



IFSTAL

Innovative Food Systems Teaching And Learning



IFSTAL Accra 2018

Monday 23rd July – Lecture 1

Basics of Food Systems





Food security...

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

(UN-FAO World Food Summit 1996, 2012)



- ... is universally applicable
- ... is more than food production
- ... is underpinned by food systems

'Unpacking' food security

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



Food Security, i.e. **stability** over time for:

FOOD UTILISATION

- *Nutritional Value*
- *Social Value*
- *Food Safety*

FOOD ACCESS

- *Affordability*
- *Allocation*
- *Preference*

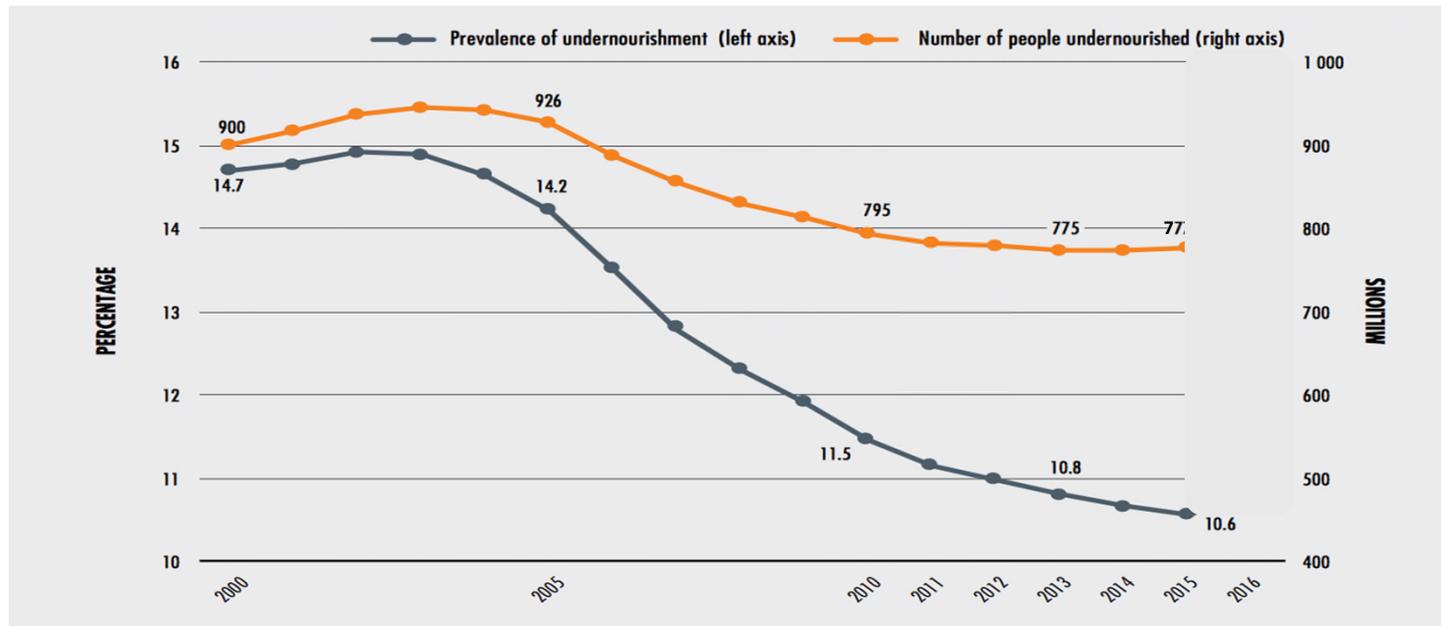
FOOD AVAILABILITY

- *Production*
- *Distribution*
- *Exchange*



Prevalence of hunger ...

% of world population



Food and Agriculture Organization
of the United Nations

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15 September 2017, Rome

World hunger again on the rise, driven by conflict and climate change, new UN report says

815 million people now hungry - Millions of children at risk from malnutrition

... ?3 billion people suffer from Vit A, Fe, I, Zn and/or other micronutrient deficiencies: “Hidden Hunger”

theguardian

About a third of the global population is Zn-deficient
(Barrett and Bevis 2015)

globaldevelopment

Supported by
BILL & MELINDA

At least half of children worldwide aged 6 months
to 5 years suffer from micronutrient deficiency
(CDC 2017)

BETTER ACCESS TO FOOD

Though hunger has been reduced substantially, poor-quality food

8+1 4

About one in five people in UK has low vitamin D levels
(NHS 2016)

Hunger · Malnutrition

Food security...



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

“enough for a particular purpose; as much as you need”

... OED

And so – by definition – a further ~2.5 billion of us are also ‘food insecure’ due to changing diets!

Global: 33% of adults are overweight or obese.

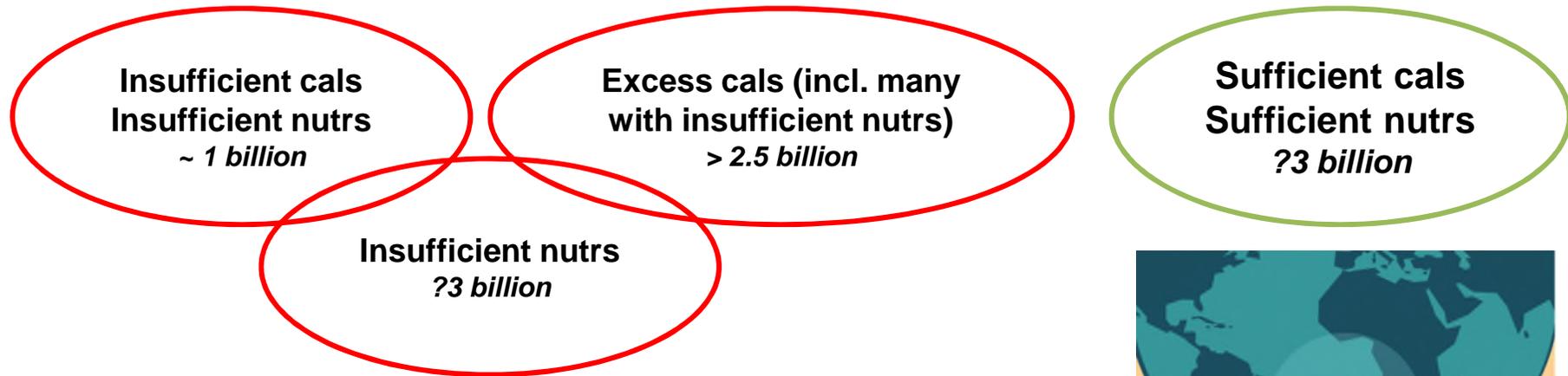
Australia: 60% of adults are overweight or obese.

England: 14% of Yr 6 children overweight & 20% obese.

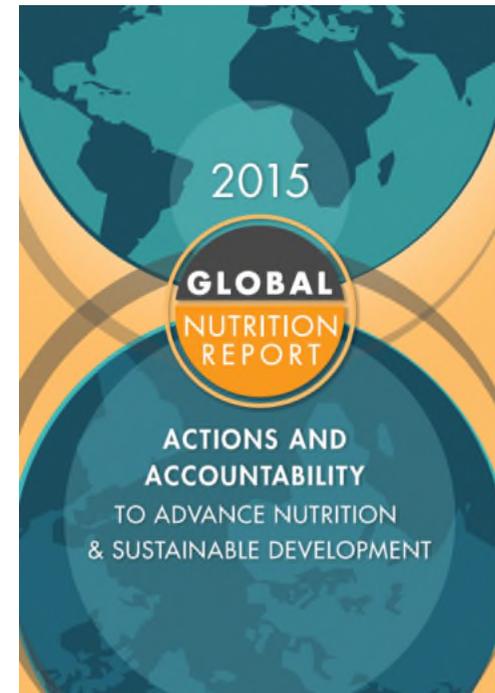
Shanghai: Over 200,000 (14%) children are obese



Overall global food security 'situation'

