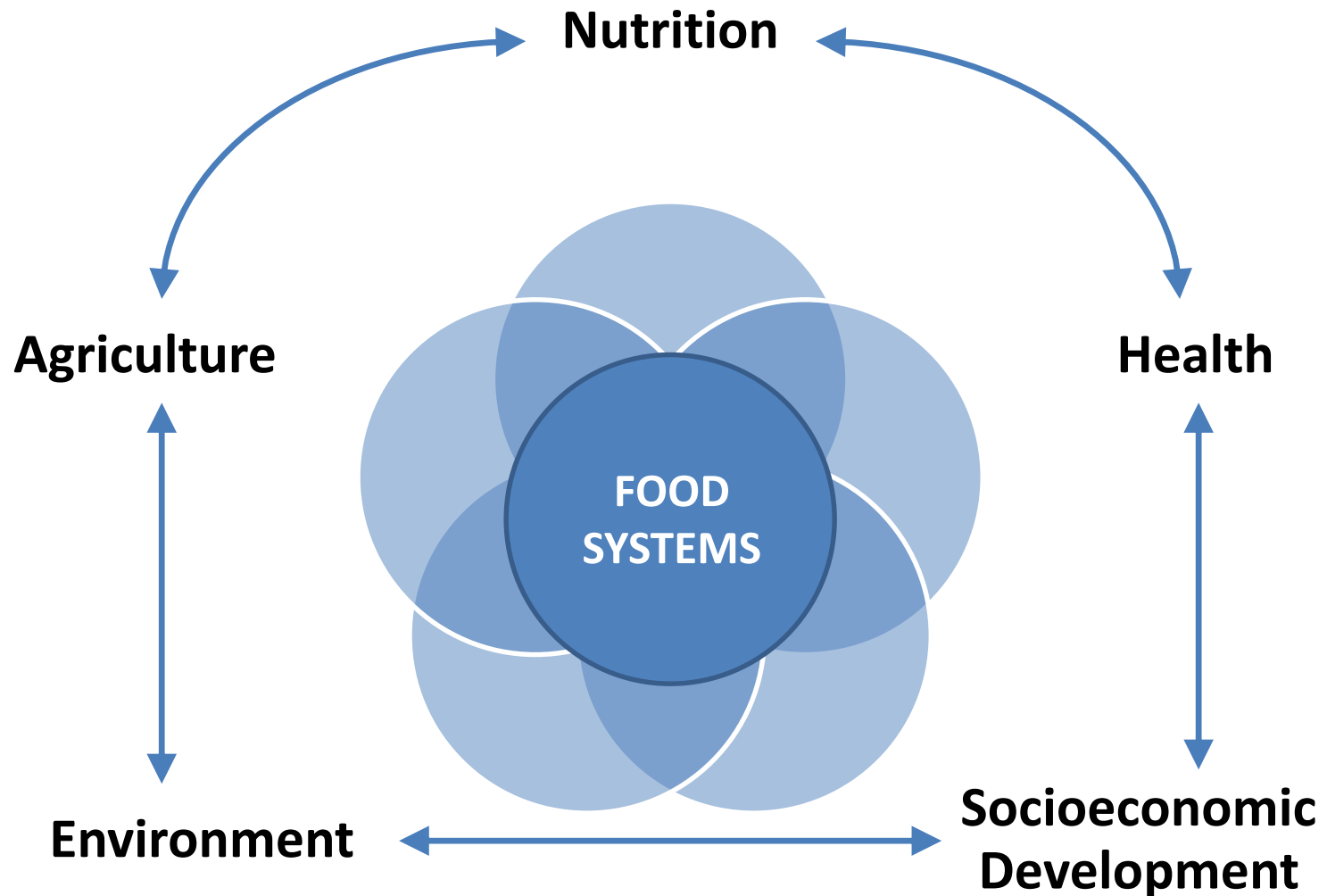


NOTE: Prevalence and number of undernourished people in the world, 2000–2016.  
 Figures for 2016 are projected estimates (see Box 1 on p. 4 and Methodological notes in Annex 1, p. 95).  
 SOURCE: FAO.

**1/3** of all food produced in the world is lost or wasted, requiring cropland area the size of China and generating about **8%** of global Greenhouse Gas Emissions

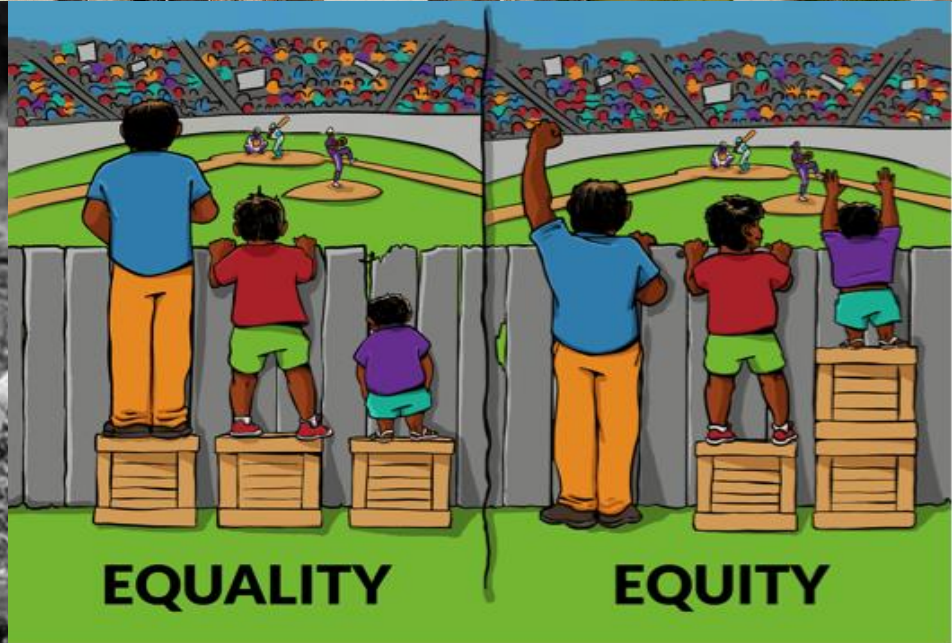
# Food systems are at the heart of many of the key global challenges in the 21st century

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# Poverty, Inequality, and Inequity

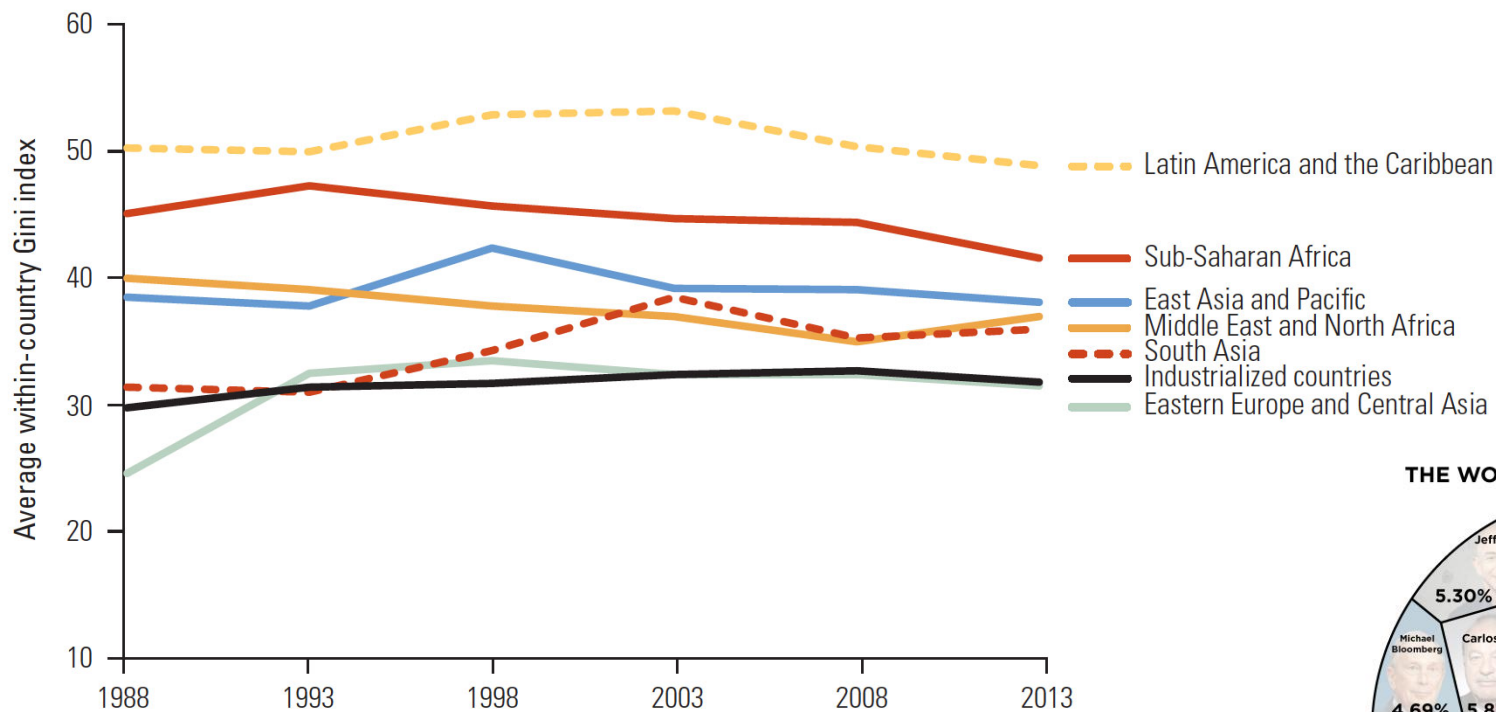
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# Poverty, Inequality, and Inequity

## Economic inequality remains persistently high and is growing in S Asia and MENA

Trends in the average economic inequality within countries, by world region – 1988-2013



Source: The World Bank (2016) – Poverty and Shared Prosperity 2016: Taking on Inequality. Reformatted for OurWorldInData.org  
Original data source: World Bank calculations based on data in Milanovic 2014; PovcalNet (online analysis tool).



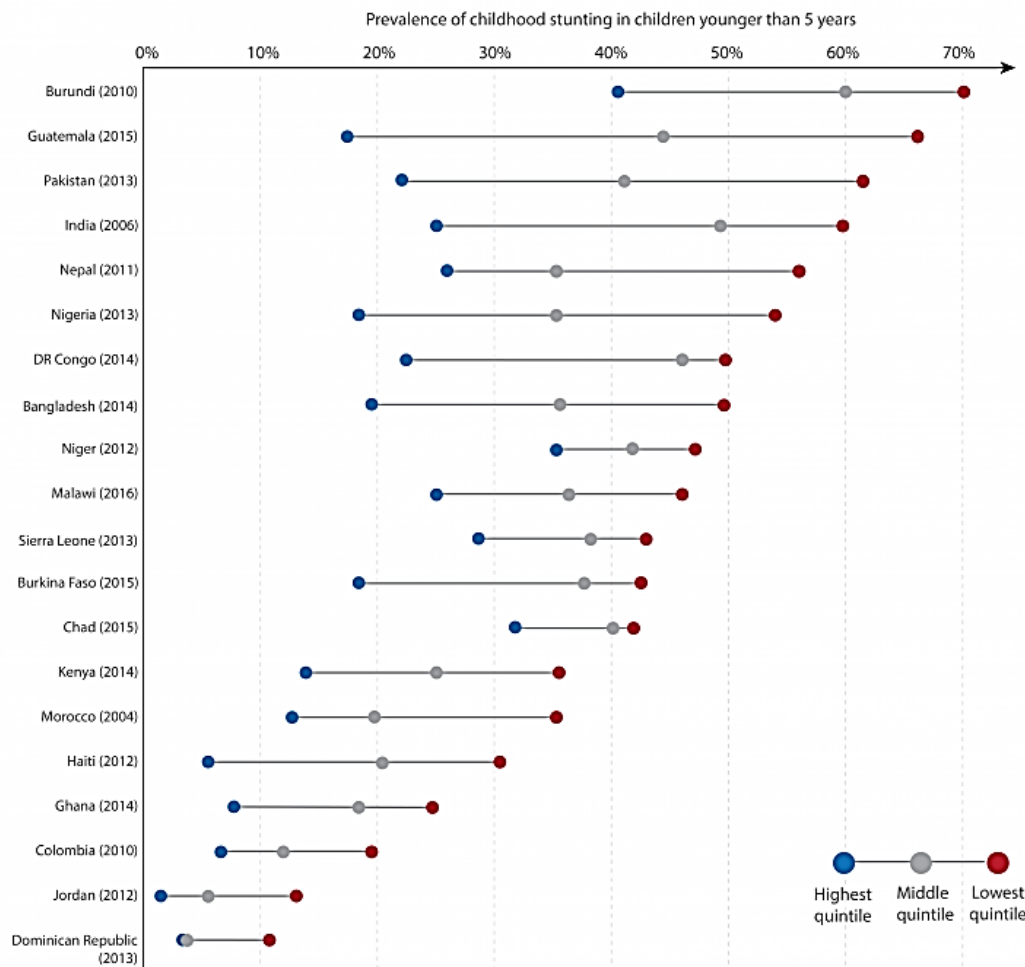


# Poverty, Inequality, and Inequity

## Poverty and inequality strongly correlate with undernutrition

### Prevalence of childhood stunting by household income

The prevalence of childhood stunting as a percentage of the total under-5 population by household income quintile, ranging from the lowest (poorest) quintile in red, to the highest (richest) quintile in blue. Prevalence in the middle income quintile is also shown in grey. Data for the second and fourth income quintiles is not included.