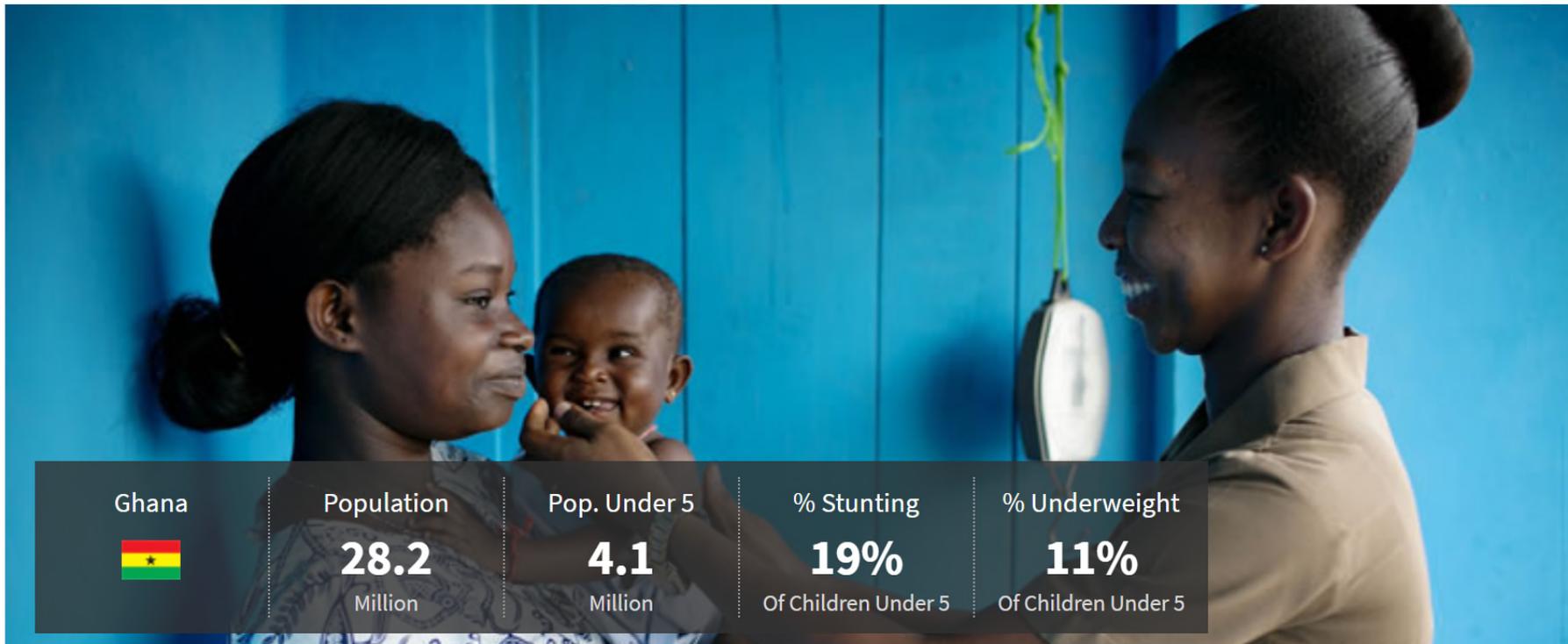


- **“Triple Burden of Malnutrition”**
Different, overlapping forms of malnutrition the ‘new normal’ (IFPRI 2015)



What's the 'situation' in Ghana? *undernutrition*

GHANA: NUTRITION PROFILE



What's the 'situation' in Ghana?

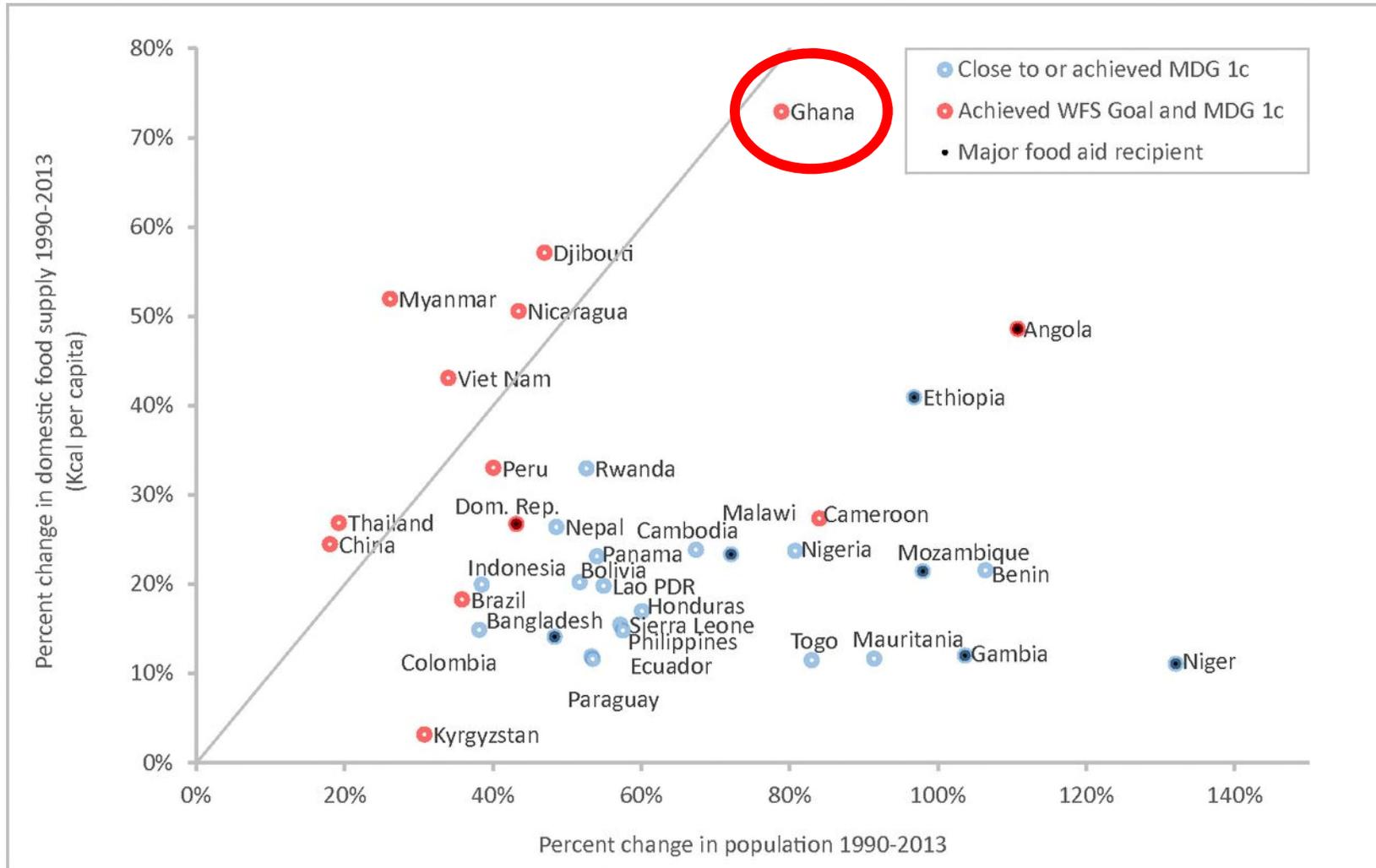
overnutrition



The screenshot shows the GhanaWeb website interface. At the top, there is a search bar and navigation links for 'Sign up' and 'Login'. Below the search bar is a breadcrumb trail: 'You are here: Home → News → 2018 02 07 → Article 624163'. A horizontal menu contains categories: News, Sports, Business, Entertainment, World, Country, TV / Radio, and Wall. On the left, a 'Latest News' sidebar lists various news categories. The main content area features a news article titled 'Is fast food to blame for Ghana's obesity epidemic?' dated Wednesday, 7 February 2018, with a source of 'face2faceafrica.com'. The article text states: 'There is growing concern about rising obesity in Ghana and Africa at large. According to research by Quartz, obesity is high among urban African women between 15 and 49 years and has increased in the 24 African countries the research has been conducted in over the last 25 years.'