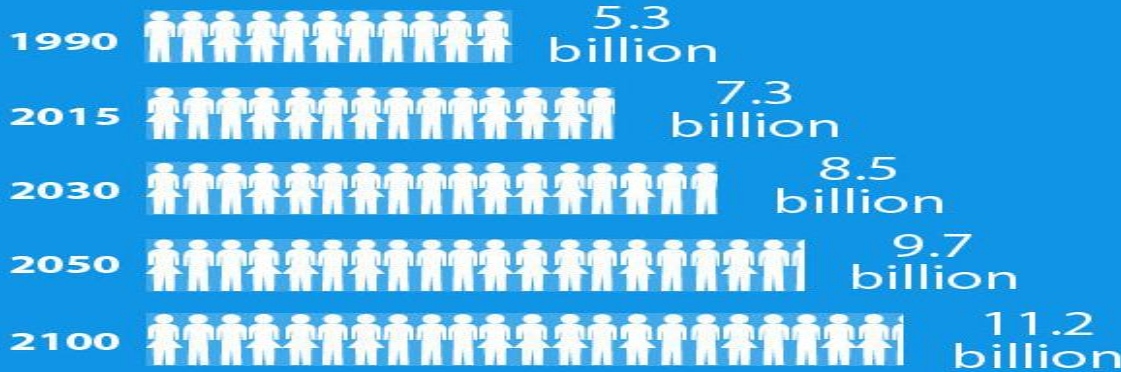


# Demographic Changes

**Growing, aging, and wealthier populations place additional pressures on health, food, and ecological systems**

## World Population

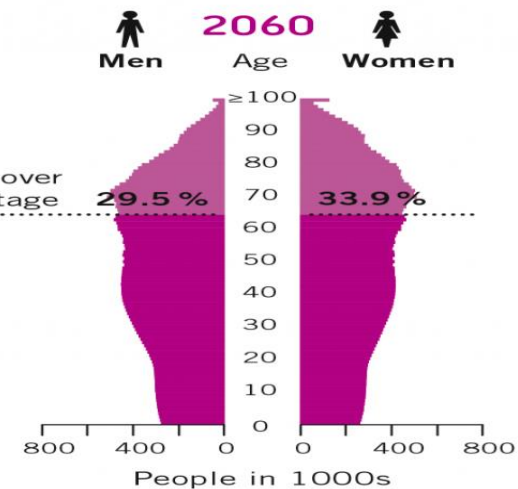
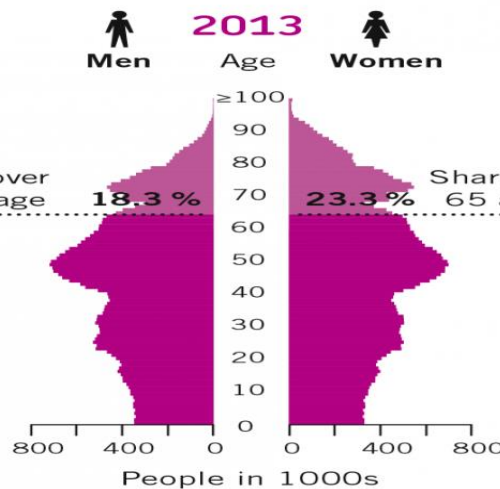
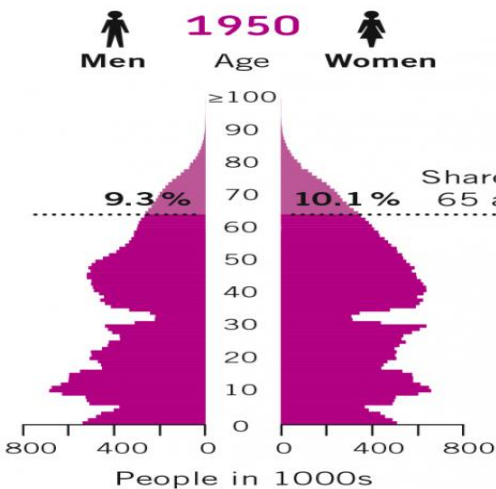
Projected world population until 2100



Source: United Nations Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2015 Revision*  
Produced by: United Nations Department of Public Information



2015  
TIME FOR  
GLOBAL ACTION



# Urbanization

---



**Tokyo, Japan**



**Lagos, Nigeria**



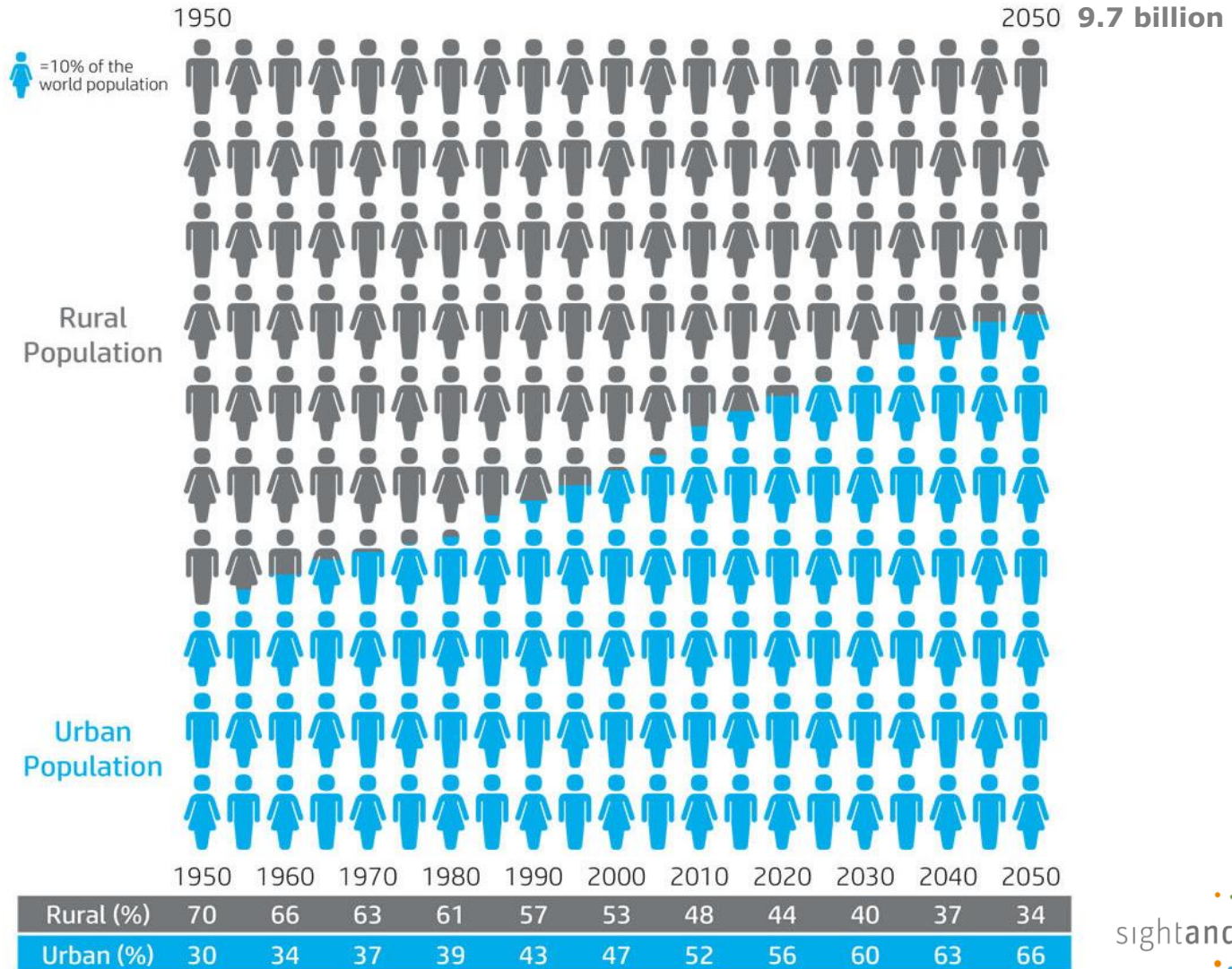
**São Paulo, Brazil**



**Delhi, India**

# Urbanization


## Two thirds of the global population will live in cities by 2050



Source: World Urbanization Prospects: 2014 Revision, United Nations Population Division

# Terror / Conflicts / Migration / Geopolitical Instability

---



**Nearly  
1.4m children  
are at imminent  
risk of death**

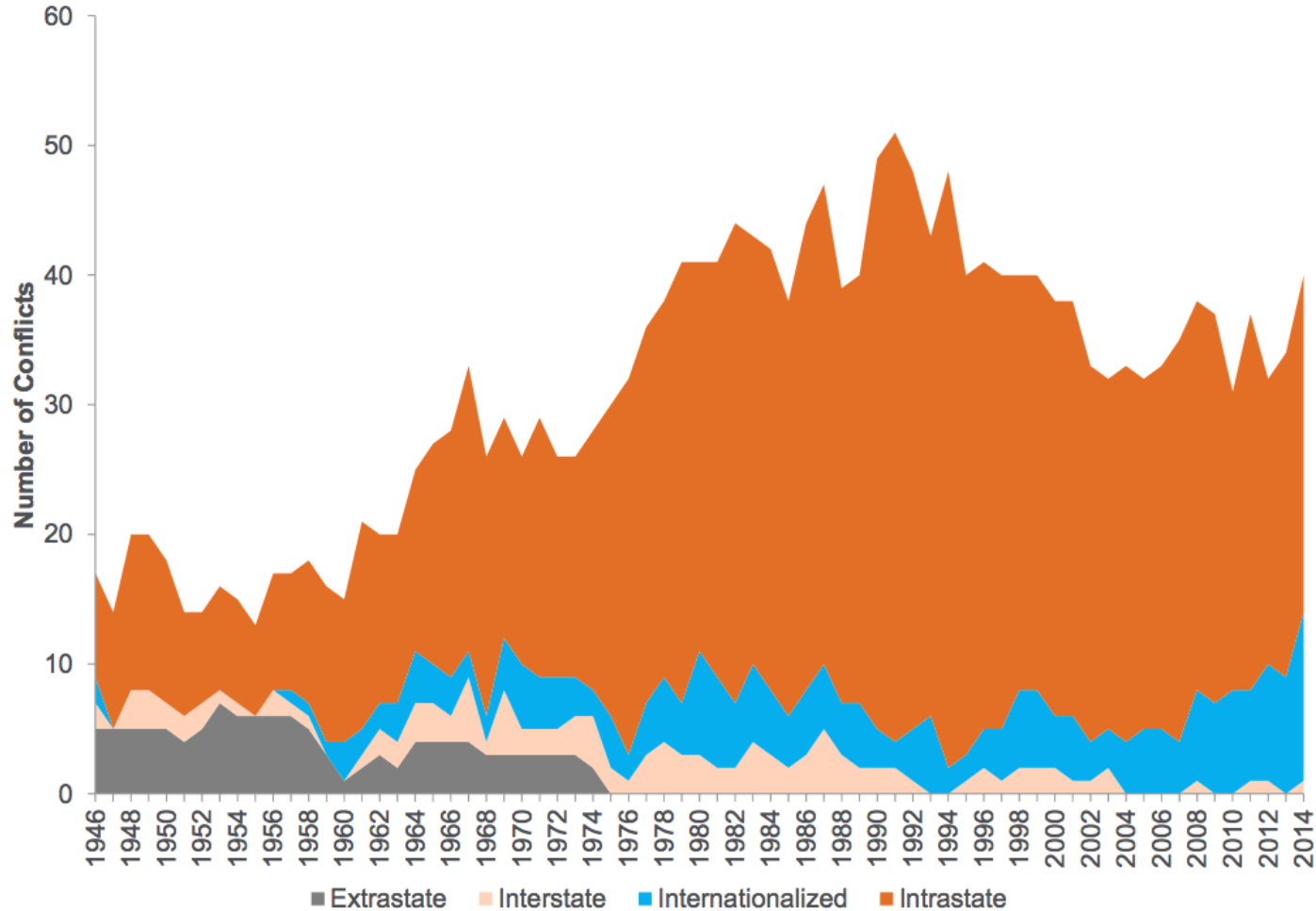
unicef  for every child

# Terror / Conflicts / Migration / Geopolitical Instability

---

**Conflict, particularly intrastate and internationalized, is on the rise**

Figure 6. Armed Conflict by Type, 1946-2014

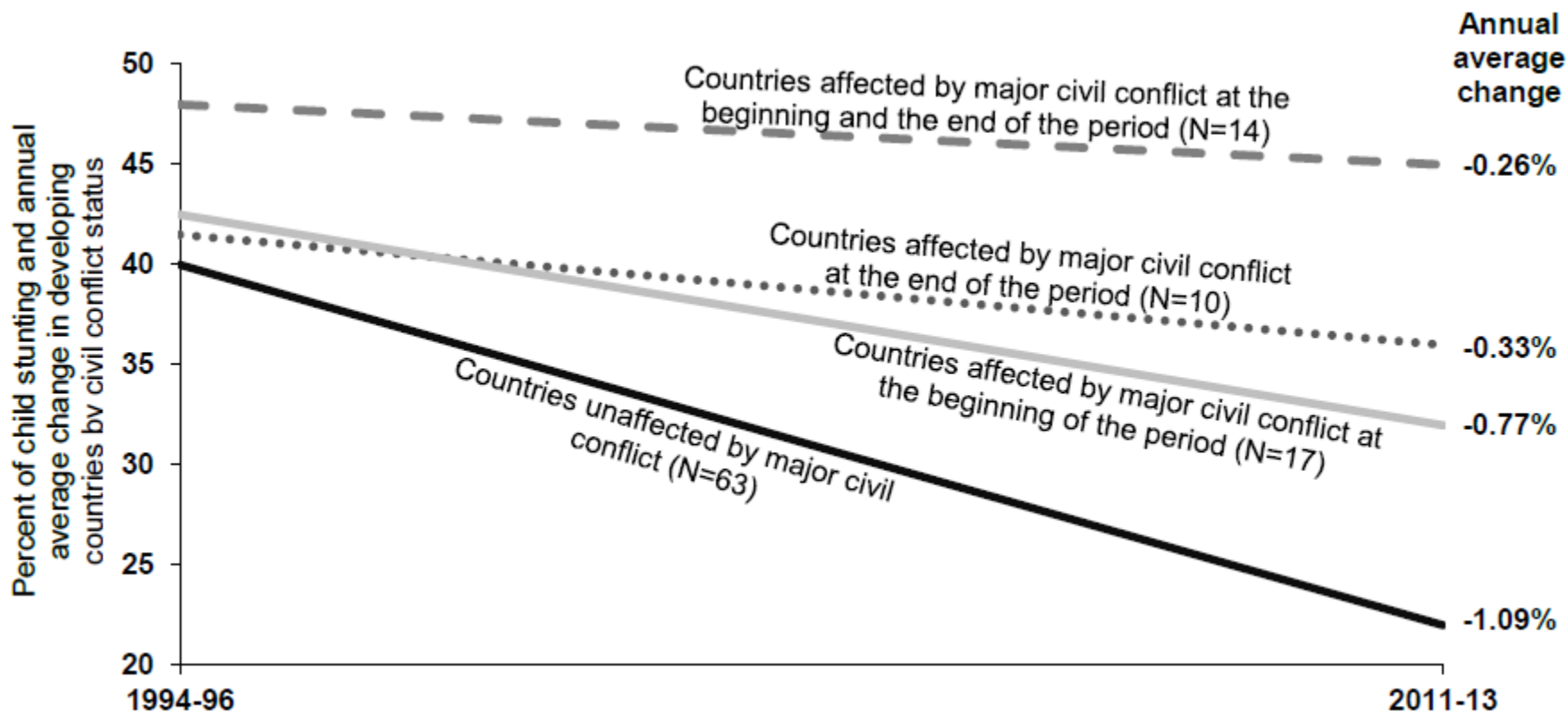


Source: Uppsala Conflict Data Program; Citi Research.