- 22% obesity in Ghana
- most prevalent among lower income earners
- 'fast food' most cited factor

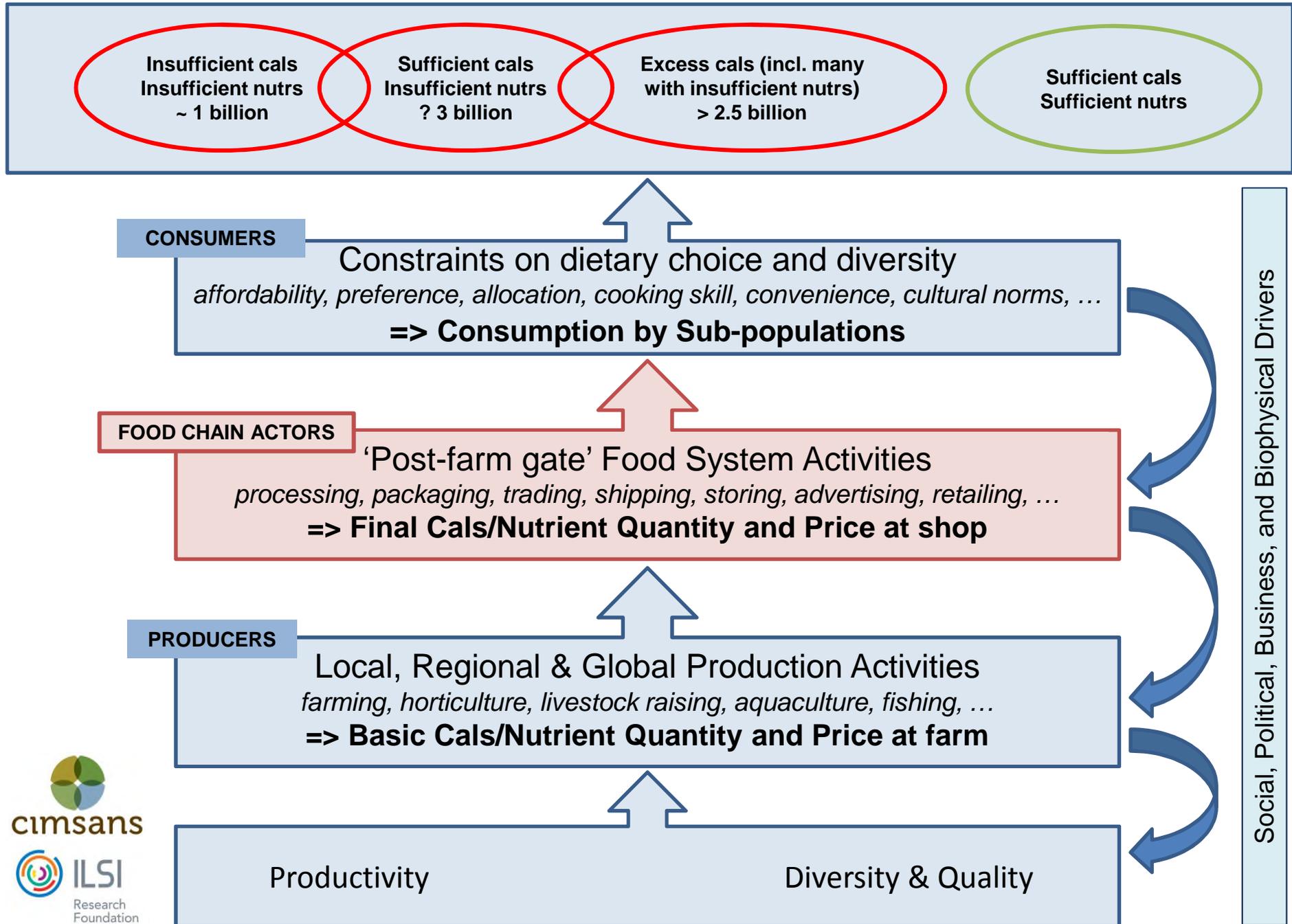
Population growth versus food supply per capita, 1990–2013 (from refs. 6–10).



Prabhu L. Pingali PNAS 2016;113:18:4880-4883

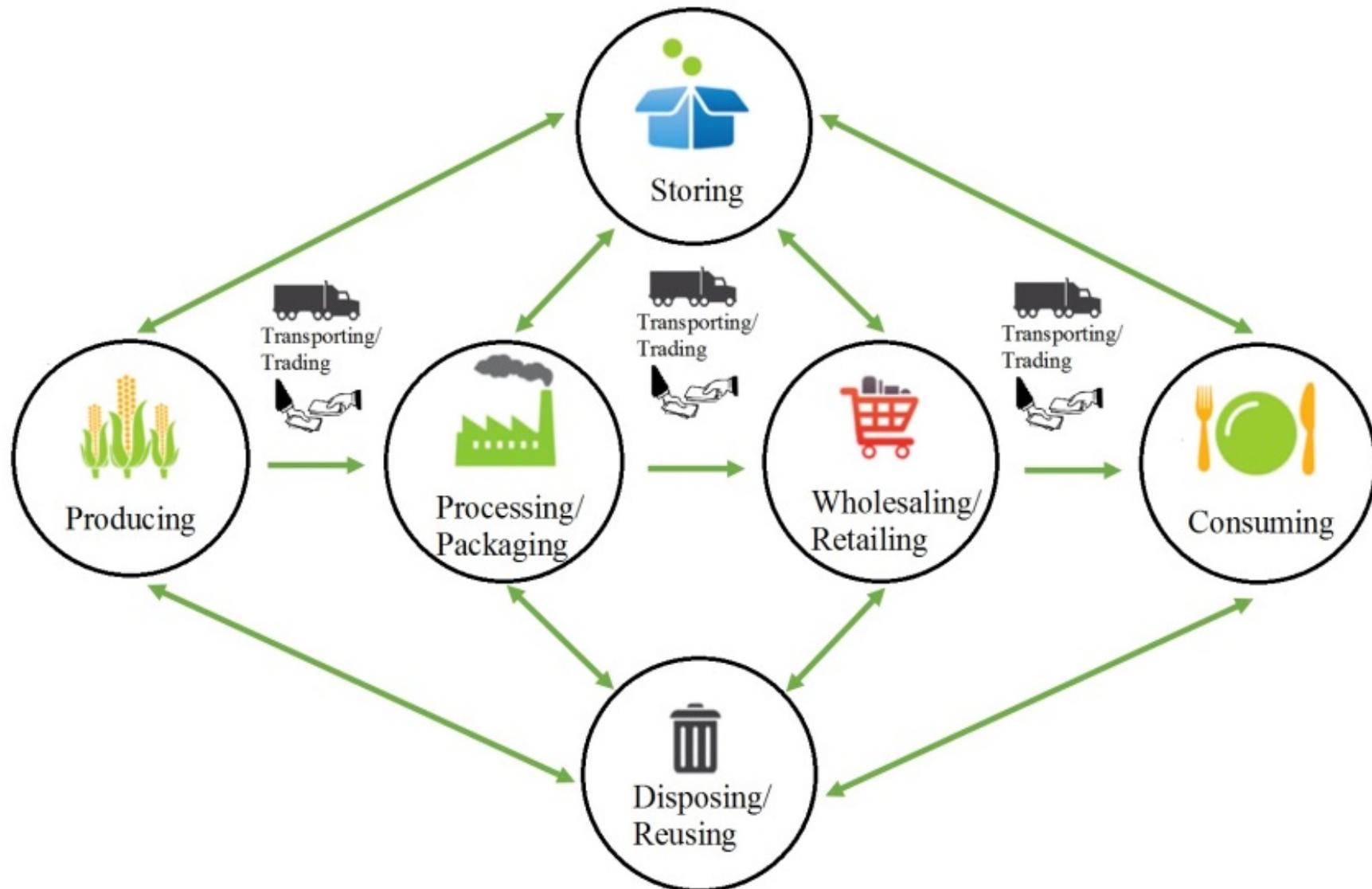
PNAS

Analysing the food security situation



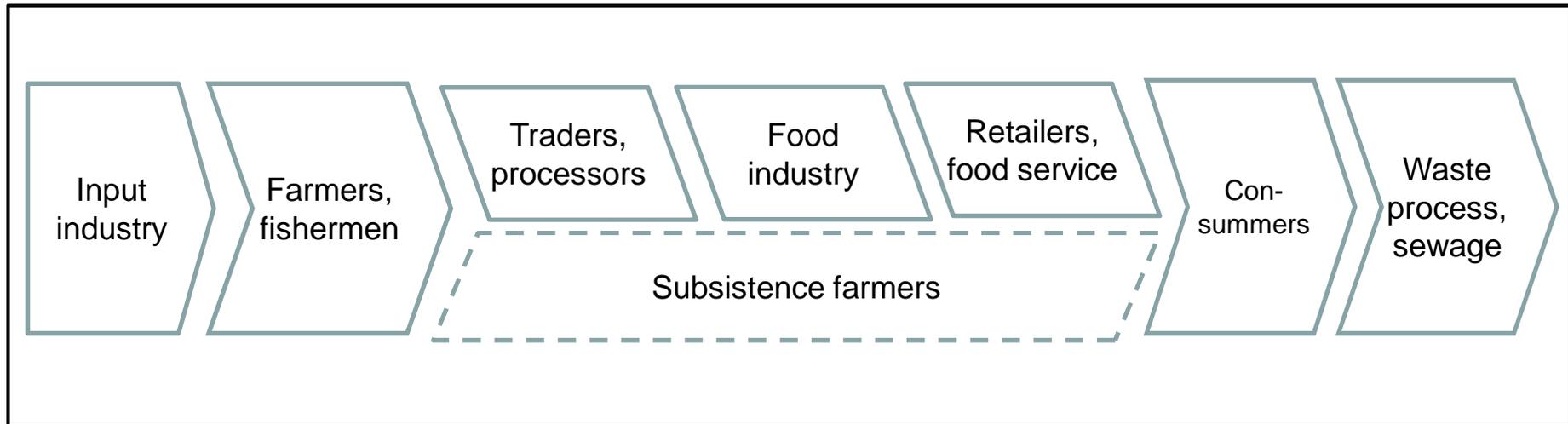
“Unpacking the Food System”