# Terror / Conflicts / Migration / Geopolitical Instability

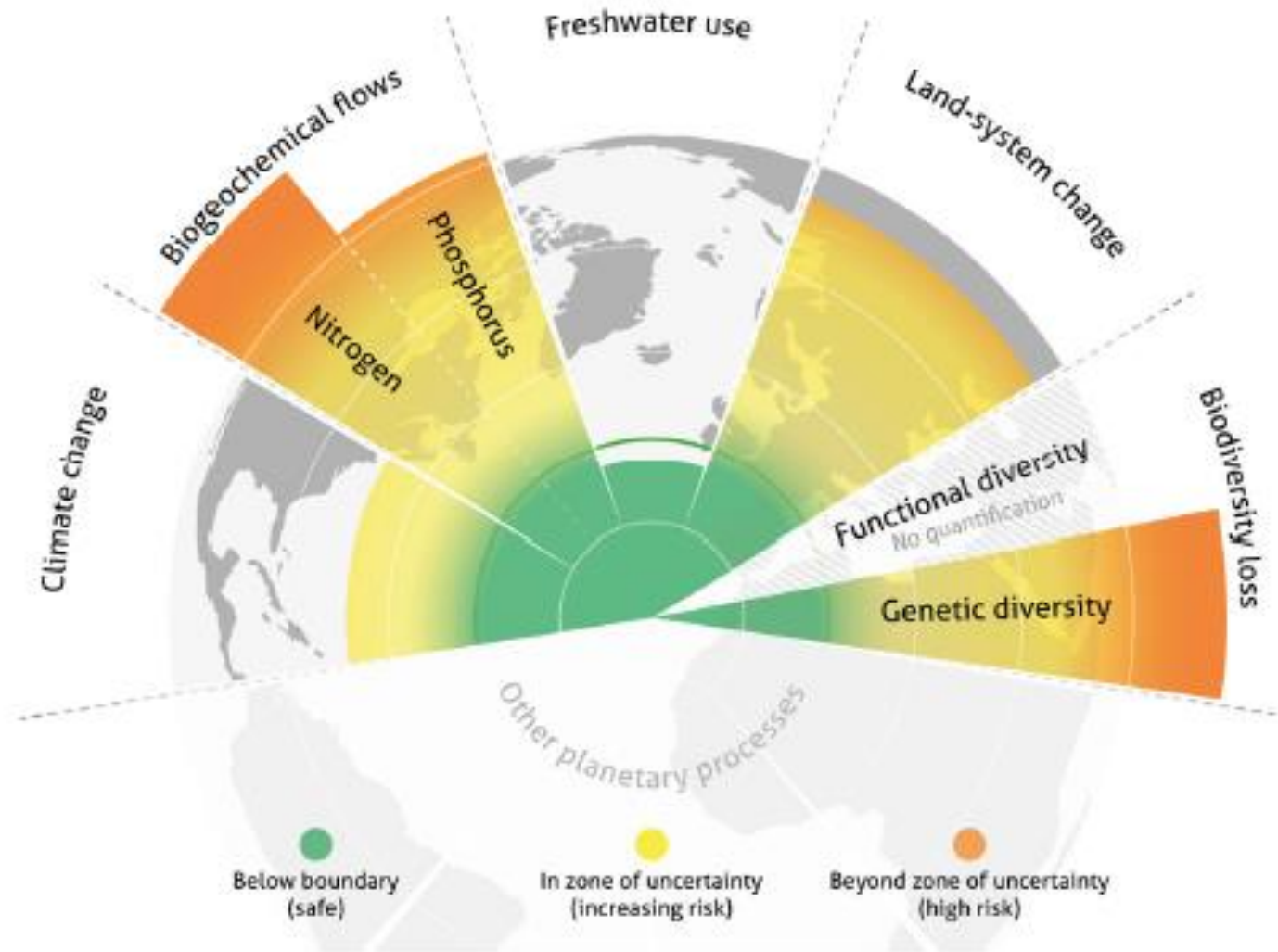
## Conflict causes persistent hunger and slows down progress in nutrition



**"Conflict**, especially when compounded by **climate change**, is therefore a **key factor** explaining the apparent reversal in the long-term declining trend in global hunger, thereby posing a **major challenge** to ending **hunger** and **malnutrition** by 2030." **FAO**

# Resource Scarcity and Stress on Planetary Boundaries

**Food production is the human activity with the highest impact on five of the nine critical planetary boundaries**



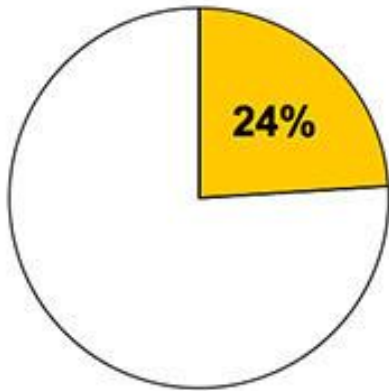


# Resource Scarcity and Stress on Planetary Boundaries

**Food systems lead to natural capital losses estimated at over 7 trillion dollars per year**

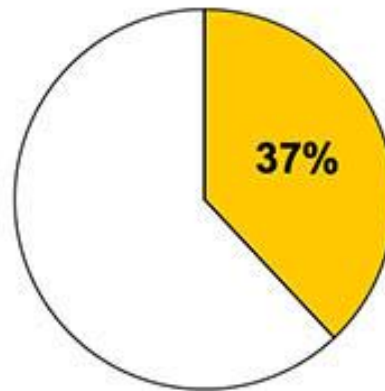
## Agriculture's Share of Global Environmental Impact (2010)

GREENHOUSE GAS EMISSIONS



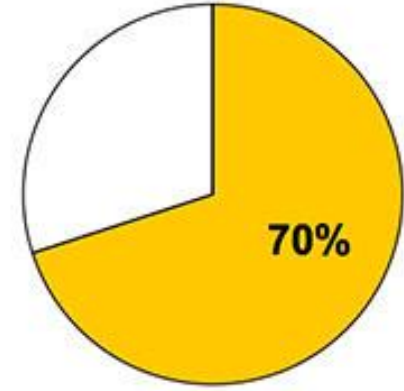
100% = 49 Gt CO<sub>2</sub>e

EARTH'S LANDMASS (EX-ANTARCTICA)



100% = 13.3 bn ha

WATER WITHDRAWAL



100% = 3862 km<sup>3</sup> H<sub>2</sub>O

# Resource Scarcity and Stress on Planetary Boundaries

**Individual food choices are consequential to food system footprints**



# Environmental Degradation and Climate Change

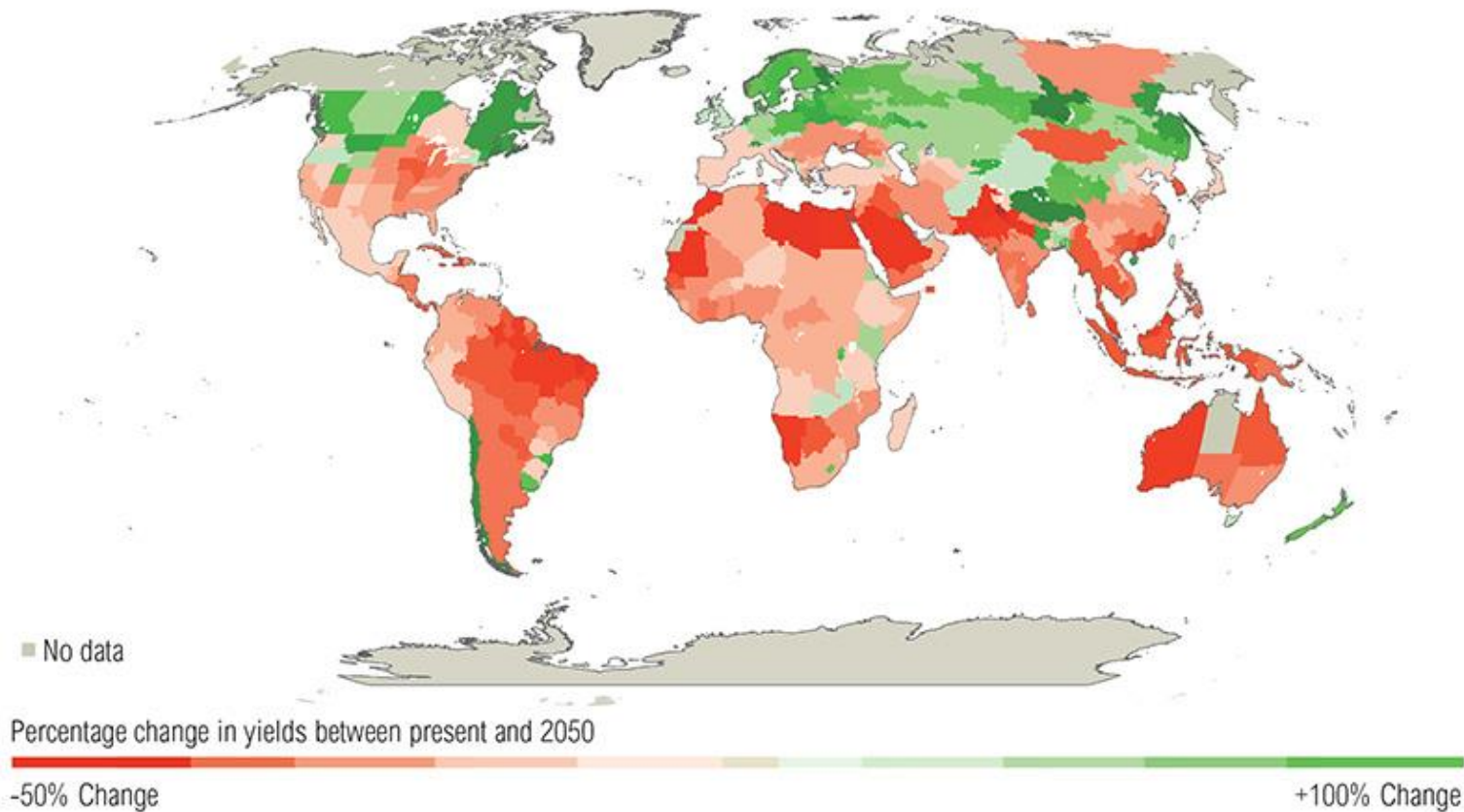
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# Environmental Degradation and Climate Change

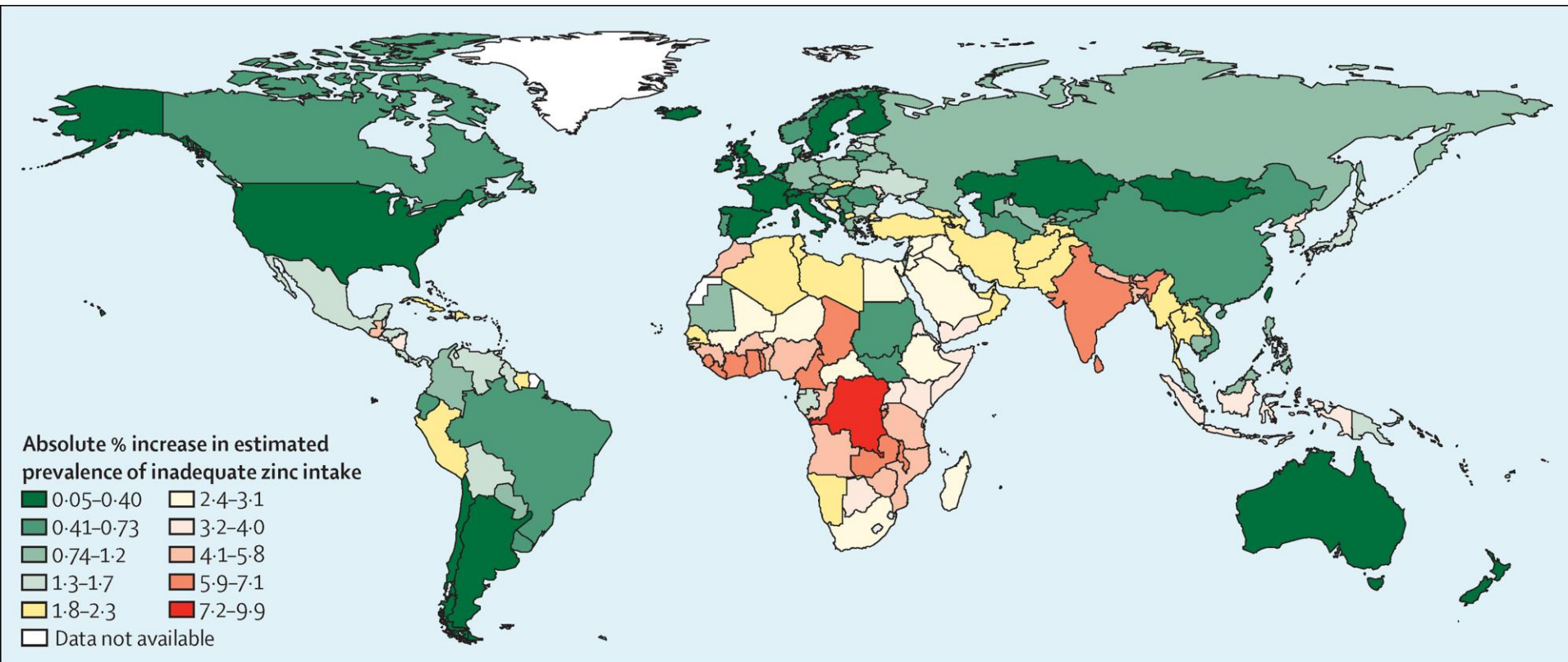
## Climate-related crop yield losses will affect vulnerable regions the most

Most studies now project adverse impacts on crop yields due to climate change (3°C warmer world)



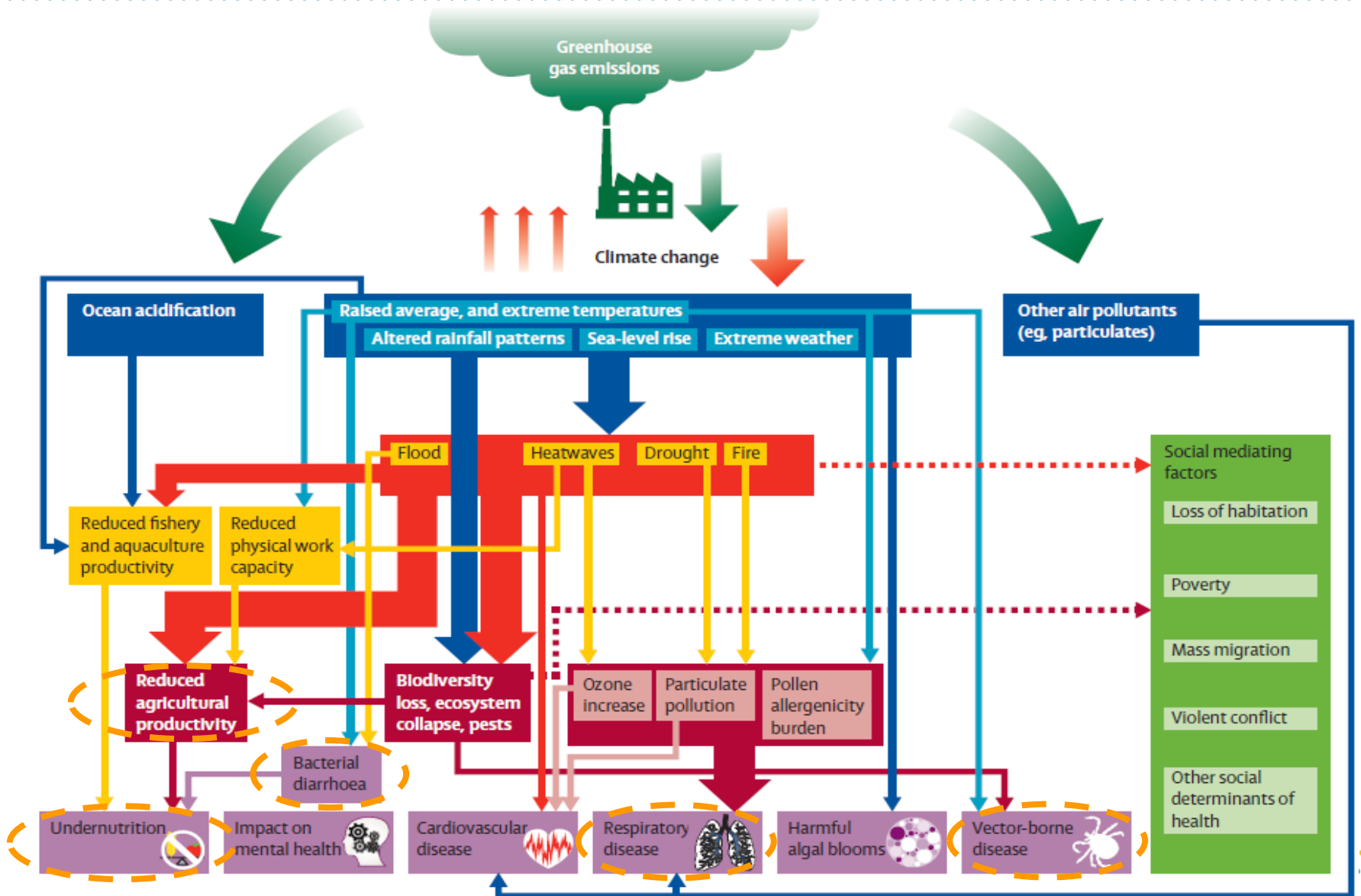
# Environmental Degradation and Climate Change