1: Recognising different Food System ‘Activities’



“Unpacking the Food System”

2: Identifying the range of Food System ‘Actors’

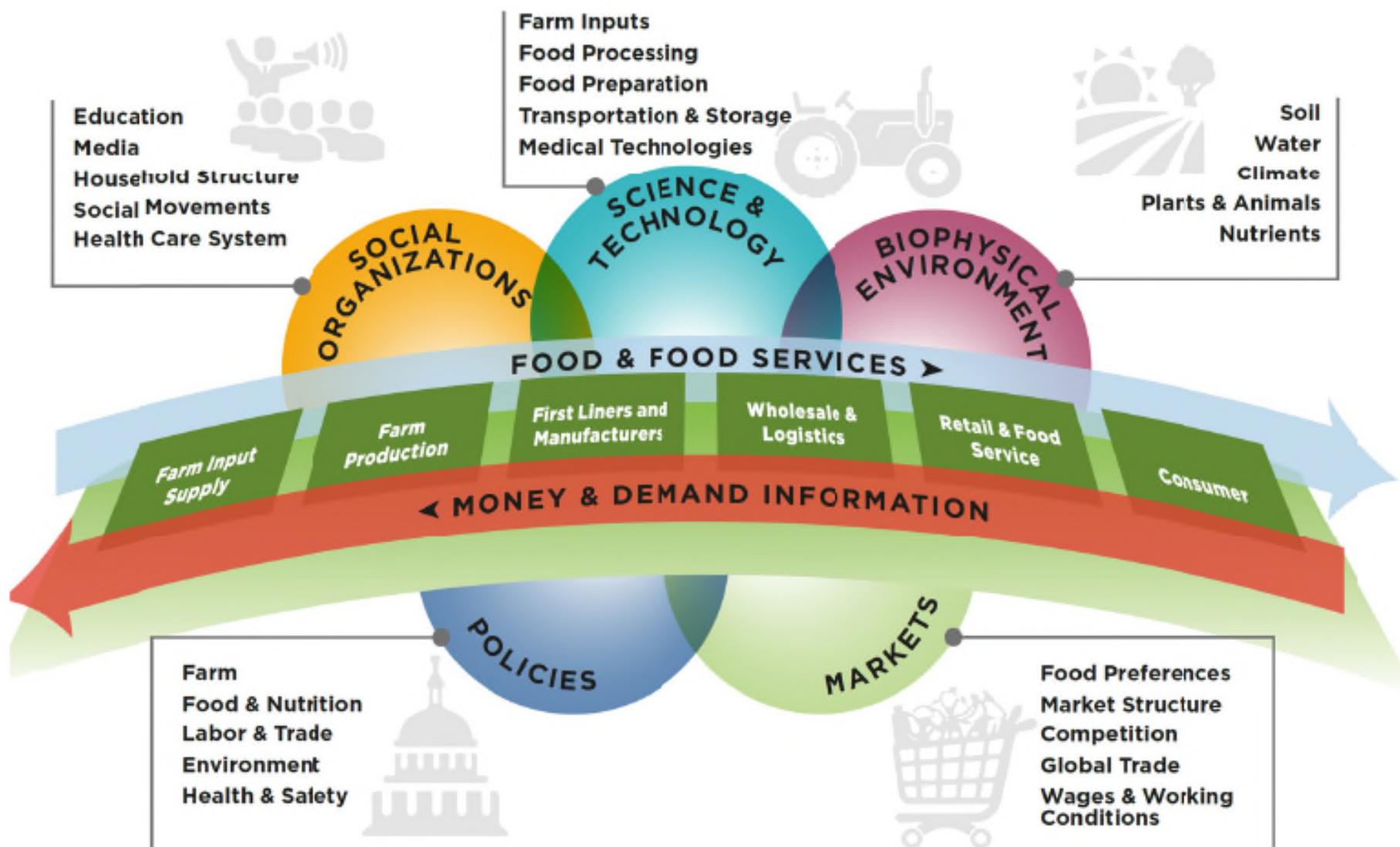


Noting they are all influenced by a range of ‘drivers’ (policy, economic, social, env, S&T, ...)

.... and all have a range of motives

“Unpacking the Food System”

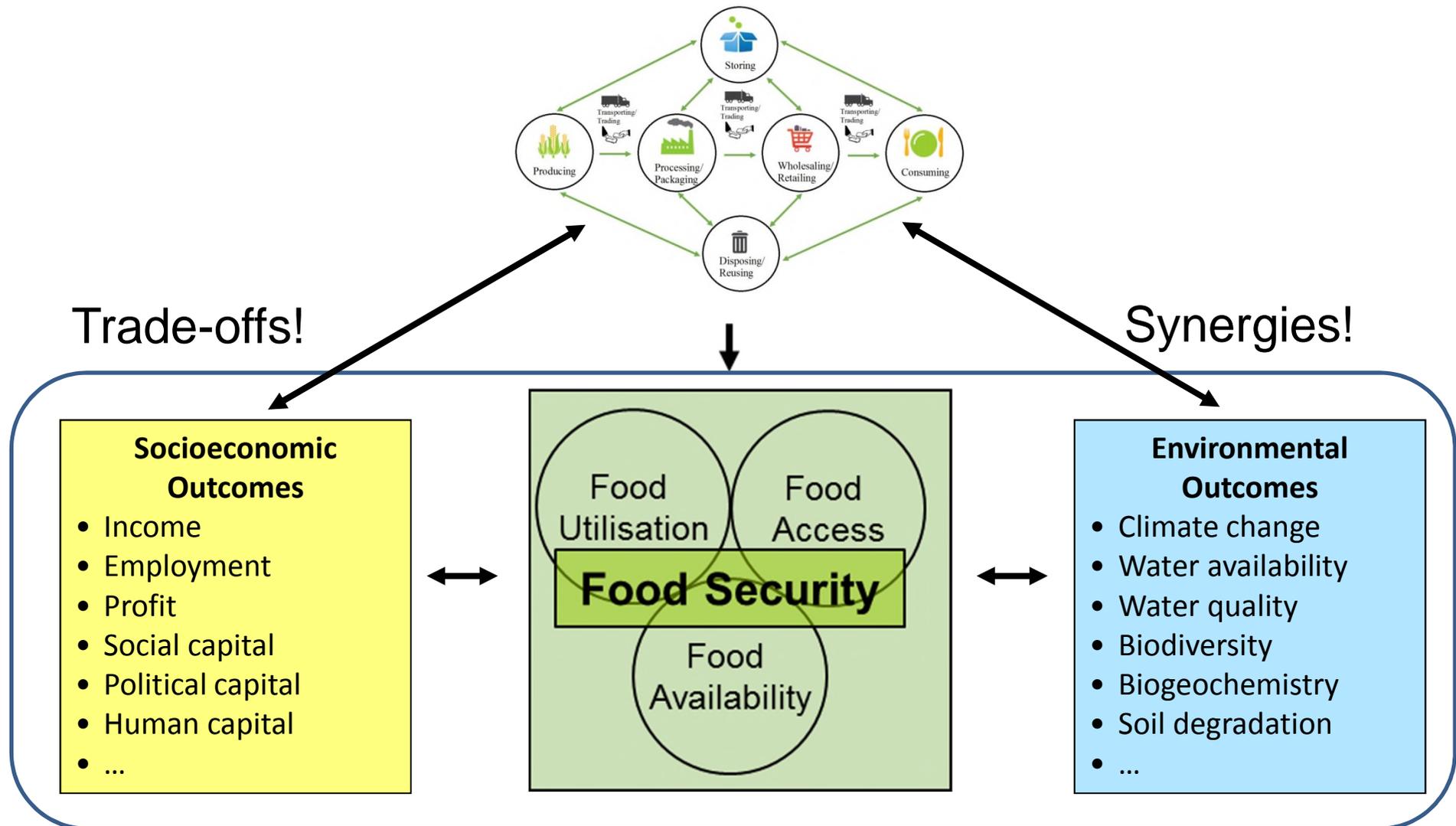
3: Recognising a wide range of ‘drivers’



Source: *The Institute of Medicine & The National Research Council of the National Academies, 2015*

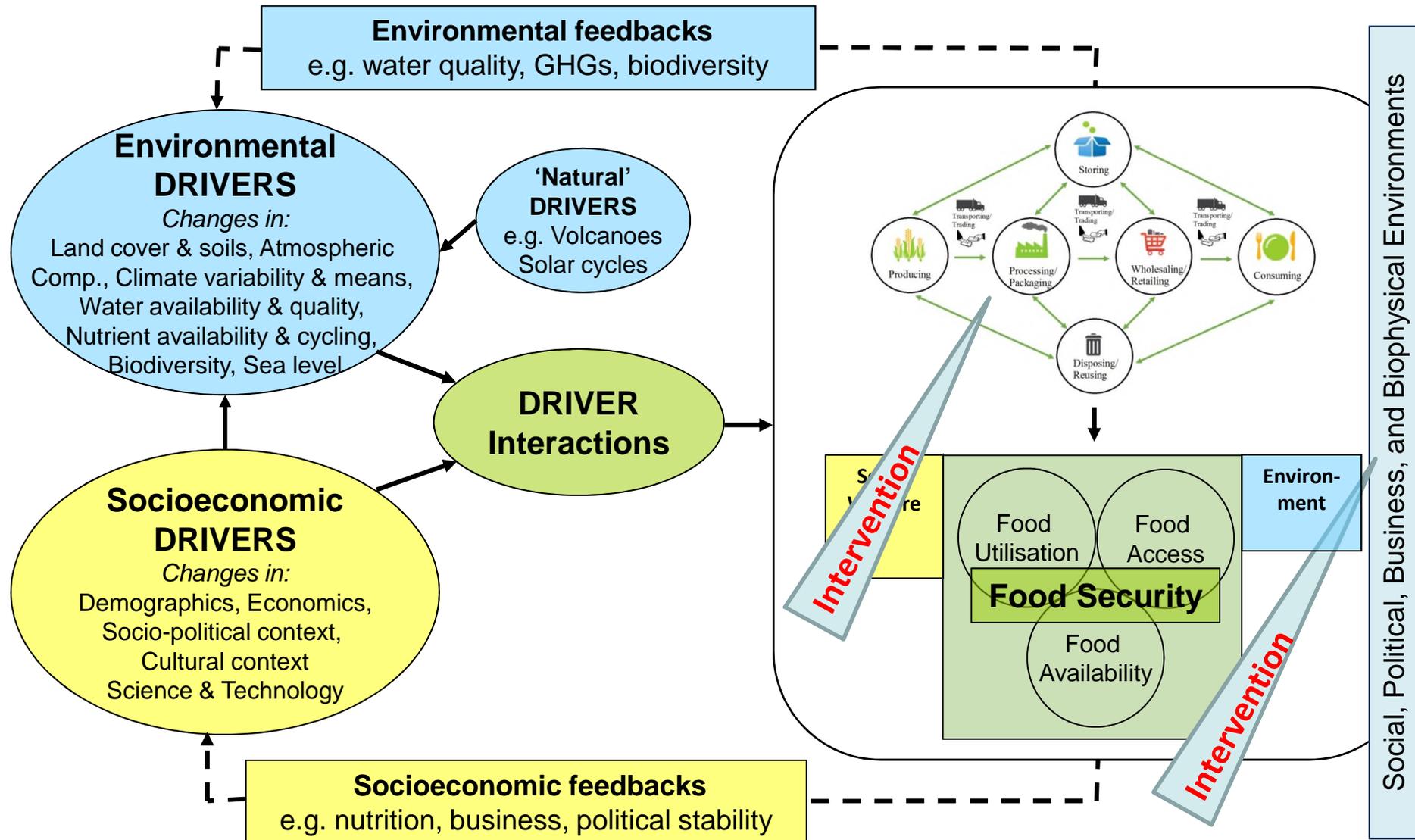
“Unpacking the Food System”

4: Including a range of ‘Outcomes’



A 'Complex Adaptive System'

Where to intervene, and who does what?



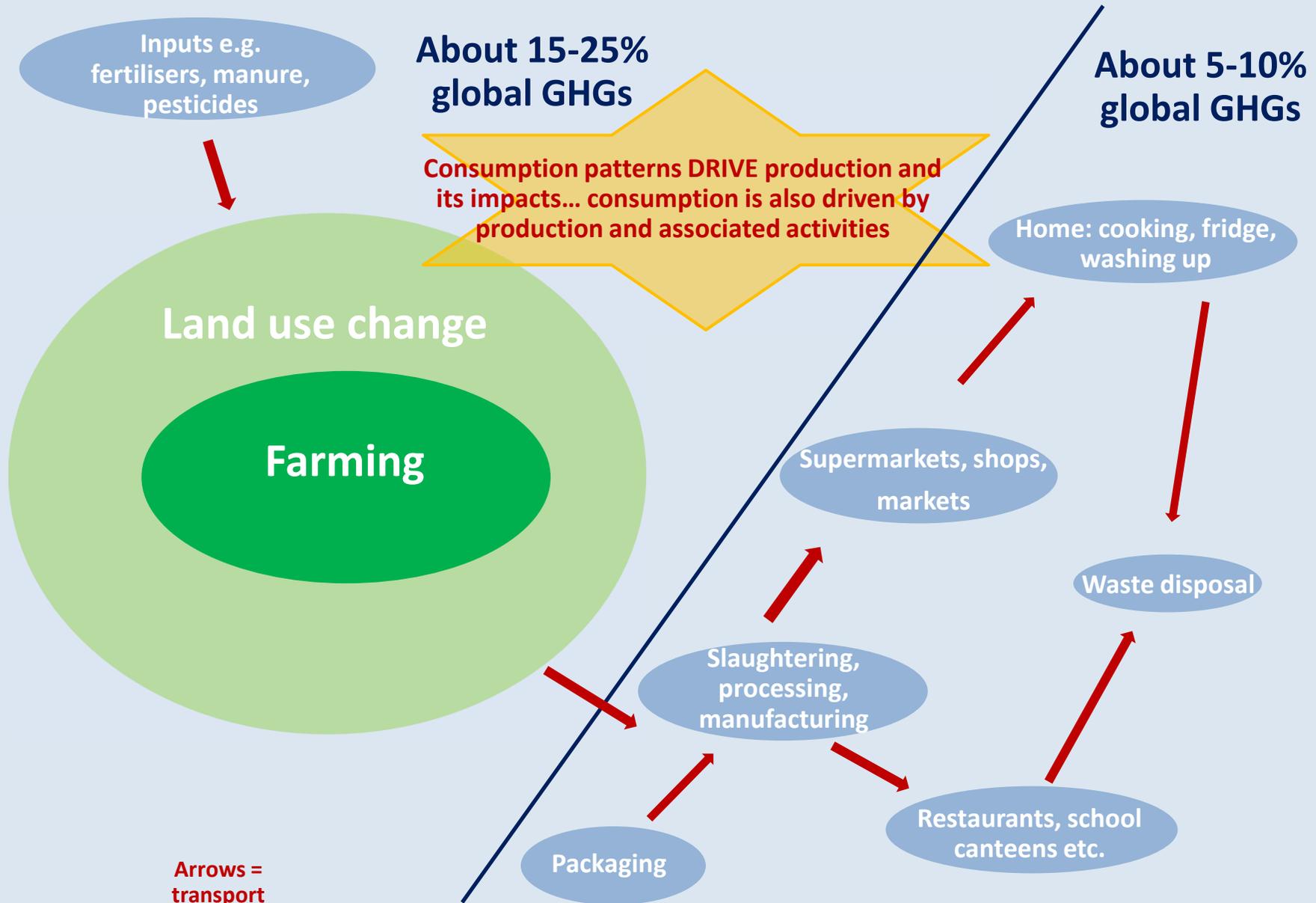
Contribution of Food System activities to Environmental Change