**Increased atmospheric CO<sub>2</sub> is likely to worsen micronutrient deficiencies**

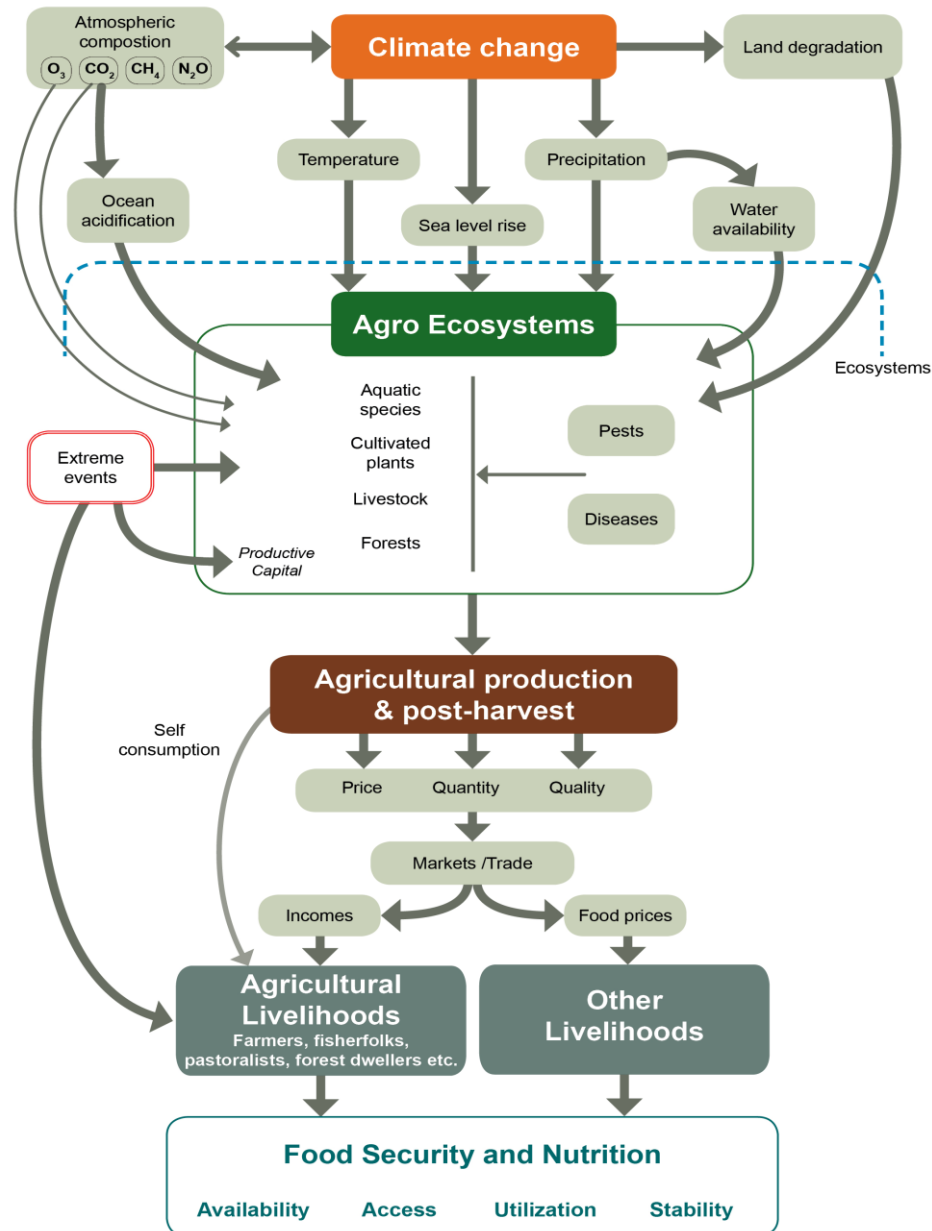


Source: Myers et al. *The Lancet Global Health*, Volume 3 , Issue 10 , e639 - e645.

# Climate change impacts global health through multiple pathways...

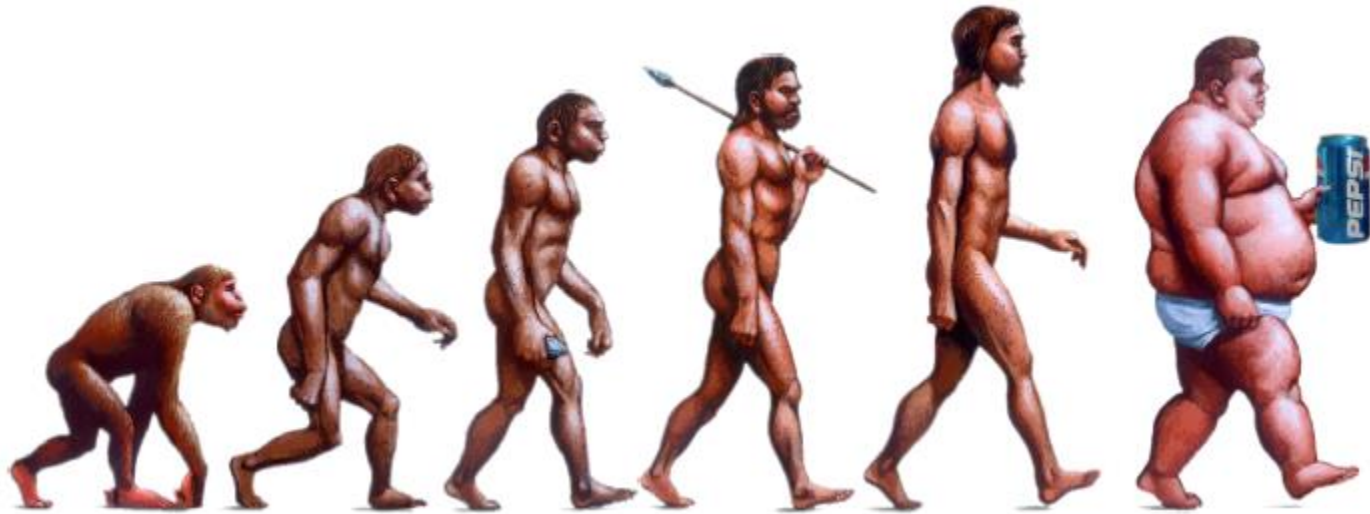


# ...and has a direct impact on food systems



# Can we afford to continue down this path?

---





# The SDGs offer an extraordinary framework for action

---

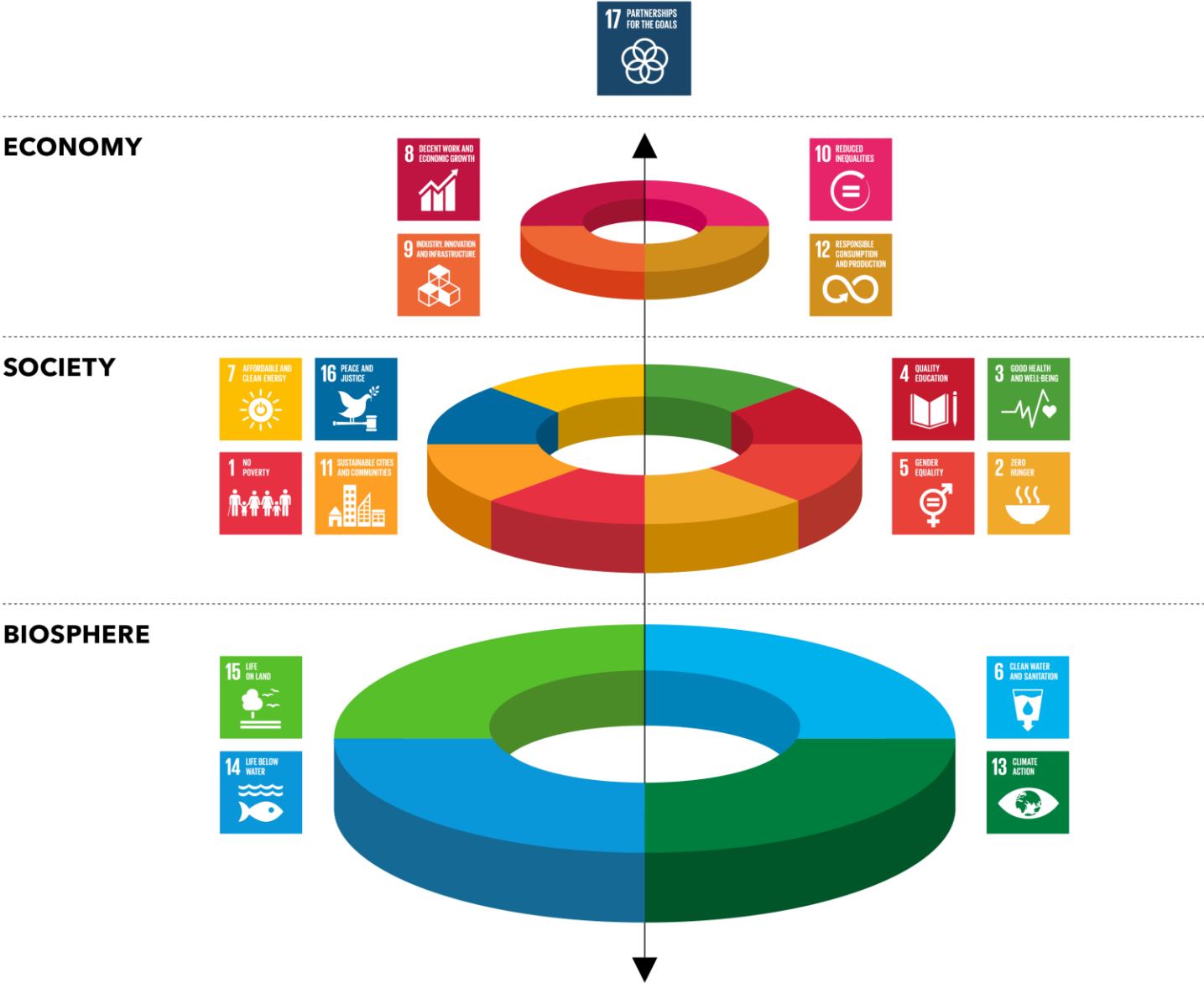


## SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD



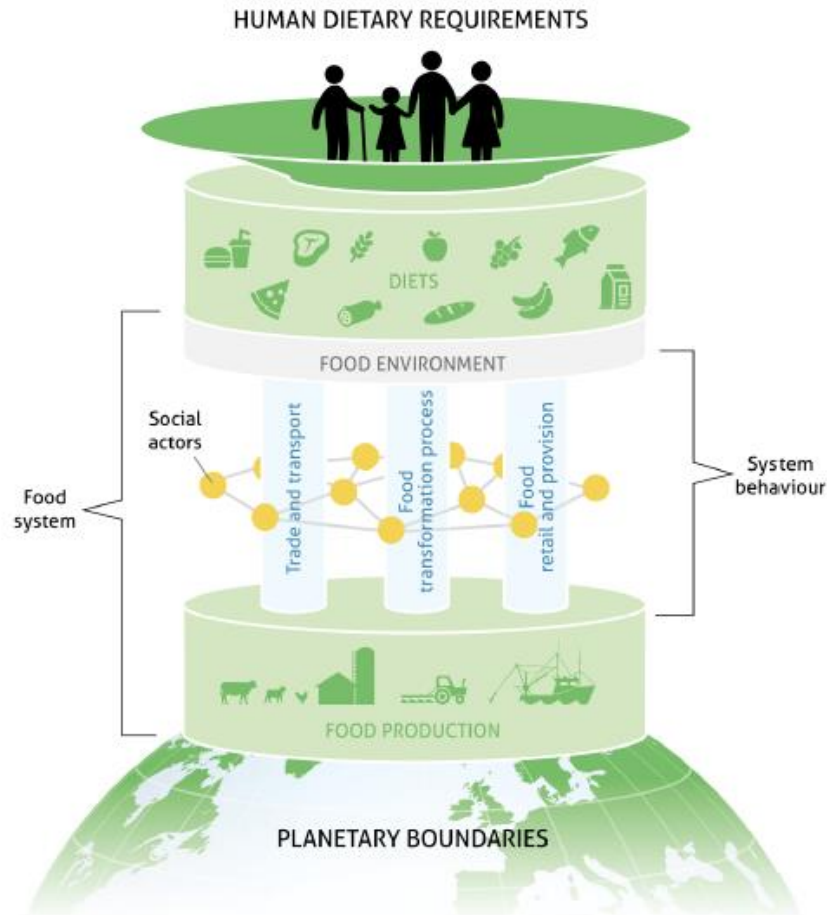
# Food touches or is touched by all SDGs



Source: M. Irvine, The Sustainable Development Goals and Business. Available at: <https://www.dnvgl.com/feature/sdgs-business-action.html>.

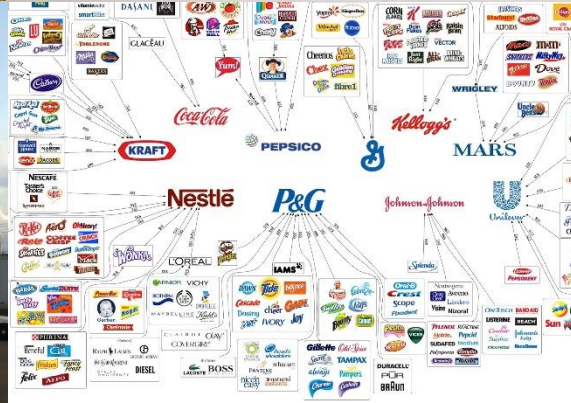


# Towards healthy diets from sustainable food systems



**Systemic thinking**  
**Human values**  
**Our common humanity & ecosphere**

# The private sector has a key role to play in enabling healthy diets from sustainable food systems



# Overview of the Global Nutrition Landscape



PEGGY BENTLEY, PH.D.

PROFESSOR OF NUTRITION

& ASSOCIATE DEAN FOR GLOBAL HEALTH



UNC

GILLINGS SCHOOL OF  
GLOBAL PUBLIC HEALTH

“End all forms of  
malnutrition by 2030.”



## SUSTAINABLE DEVELOPMENT GOAL 2

End hunger, achieve food security and improved nutrition and promote sustainable agriculture



## Nutrition

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[Nutrition topics](#)

[Databases](#)

[Publications](#)

[Collaborating centres](#)

[Regional offices](#)

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### United Nations Decade of Action on Nutrition Decade of Action on Nutrition



WHO/NHD

The United Nations General Assembly on April 2016 agreed on a resolution proclaiming the UN Decade of Action on Nutrition from 2016 to 2025. By agreeing to this resolution, governments endorsed the Rome Declaration on Nutrition and Framework for Action adopted by the Second International Conference on Nutrition (ICN2) in November 2014. This UN resolution calls upon FAO and WHO to lead the implementation of the Decade of Action on Nutrition, in collaboration with the World Food Programme (WFP), the International Fund for Agricultural Development (IFAD) and the United Nations Children's Fund (UNICEF), and involving coordination mechanisms such as the United Nations System Standing Committee on Nutrition (UNSCN) and multi-stakeholder platforms such as the Committee on World Food Security (CFS).

[Read more about the high-level political forum](#)

[More information](#) 



Stunting

**156 million**

Overweight

**1.9 billion**

SDGs

**12 of 17**

Although the numbers of people affected by different types of malnutrition cannot simply be summed (because a person can suffer from more than one type), the scale of malnutrition is staggering.