- Soil 33% degraded
- Fresh water 20% aquifers overexploited
- Biodiversity 60% of loss
- Marine resources 29% over-fished; 61% fully-fished
- Fossil fuels 30% of all fossil fuel use

And 24% of total GHG emissions



Summary: Pre- and post-farm gate

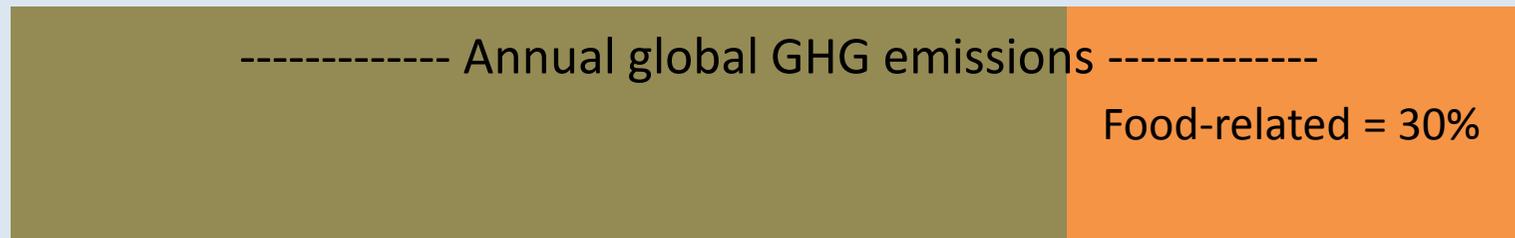


Slide courtesy Tara Garnett, FCRN

Estimates from Vermeulen, S. J. et al.(2012) Climate Change and Food Systems. *Annual Review of Environment and Resources*. 37. p.195-222.

Food Systems and Paris targets

**2010
GHG baseline**



Food System Activities and Environmental Concerns

Example contributions of FSAs to Env	Producing food			
Climate change				
N cycle				
P cycle				
Fresh water use				
Biodiversity loss				
Atmos. aerosols				
Chemical pollution				

Food System Activities and Environmental Concerns

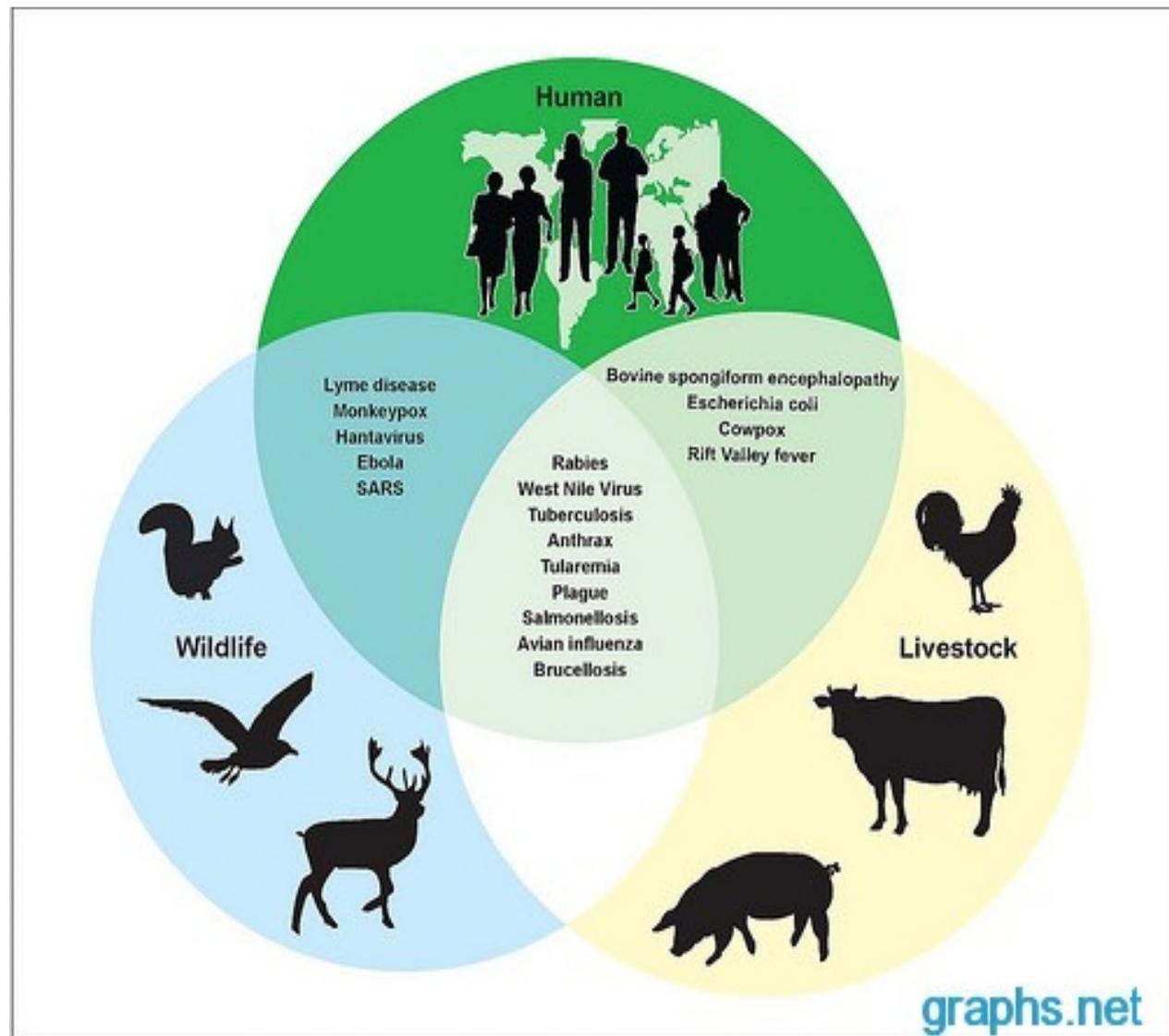
Example contributions of FSA s to Env	Producing food			
Climate change	CO ₂ , CH ₄ , N ₂ O, albedo			
N cycle	Fertilisers			
P cycle	Fertilisers			
Fresh water use	Irrigation			
Biodiversity loss	Deforestation, soils, fishing, monocultures			
Atmos. aerosols	Deforestation, tillage			
Chemical pollution	Pesticides			

Food System Activities and Environmental Concerns

Example contributions of FSAs to Env	Producing food	Processing & Packaging food	Distributing & Retailing food	Consuming food
Climate change	CO2, CH4, N2O, albedo	Factory and materials emissions	Transport and cold chain emissions	Cooking and washing emissions
N cycle	Fertilisers	Factory effluent	transport NOx	Waste
P cycle	Fertilisers	Detergents		Waste
Fresh water use	Irrigation	Washing, heating, cooling	Cleaning food	Cooking, cleaning
Biodiversity loss	Deforestation, soils, fishing. monocultures	Paper/card Metal mining	Invasive spp	Consumer choices
Atmos. aerosols	Deforestation, tillage		Shipping	Smoke from cooking
Chemical pollution	Pesticides	Factory effluent	Transport emissions	Cooking, cleaning

There are also concerns about animal-human interactions ...

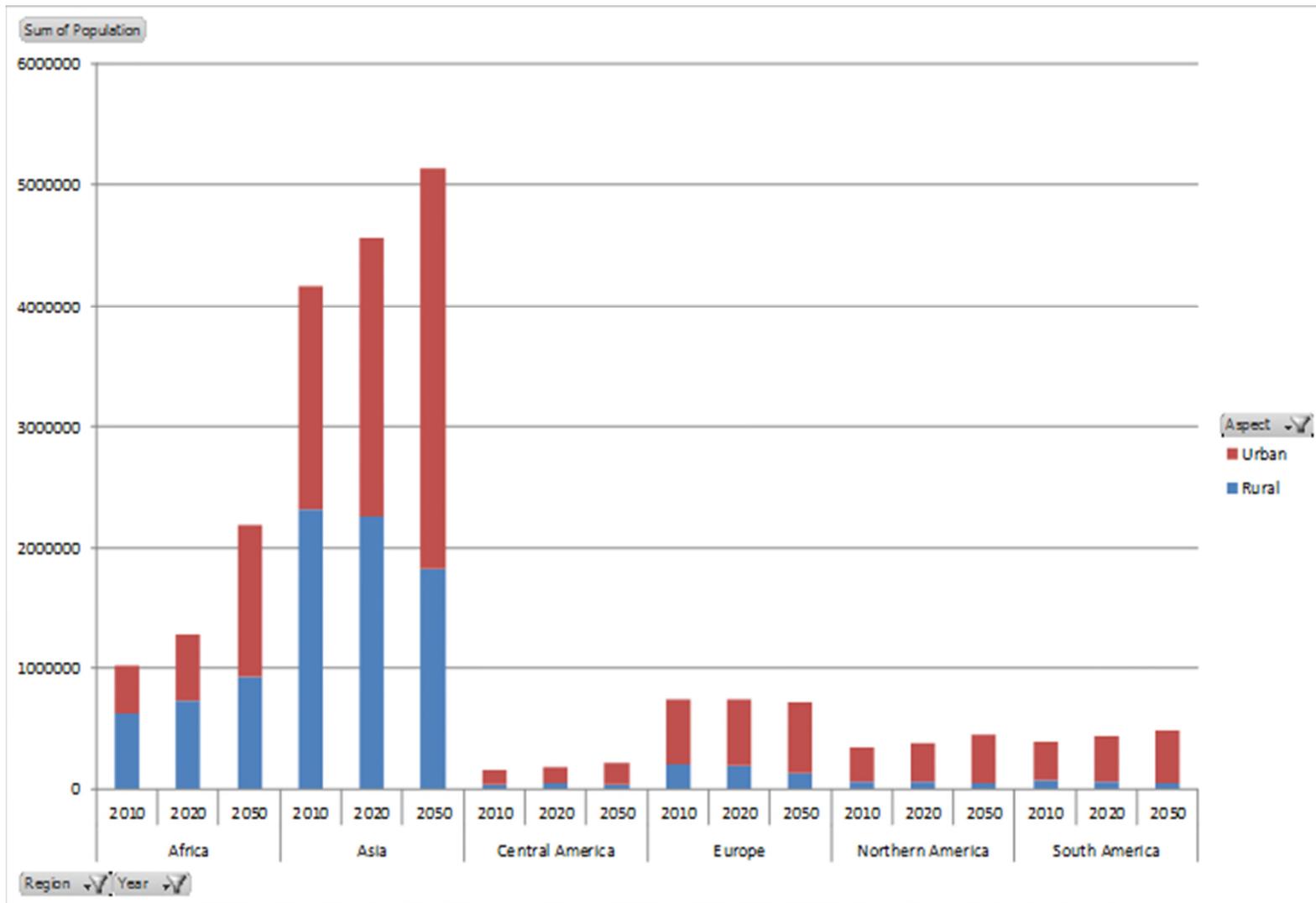
- Animal welfare
- Zoonotic disease extent, impact, spread
- Links between human and animal prophylaxis, e.g. ABR



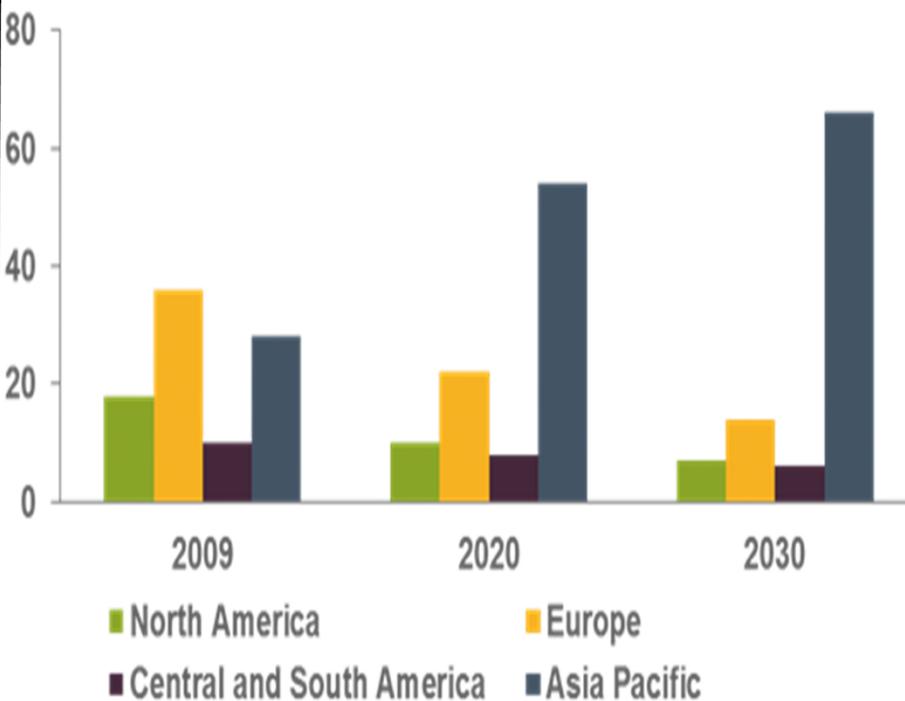
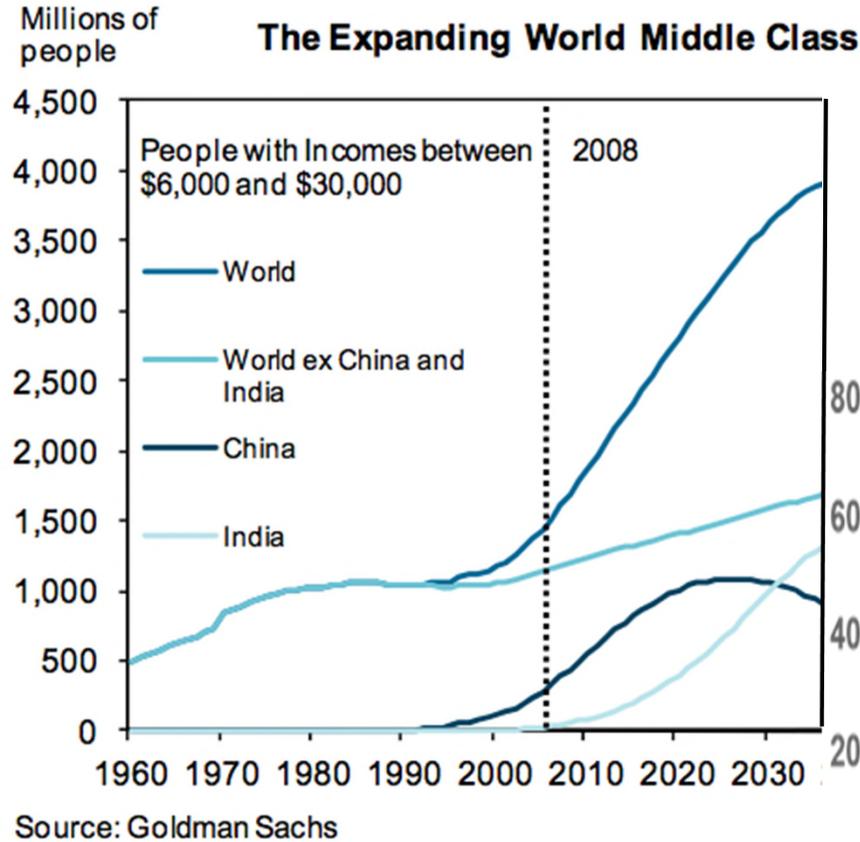
... and there are also growing ethical concerns.

- Child labour
- Workers rights
- Inter-generational legacy
- Farmer welfare
- Food crime
- ...