OUT OF A WORLD POPULATION OF  
**7 BILLION**



About **2 billion** people suffer from micronutrient malnutrition



Nearly **800 million** people suffer from calorie deficiency

OUT OF **5 BILLION**  
ADULTS WORLDWIDE



Nearly **2 billion** are overweight or obese



**One in 12** has type 2 diabetes

OUT OF **667 MILLION** CHILDREN UNDER AGE 5 WORLDWIDE



**159 million** under age 5 are too short for their age (stunted)



**50 million** do not weigh enough for their height (wasted)



**41 million** are overweight

OUT OF 129 COUNTRIES WITH DATA, **57 COUNTRIES**

have serious levels of both undernutrition and adult overweight (including obesity)



# The Triple Burden

On a global level, overweight and obesity are now more prevalent than under-nutrition

WHO estimates: almost one in six of the estimated world population of 6.5 billion is now overweight or obese, and about 800 million people do not have enough to eat

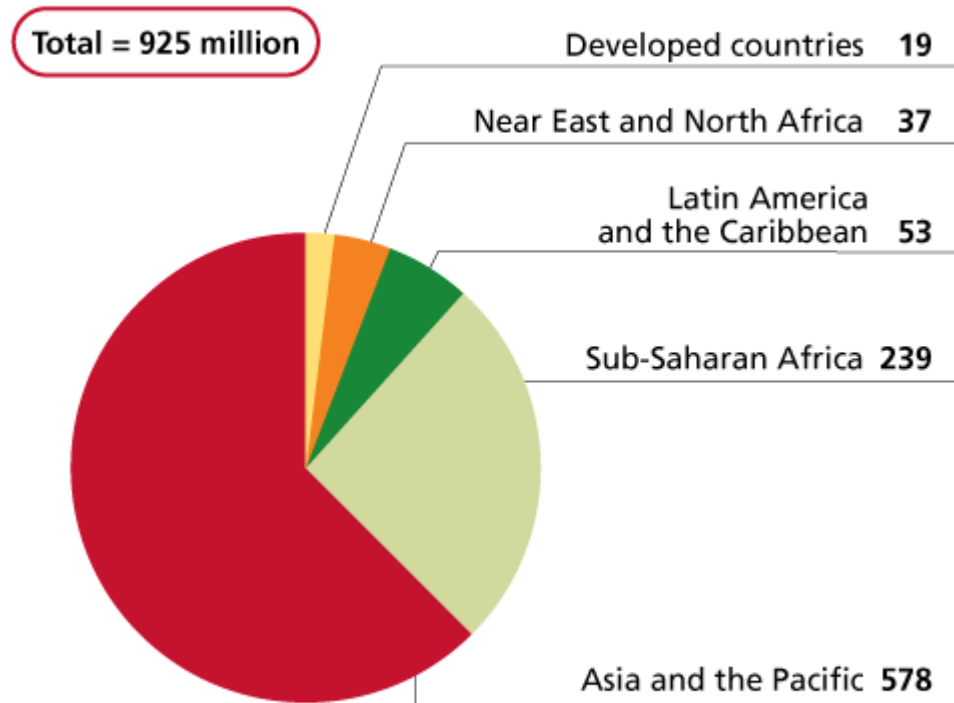
Micronutrient deficiencies MND – hidden hunger – affect more than 2 billion people – including those under and over nourished

World wide, households and communities are experiencing the triple burden of disease – co-existing undernutrition and over-nutrition and micronutrient deficiencies



# Undernutrition

**925 million hungry people in 2010**



Source: FAO.

Data and graph: FAO, accessed via <http://www.worldhunger.org>

# Micronutrients

Folic Acid

*Vitamin A*

Iodine

Zinc

Calcium

*Vitamin D*

Iron



# Micronutrients

Focus in global health has been on micronutrient deficiencies and their association with maternal and child health and development

Main concerns have been around iron, iodine, Vitamin A, zinc, folic acid

MULTIPLE micronutrient deficiencies are common

Also need to consider effects of deficiencies AND excesses on chronic disease risk

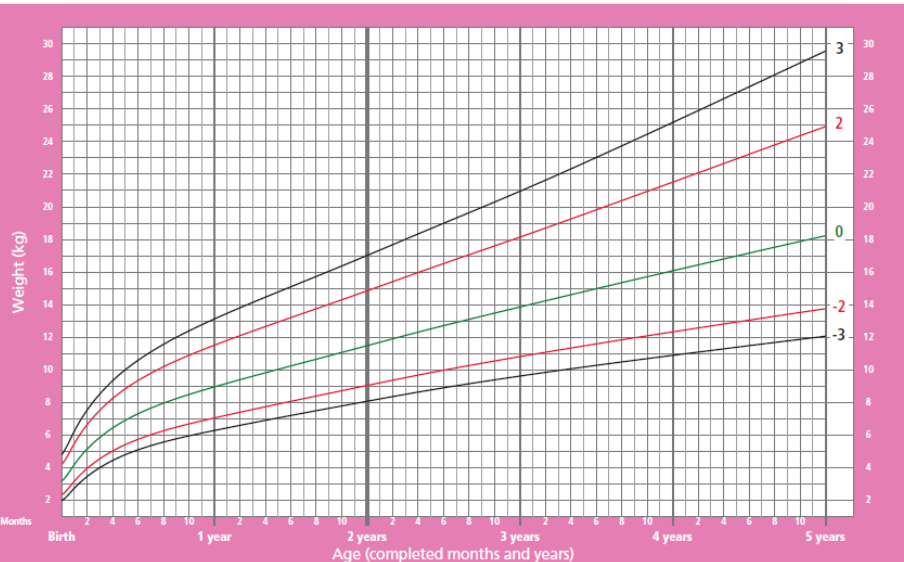
# Defining Undernutrition

## Weight status

- Children: defined relative to the WHO growth standard
  - Low Weight-for-age = WAZ < -2 SD
  - Wasting = weight-for-length < -2 SD
- Adults: BMI < 18.5 kg/m<sup>2</sup>

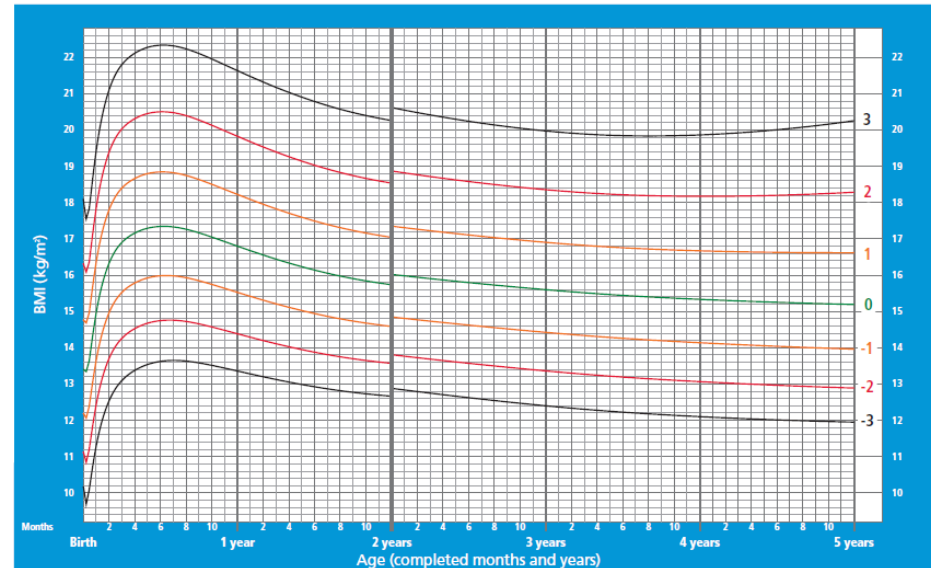
## Weight-for-age GIRLS

Birth to 5 years (z-scores)



## BMI-for-age BOYS

Birth to 5 years (z-scores)

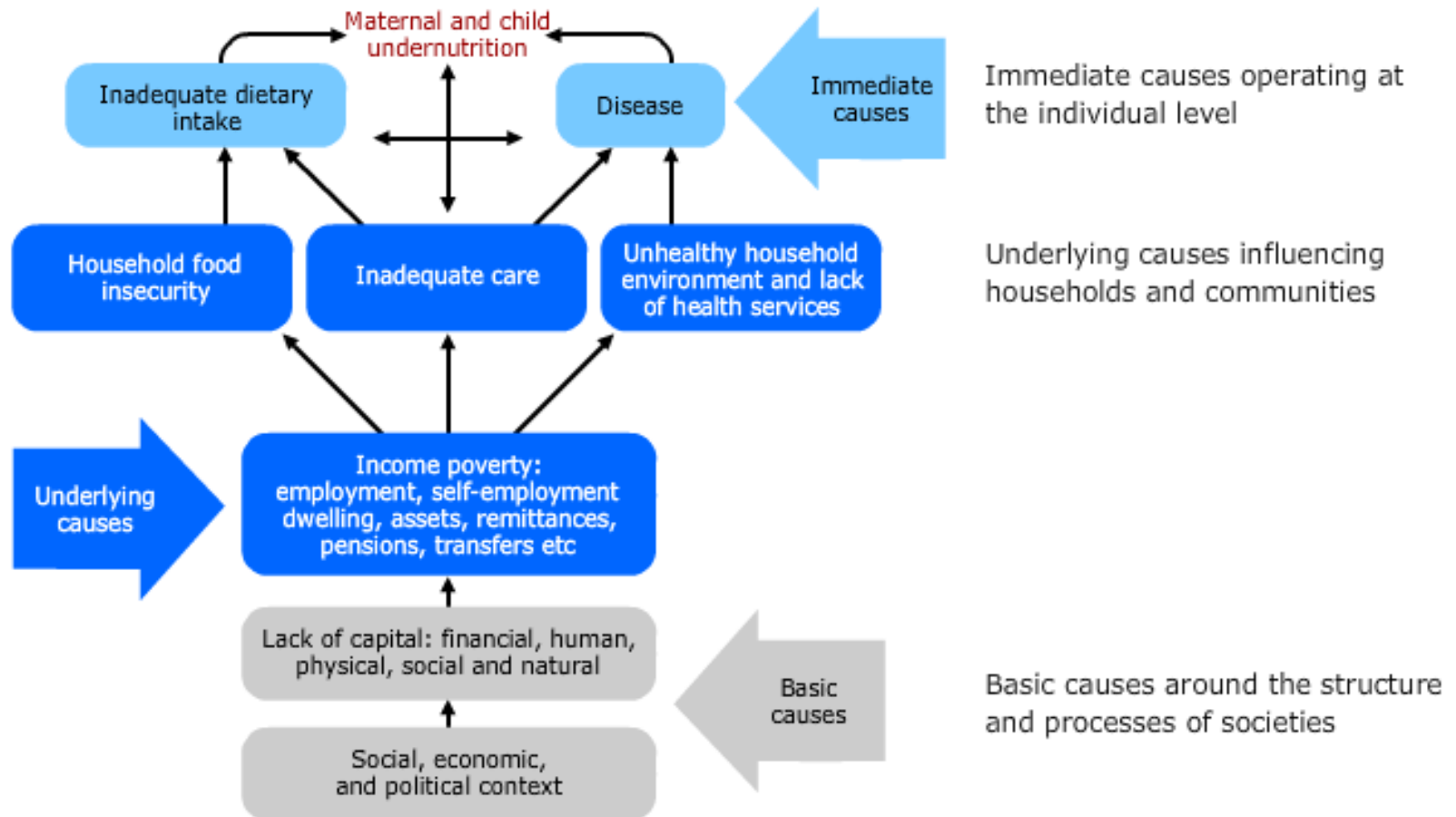


# Defining undernutrition: Stunting

Length or height-for-age Z score  $< -2$

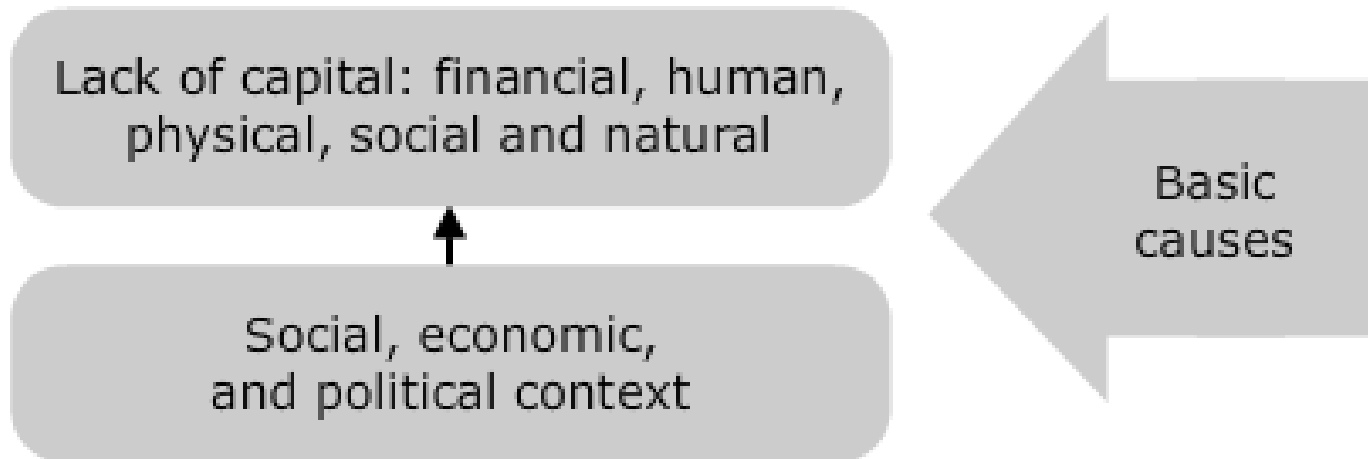


# UNICEF Conceptual Framework





# Basic Causes of Undernutrition



# Examples of Basic Causes

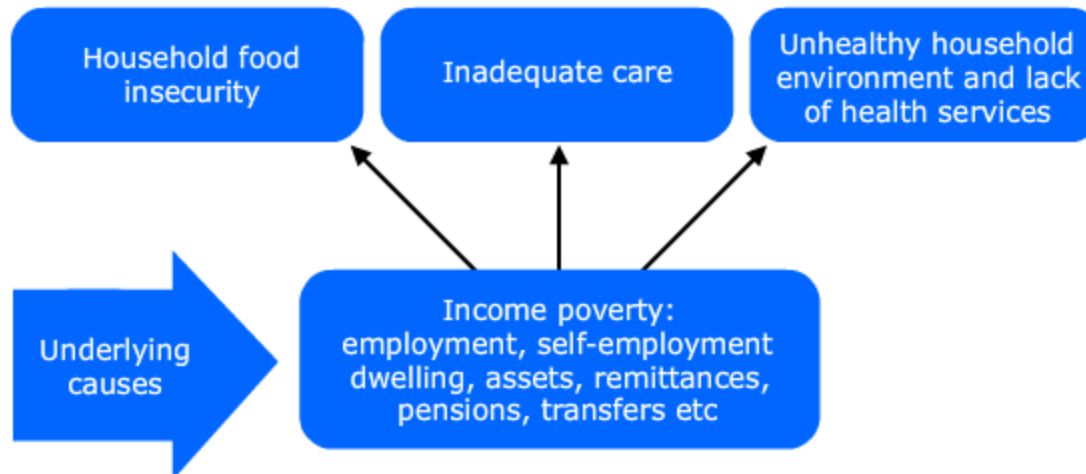
Rights of women and girls

Entrenched poverty

Equitable education and income distribution



# Underlying Causes of Undernutrition



# Underlying Causes Overlap

Sick child depends on mother

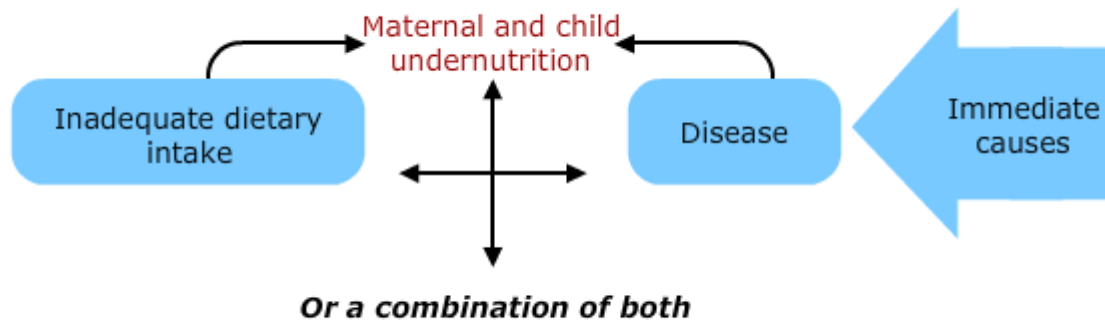
Mother's time depends on work

Time required to access health facility



© Valerie Gatchell

# Immediate Causes



# Synergism of nutrition and infection



Malnutrition depresses immune function and increases susceptibility to infection

- \* Diarrhea & vomiting increase nutrient losses
- \* Fever increases energy needs
- \* Infection disrupts nitrogen balance & increases protein needs
- \* Infection causes anorexia

# Poor Public Health

Access to clean, safe water and sanitation

Presence of malarial breeding sites

Quality of shelter and level of cold, stress, overcrowding

Access to basic health services

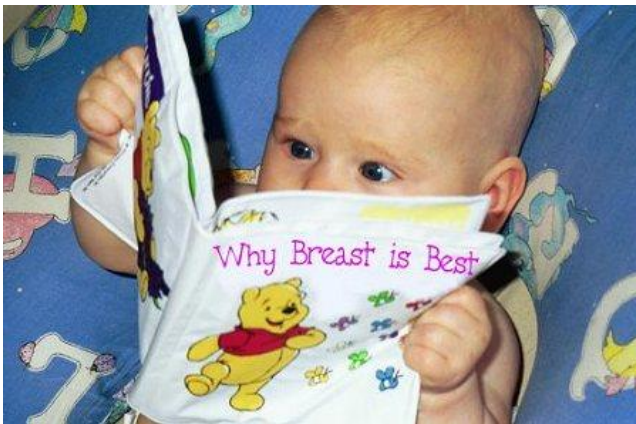


# Caring Practices

## Infant and young child feeding

- Breastfeeding
- Complementary feeding

## Hygiene and health seeking behaviors





# Emerging Plant Disease and Global Food Security

Jean Beagle Ristaino

WNR Distinguished Professor

Department of Entomology and  
Plant Pathology

**NC STATE**  
UNIVERSITY

GLOBAL **FOOD** SECURITY



**NC STATE** UNIVERSITY

# Four Components of Food Security

Food security exists when all people have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.

*Table ES-1: The Components of Food Security. For food security to be achieved, all four components must be attained and maintained, simultaneously. Each is sensitive to climate change.*

Component	Definition
Availability	The existence of food in a particular place at a particular time.
Access	The ability of a person or group to obtain food.
Utilization	The ability to use and obtain nourishment from food. This includes a food's nutritional value and how the body assimilates its nutrients.
Stability	The absence of significant fluctuation in availability, access, and utilization.

# 2017 G7 Summit To Focus On Africa And Migration

TOPICS: 2017 ActionAid Africa Migration Renzi



## TREND 11

### MIGRATION AND THE FEMINIZATION OF AGRICULTURE

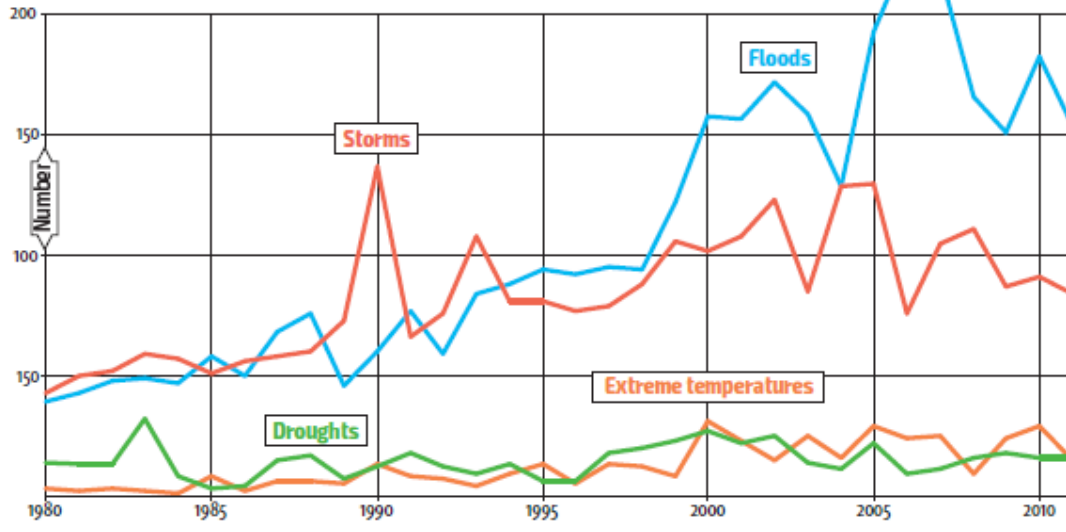
Poverty, climate change, conflicts and competition for natural resources are expected to fuel more distress migration.

The feminization of agriculture often increases women's burdens, but also presents them with opportunities.

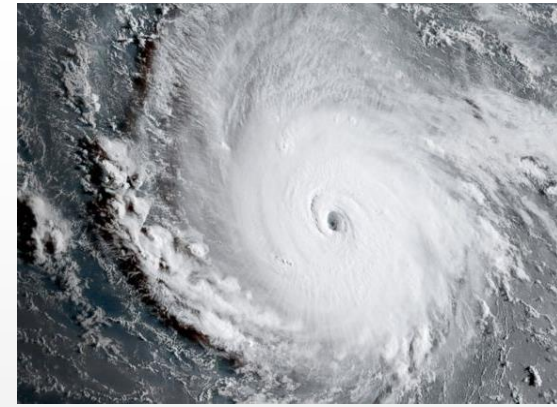
# Conflict impacts Food Security –

93 million displaced people  
human rights, food security, migration, and displacement

Figure 7.2 Climate-related disasters, 1980-2011



Source: UNISDR, 2016.



Climate related disasters have increased and affect food production

In order to match the projected increase in demand for food, by 2050 global food production must be 60 percent higher than it was in 2005/2007 (FAO, 2012). Food loss and waste must decrease



Food Production must increase



## Four threats to global food security and what we can do about them

September 21, 2016 8.09am EDT

Drought  
Salty Soils  
Fertilizer Dependence  
Emerging disease



# The future of food and agriculture

The global trends and **challenges** that are shaping our future

7 Improve income earning opportunities in rural areas and address the root causes of migration

Population growth, globalization, inequalities and climate change will accelerate distress migration

5 End hunger and all forms of malnutrition

Globally, around one-third of all food produced is lost or wasted resulting in losses for farmers and unnecessary pressures on natural resources

6 Make food systems more efficient, inclusive and resilient

~1/2 billion

people in more than 20 countries are affected by protracted crisis

Outbreak of transboundary pests and diseases of plants and animals is growing alarmingly

9 Prevent transboundary and emerging agriculture and food system threats

8 Build resilience to protracted crises, disasters and conflicts

10 Address the need for coherent and effective national and international governance



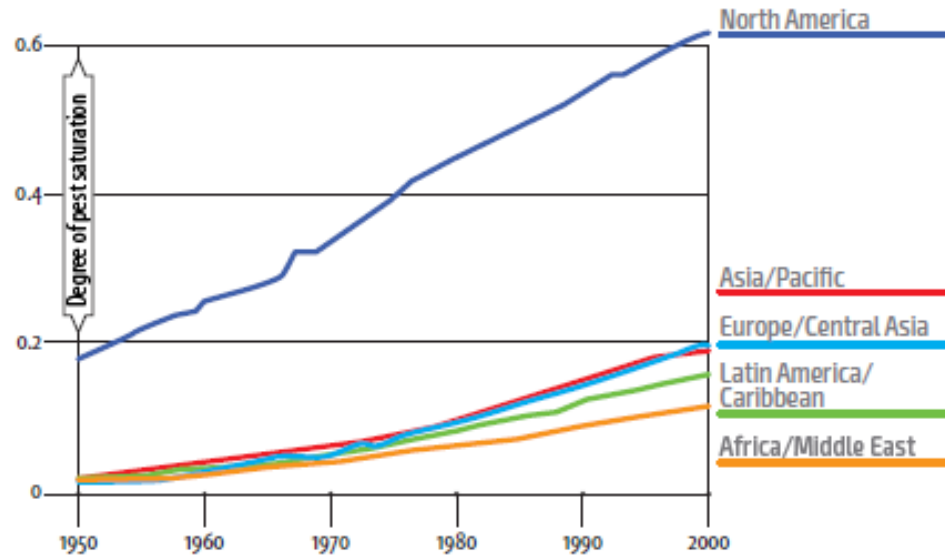
Food and Agriculture Organization of the United Nations

[fao.org/publications/fofa/en](http://fao.org/publications/fofa/en)



©FAO, 2017  
16887EN/1.10.2.17

**Figure 6.2** Global spread of crop pests and pathogens, 1950–2000



Note: The degree of pest saturation for a region is the mean of the degrees of saturation of countries in that region. The degree of saturation in a country is the number of crop pests and pathogens (CPPs) currently present divided by the number of CPPs that could occur.

Source: Bebbler, Holmes and Gurr, 2014.

Potential for more  
emerging pests and  
pathogens



# What are the Characteristics of Emerging Plant Diseases?

- Caused by pathogens that have increased in incidence, geographical or host range
- Have changed in pathogenesis
- Have newly evolved
- Have been discovered or newly recognized.

Anderson et al, TRENDS in Ecology and Evolution 2004.

# Plant disease threatens food security and national security



Late blight – *Phytophthora infestans*

# Late blight re-emerging disease: A constraint to production worldwide - food security



**Has increased in incidence, geographical  
and host range**

# Late blight epidemics in the US in 2009

## Emergence of US-22 strain

- Climate change – rainy season
- Movement of infected tomato transplants
- Susceptible varieties

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**The New York Times**

**Opinion**

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OP-ED CONTRIBUTOR

### You Say Tomato, I Say Agricultural Disaster




By DAN BARBER  
Published: August 8, 2009

Tarrytown, N.Y.

SIGN IN TO RECOMMEND

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### Science News

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#### Late Blight -- Irish Potato Famine Fungus -- Attacks U.S. Northeast Gardens And Farms Hard

ScienceDaily (July 5, 2009) — Home gardeners beware: This year, late blight -- a destructive infectious disease that caused the Irish potato famine in the 1840s -- is killing tomato and potato plants in gardens and on commercial farms in the Northeast. In addition, basil downy mildew is affecting plants in the Northeast.



Leaf lesions due to late blight. (Credit: Copyright College of Agriculture and Life Sciences, Cornell University)

"Late blight has never occurred this early and this widespread in the U.S.," said Meg McGrath, associate professor of plant pathology and plant-microbe biology.

One of the most visible early symptoms of the disease is brown spots (lesions) on stems. They begin small and firm, then quickly enlarge, with white fungal growth developing under moist conditions that leads to a soft rot collapsing the stem.

Classic symptoms are large (at least nickel-sized) olive-green to brown spots on leaves with slightly fuzzy white fungal growth on the underside when conditions have been humid (early morning or after rain). Sometimes the spot is yellow or has a water-soaked appearance. Firm, brown spots begin tiny, irregularly shaped and brown. Firm, brown spots on tomato fruit.

Ads by Google

**Plant Problems? Try BASF**  
Control downy mildew diseases with BASF Stature SC fungicide  
[www.BetterPlants.com](http://www.BetterPlants.com)

**2009 Mazda Clearance**  
Inventory blowout pricing!  
Dealers are liquidating inventory  
[Mazda.Reply.com](http://Mazda.Reply.com)

### The New York Times

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July 18, 2009

#### Outbreak of Fungus Threatens Tomato Crop

By JILLIA MOSKIN

A highly contagious fungus that destroys tomato plants has quickly spread to nearly every state in the Northeast and the mid-Atlantic, and the weather over the next week may determine whether the outbreak abates or whether tomato crops are ruined, according to federal and state agriculture officials.

The spores of the fungus, called late blight, are often present in the soil, and small outbreaks are not uncommon in August and September. But the cool, wet weather in June and the aggressively infectious nature of the pathogen have combined to produce what Martin A. Draper, a senior plant pathologist at the [United States Department of Agriculture](http://www.usda.gov), described as an "explosive" rate of infection.

William Fry, a professor of plant pathology at Cornell, said, "I've never seen this on such a wide scale."

A strain of the fungus was responsible for the Irish potato famine of the mid-19th century. The current outbreak is believed to have spread from plants in garden stores to backyard gardens and commercial fields. If it continues, there could be widespread destruction of tomato crops, especially organic ones, and higher prices at the market.

"Locally grown tomatoes normally get \$15 to \$20 a box" at wholesale, said John Mishanec, a pest management specialist at Cornell who has been visiting farms and organizing emergency growers' meetings across upstate New York. "Some growers are talking about \$40 boxes already." Tomatoes on almost every farm in New York's fertile "Black Dirt" region in the lower Hudson Valley, he said, have been affected.

Professor Fry, who is genetically tracking the blight, said the outbreak spread in part from the hundreds of thousands of tomato plants bought by home gardeners at Wal-Mart, Lowe's, Home Depot and Kmart stores starting in April. The wholesale gardening company [Bonnie Plants](http://www.BonniePlants.com), based in Alabama, had supplied most of the seedlings and recalled all remaining plants starting on June 26. Dennis Thomas, Bonnie Plants' general manager, said five of the recalled plants showed signs of late blight.

"This pathogen did not come from our plants," Mr. Thomas said on Wednesday. "This is something that has been around forever."

Mr. Draper said the diseased seedlings, found in stores as far west as Ohio, were at least one source of the illness, but he added, "It's possible that we are looking at multiple sources."

# Viral diseases of cassava in Africa – Newly evolved, host jumps

healthy tubers

Cassava mosaic disease

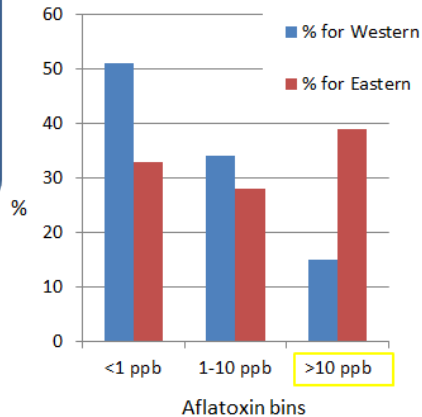
Cassava brown streak disease



- Pathogen may have jumped host from indigenous plants when cassava was introduced into Africa from South America- Accidental Host
- Cassava Mosaic Virus in Uganda – \$60 million losses

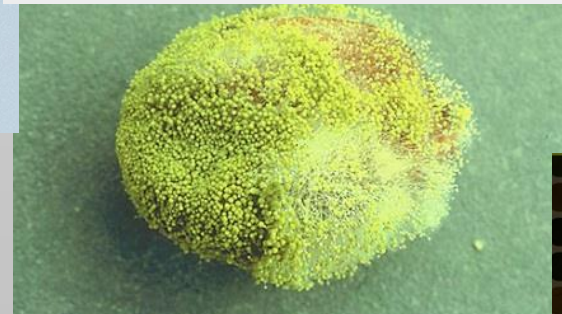
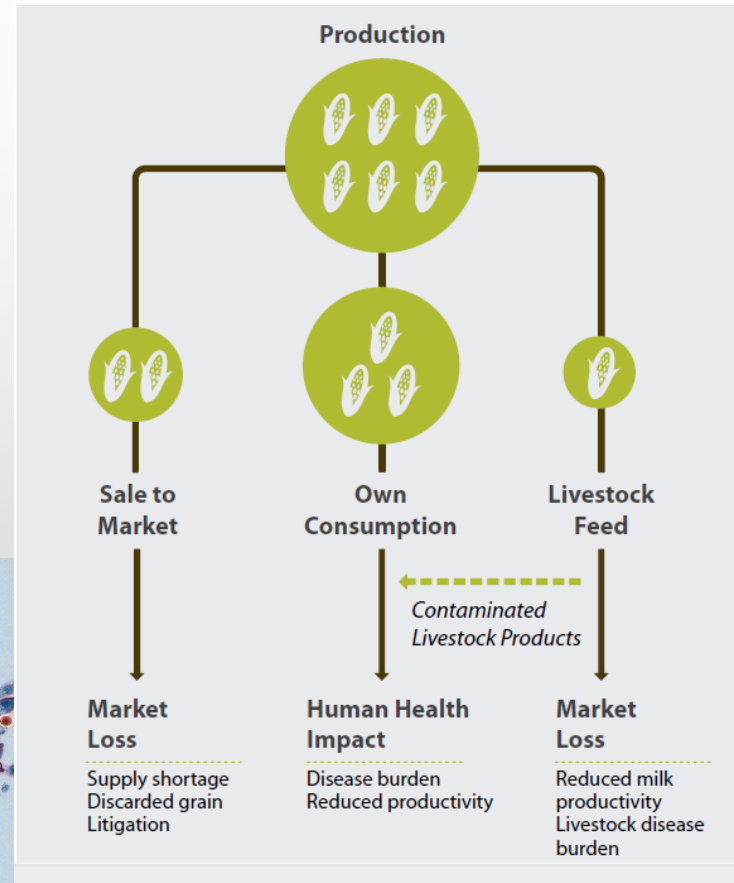
# Aflatoxins – corn and peanut

Western  
2009  
26 mills  
n=985  
15% over  
legal limit



Eastern  
2010  
146 mills  
n=1,500  
39% over  
legal limit

S. Mutiga

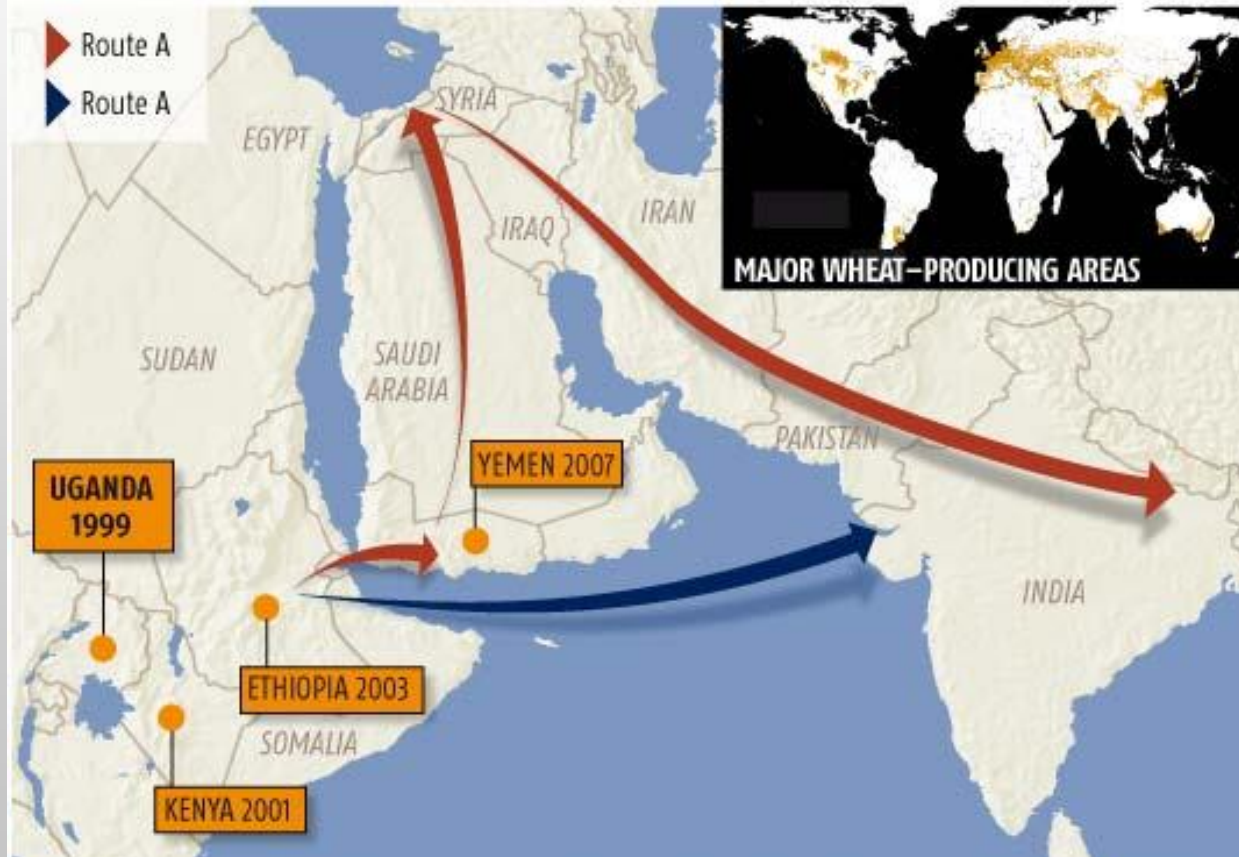


# A pathogen that has changed in pathogenesis

New virulent race (UG-99) of *Puccinia graminis* not in US yet.....

## POSSIBLE MIGRATION ROUTES OF WHEAT RUST Ug99

Based on prevailing winds and areas of wheat production, route A via the Arabian peninsula is considered the more likely route for the continuing advance of the disease



Dr. Norman Borlaug issued a call to action to find a way to reduce the impact of Ug99.

Borlaug was concerned that all of the advancement made in the past few decades during the “Green Revolution,” may be eliminated by an outbreak of Ug99.

This disease threatens to eliminate the majority of the resistant varieties developed.

# RustTracker.org

A Global Wheat Rust Monitoring System

Home Stem Rust Yellow Rust Leaf Rust Resistant Cultivars Screening Results

- About rusttracker.org

## Country Pages

— Country Pages — ▾

## Rust tools & Resources

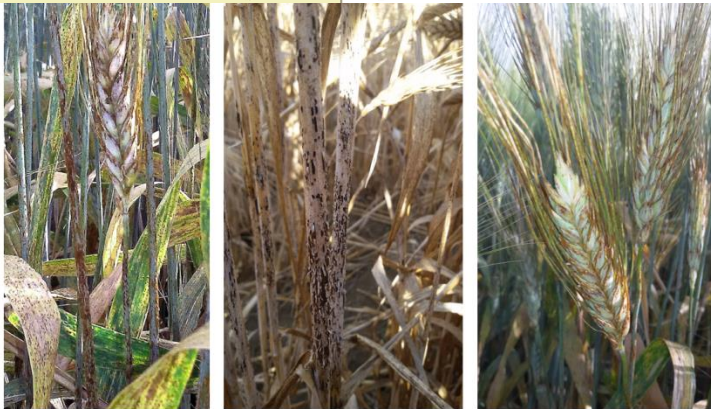
- Pathotype Tracker – Where is Ug99?
- Survey Mapper
- Importance of Rusts
- Stem Rust Tools – Maps &

## Alerts and Cautions!

- CAUTION: February 2, 2017: Risk of wheat stem rust in Mediterranean Basin in the forthcoming 2017 crop season following outbreaks on Sicily in 2016
- Alert - Jan 9, 2015: Summary of Ethiopia 2014/15 rust situation. Re-current, localized stem rust epidemics caused by race TKTTF ("Digalu" race) in Ethiopia. Extreme caution and vigilance needed in East Africa
- ALERT - Dec 23, 2013: LOCALIZED STEM RUST EPIDEMIC IN SOUTHERN ETHIOPIA. EXTREME CAUTION AND VIGILANCE NEEDED IN EAST AFRICA AND MIDDLE EAST REGION

## Wheat Rust in the News

- California wheat growers: Inspect fields for new stripe rust race – New race of stripe rust in wheat discovered in Mexico Western Farm Press | April 5, 2017
- Yellow rust diversity leads to new race-naming system FarmingUK | 8 March 2017
- Wheat workshop begins The



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Archive > Volume 542 > Issue 7640 > News > Article

NATURE | NEWS

## Deadly new wheat disease threatens Europe's crops

Researchers caution that stem rust may have returned to world's largest wheat-producing region.

# New race of stem rust discovered in Sicily, 2016



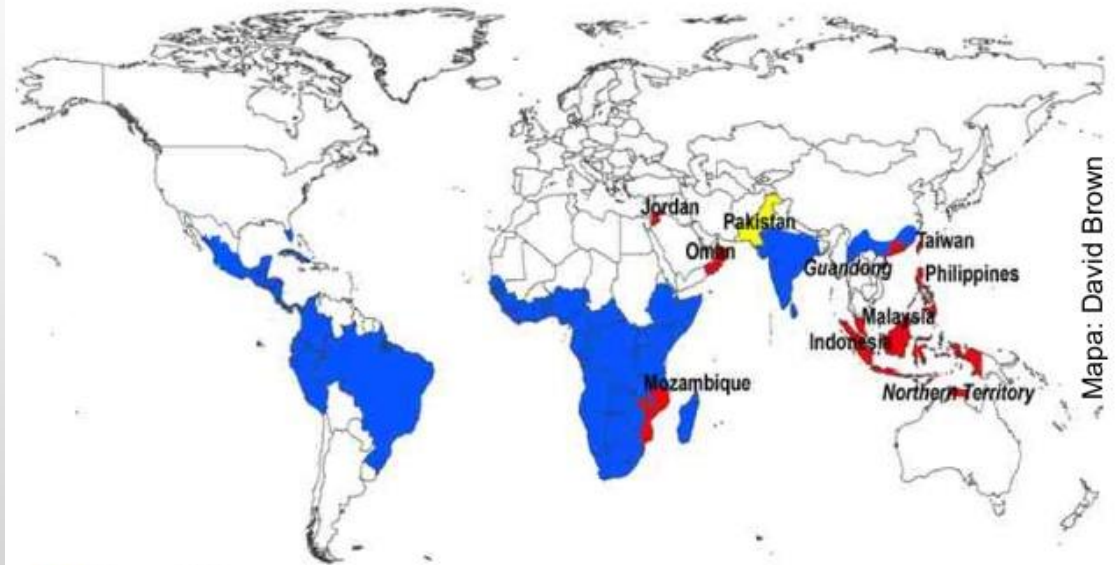
# Coffee Rust – Climate Change

- *Hemilia vastatrix* - fungus
- Wind blown spores – regional epidemics
- Lack of resistant varieties
- More disease at high altitudes
- Lack of fungicide use in shade grown coffee areas by small holders
- Old plantations >40 years



# Panama Disease – subtropical Race 4 – banana -

## Fusarium wilt of banana: Distribution of races



- Races 1, 2
- Tropical race 4, 1, 2
- Under evaluation for Tropical race 4

This MAP is only a tentative approximation of the distribution of Foc to be used for academic purposes. It is not based on any scientific studies and should not be used by authorities for decision making purposes.

A plant disease that has  
changed in pathogenesis and  
expanded in geography



# Drivers of Emerging Plant Diseases

- **Global trade-** movement of plant materials
- **Climate change**
  - Change the distribution of vectors and pathogens
  - Increase frequency of unusual weather events
  - Drought stress – aflatoxins
  - Milder winters- increase pathogen survival
- **Agricultural change:**
  - Developing countries – increased intensity and acreage of nontraditional crops (fruits, flowers, vegetables).
  - > 40% of world crops – 4 staples – monoculture and loss of genetic diversity are major issues
- **Host parasite evolution-**
  - interspecific hybridization - Alder– *Phytophthora alni*,
  - Host jumps – Cassava Mosaic Virus

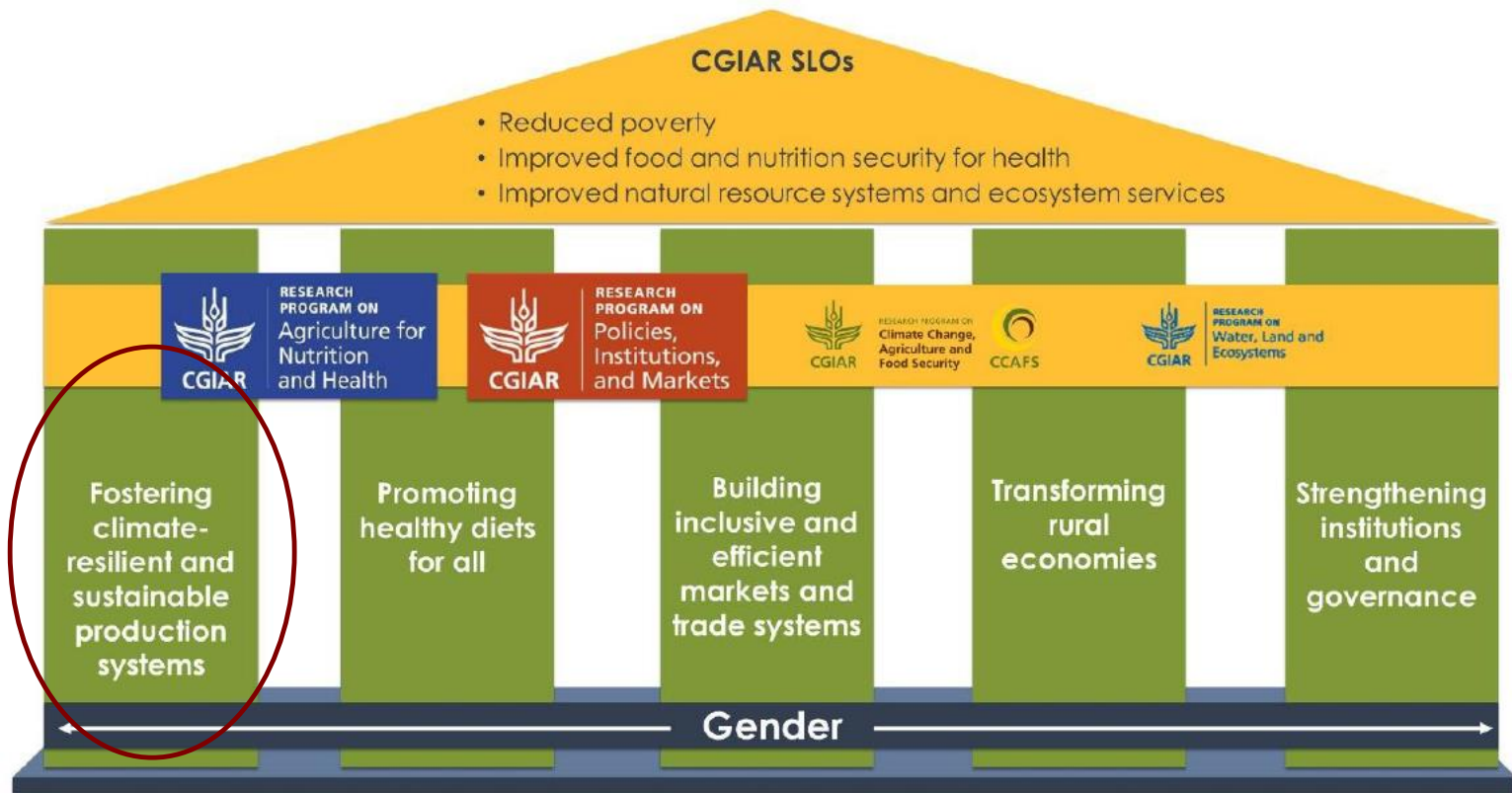


Figure 2: IFPRI, CRP, and CGIAR alignment

# Alignment with CGIAR



**Bioinformatics**  
evolution of infectious pathogens, new phylogenetic methods to track epidemic dynamics using pathogen sequence data



**Landscape Ecologist-**  
management, climate change, and natural disturbances impact resilience



**Engineer** - next-generation field-deployable molecular imaging, sensing, and diagnostic tools



**Biologist-** plant-virus-vector interactions, biologically-based strategies for controlling viruses and arthropod vectors.

New faculty  
Emerging Plant Disease  
Global Food Security

The GFSI brings together scientific thought leaders from six **NC State** Colleges and the Chancellors Faculty Excellence Program Clusters, expertise from **Duke University** World Food Policy Center and the Triangle Center for Evolutionary Medicine (**TRICEM**), Food Security and Agriculture from **RTI International**, Nutrition and Public Health from **UNC-CH**, and **companies in RTP**.

**NC STATE UNIVERSITY**



THE UNIVERSITY  
of NORTH CAROLINA  
at CHAPEL HILL

**Duke**  
UNIVERSITY

**RTI**  
INTERNATIONAL



**Global Food  
Security Initiative,  
April, 2017**



THE RESEARCH  
TRIANGLE PARK

[www.globalfoodsecurity.ncsu.edu](http://www.globalfoodsecurity.ncsu.edu)

# Areas of Research GFSI



**NC STATE**  
UNIVERSITY

Global Food Security



THE UNIVERSITY  
of NORTH CAROLINA  
at CHAPEL HILL



**Duke**  
UNIVERSITY



# Integrating agriculture and nutrition for a healthier and more sustainable world

Triangle Global Health Consortium Annual Conference

Paul Weisenfeld

Executive Vice President, International Development



# The Feed the Future Initiative



U.S. Government effort to address the **root causes of hunger and poverty**.

Supports partner **country-led efforts** through the work of 11 U.S. federal agencies.

# Feed the Future Senegal Naatal Mbay Project



USAID-funded project to boost smallholder incomes by significantly **scaling up and expanding successful technologies**.

Strengthens **production, productivity, and marketing** of irrigated and rain-fed **rice, maize, and millet**.

# Rwanda Milk Production Study



Supporting Feed the Future Innovation Lab for Livestock Systems (at University of Florida) to **evaluate nutrition impacts** and animal source food consumption.

Will help measure whether a **recent nutrition education** intervention has shown **successful outcomes**.

# The Locality of Global Health

*Hunger, Obesity, and Chronic Disease in Edgecombe County NC*



**Jen Zuckerman**

**Director of Strategic Initiatives**

**World Food Policy Center, Duke University**

**[Jennifer.Zuckerman@duke.edu](mailto:Jennifer.Zuckerman@duke.edu)**

# World Food Policy Center

2

- New center, established in July 2017
- Within Sanford School of Public Policy, Duke University
- Directed by Dr. Kelly Brownell
- Looking at issues of food across policy areas:
  - ▣ Hunger and Malnutrition
  - ▣ Obesity and Chronic Disease
  - ▣ Agriculture and the Environment
  - ▣ Food Safety and Food Defense
- Global center, rooted in North Carolina
- Durham and Edgecombe as model food communities

# North Carolina

Source - USDA Economic Research Service, ESRI

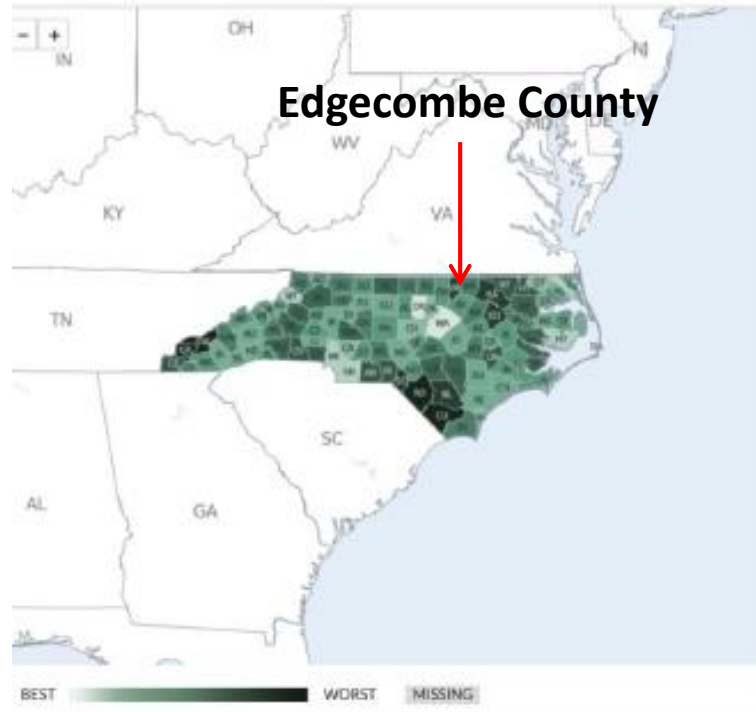
3

## PREMATURE DEATHS, 2017

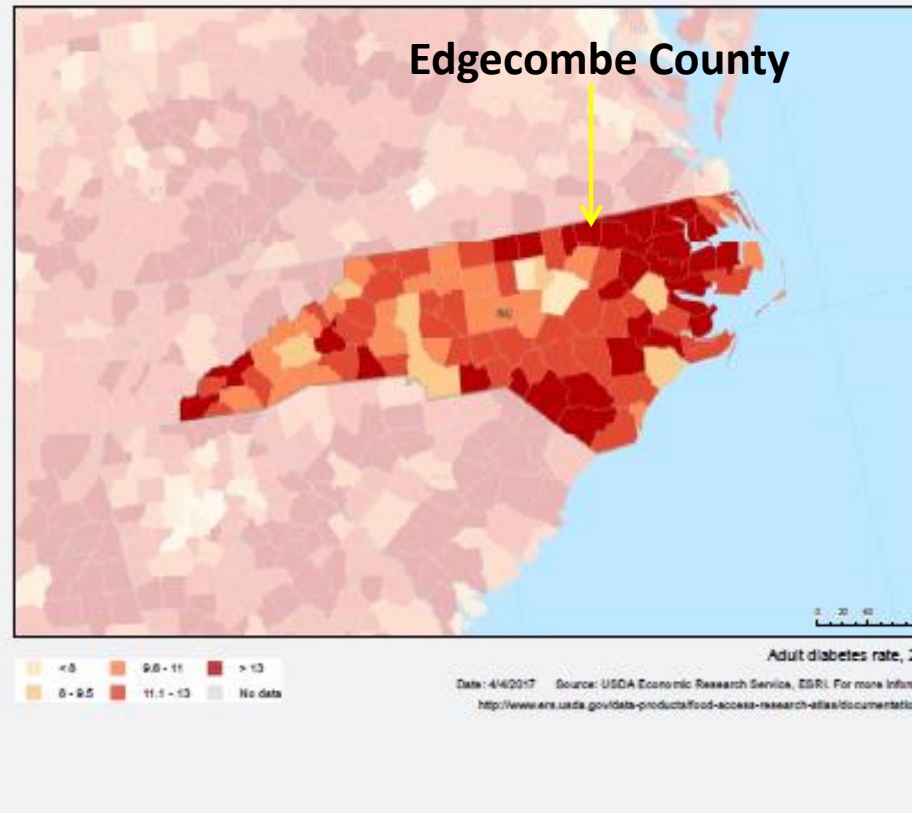
### remature death

ars of potential life lost before age 75 per 100,000 population (age-adjusted). Learn more about is measure.

ap | Data | Description | Data Source

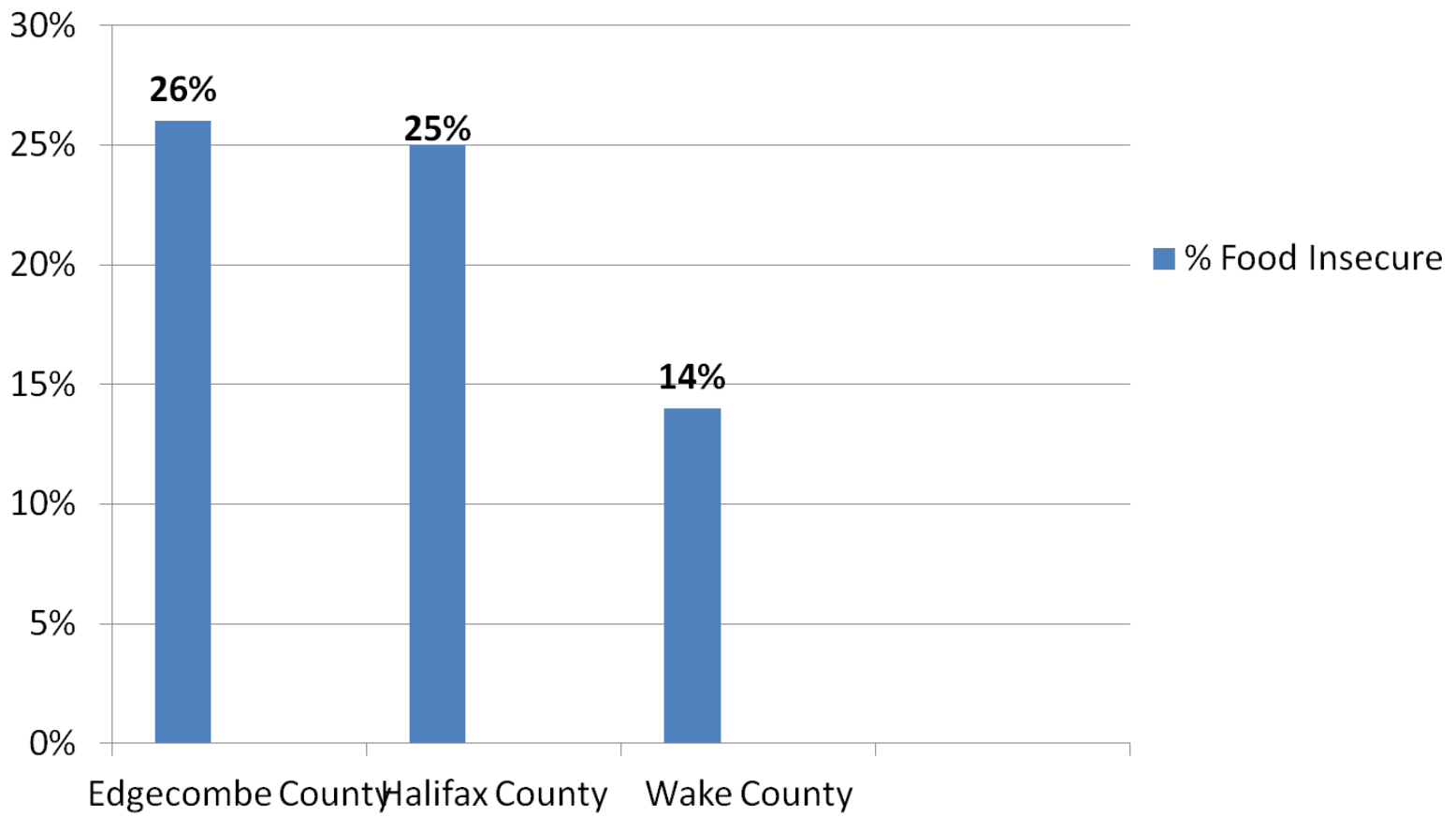


## ADULT DIABETES RATE, 2010



# Food Insecurity in NC - Percentage Food Insecure

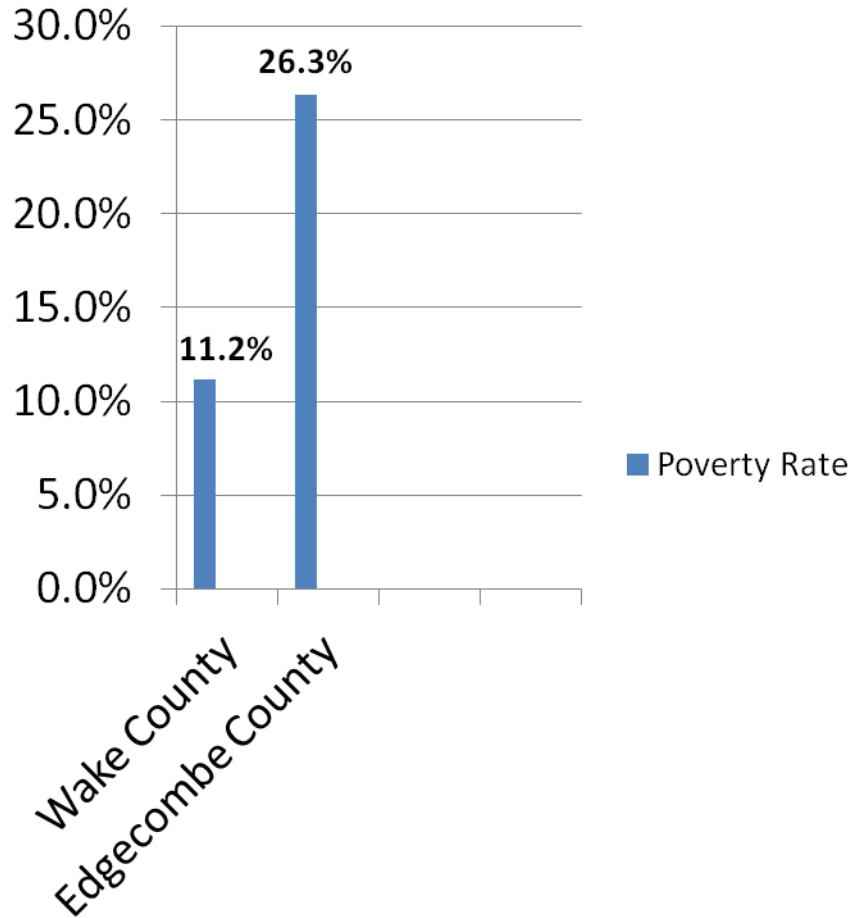
Source - Robert Wood Johnson 2017 County Health Rankings and Roadmaps



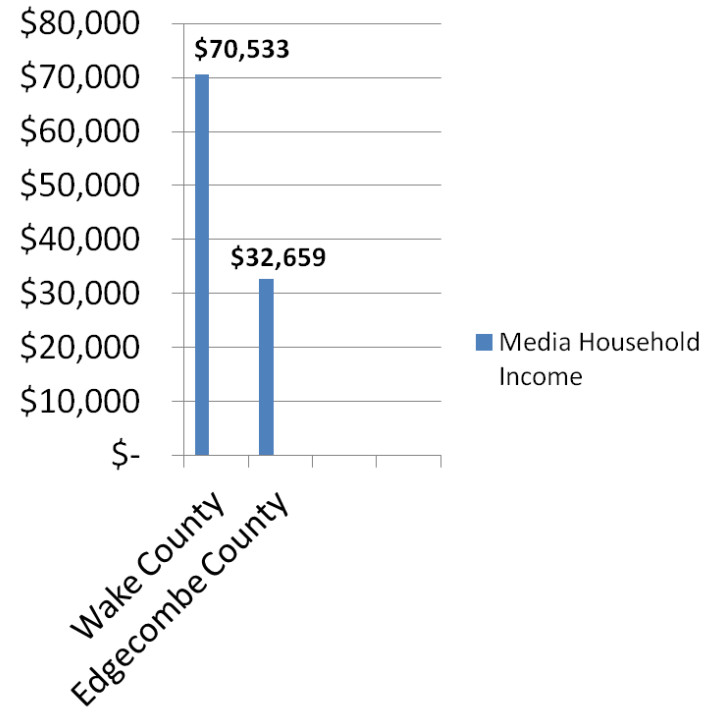
# Poverty and Median Household Income

Source - Data USA, Wake County, NC and Edgecombe County, NC

## Poverty Rate



## Median Household Income





# Conetoe: it started with a garden

6

## Social Determinants model:

- Focus on education, economic stability, neighborhood and built environment, health and healthcare, social and community context

## Results:

- Graduation rate increased from 40%-98%
- No teen pregnancies
- Reduced ER use from 96 people per year to 24
- \$24K in scholarship funds collected through garden funds
- GAP certification-selling into hospitals and schools

# Conetoe, North Carolina

7

- Growing food and growing people:



# Growing what works

8

## What is a model food systems community?

- ❑ Investing in people
- ❑ Listening to community
- ❑ Building capacity
- ❑ Providing technical assistance and support
- ❑ Importing and exporting expertise
- ❑ Documenting the success