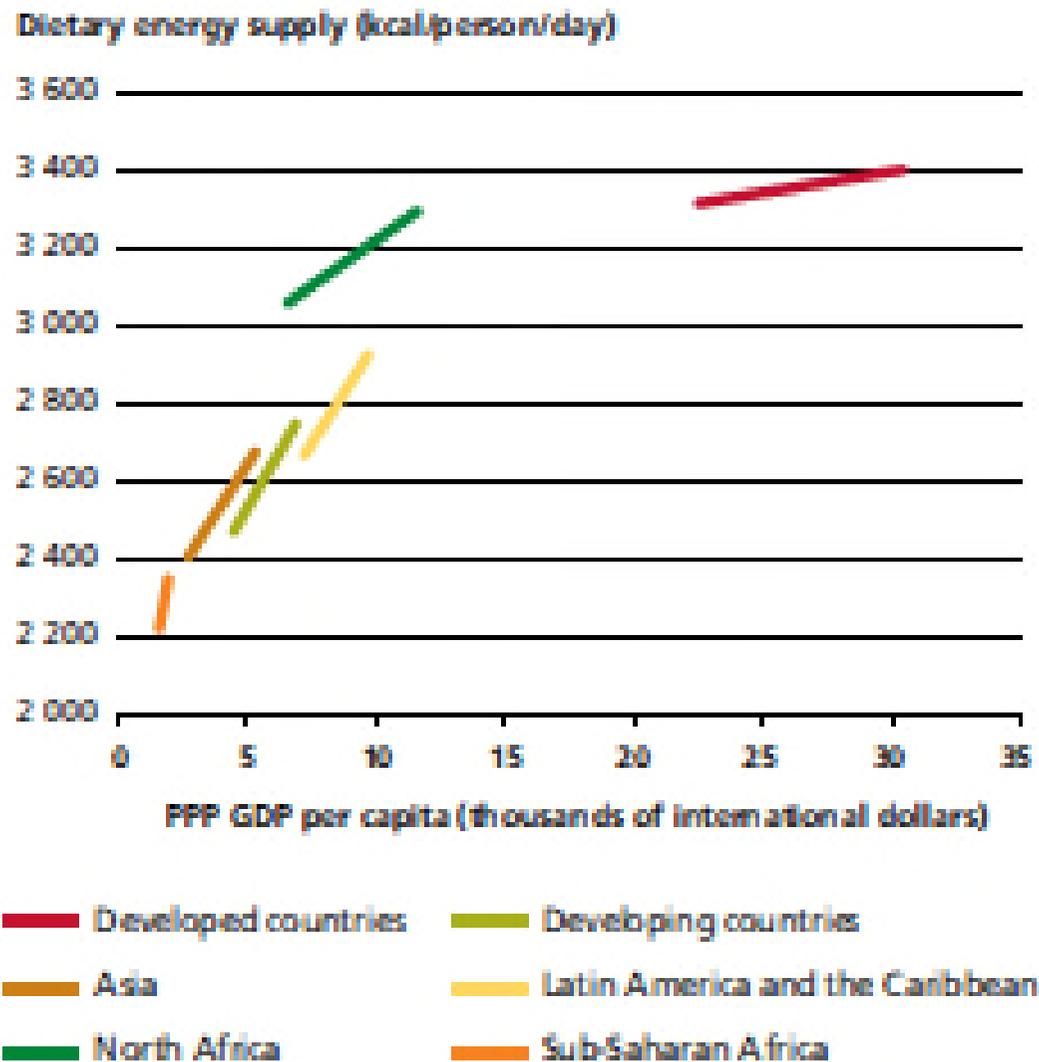
Marked regional differences in projected population growth



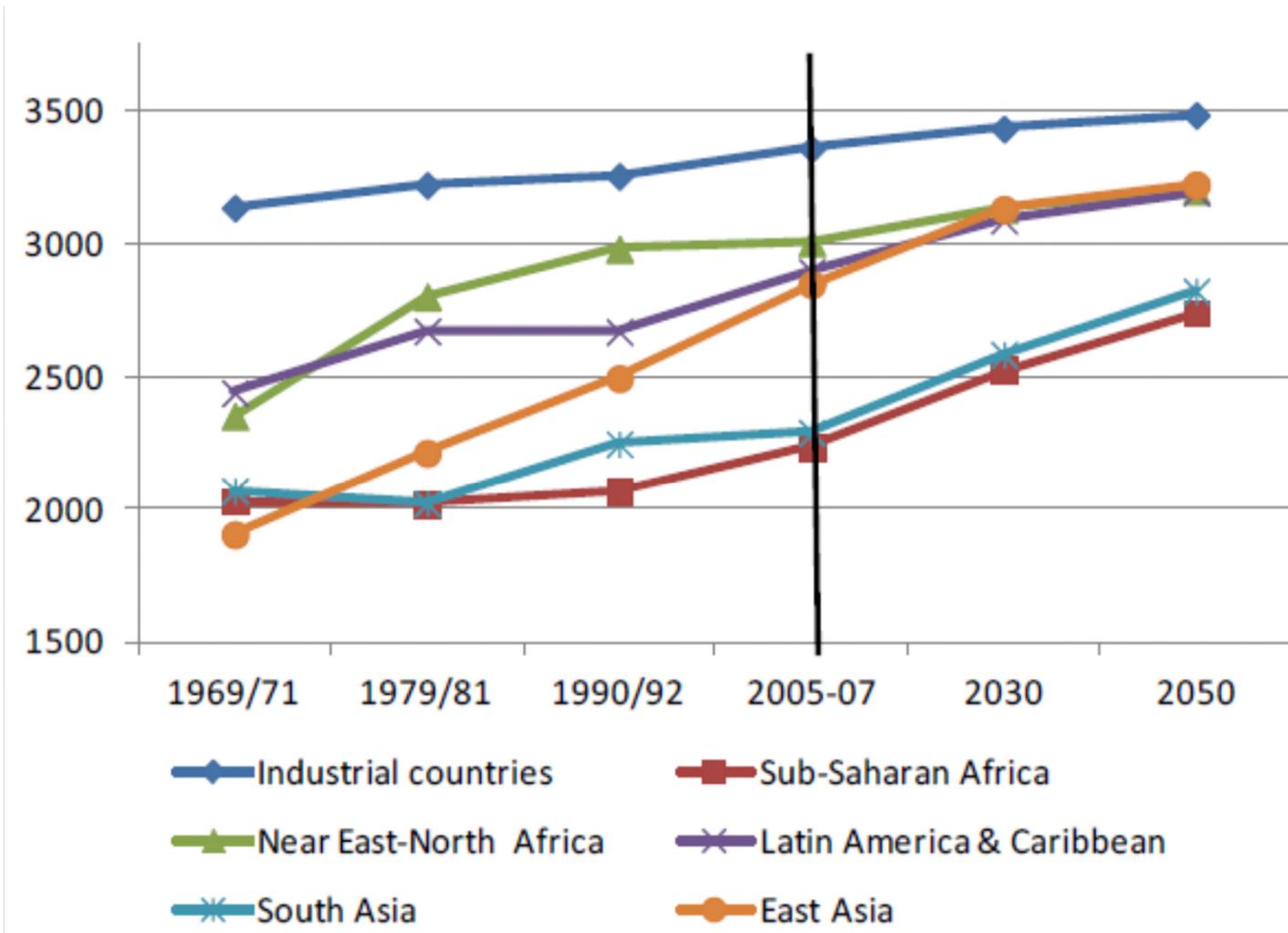
Plus increasing wealth \$6,000 – \$30,000



Dietary energy supply increases as incomes rise ...



... leading to increases in consumption. (kcal/person/day)



Current news:

US obesity rates 'rising for first time since 2004'

12 Nov

“zero chance that the world can meet the target set by the UN for halting the climbing obesity rate by 2025”
... *Lancet*, 2016

Obesity rates are rising again among American adults despite national efforts to promote healthy lifestyles.

Rates of obesity had been climbing dramatically since the 1980s but started levelling off in about 2004.

This latest study means they are rising again - to nearly 38% in 2013-14, about 32% a decade ago.

One fifth of adults worldwide will be obese by 2025, predicts study

UK is on track to have the highest obesity levels in Europe, while a fifth of world's obese adults live in six high-income English-speaking countries



By 2025, the UK will have the highest obesity among both men and women in Europe, at 38%, say the researchers Photograph: Dominic Lipinski/PA

About a fifth of all adults around the world and a third of those in the UK will be obese by 2025, with potentially disastrous consequences for their health, according to a study.

The research published by the *Lancet* medical journal says there is zero chance that the world can meet the target set by the UN for halting the climbing obesity rate by 2025.

Looking ahead ...

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November 20, 2014 12:02 am

Fat places \$2tn burden on world economy, says McKinsey report

Scheherazade Daneshkhu, Consumer Industries Editor



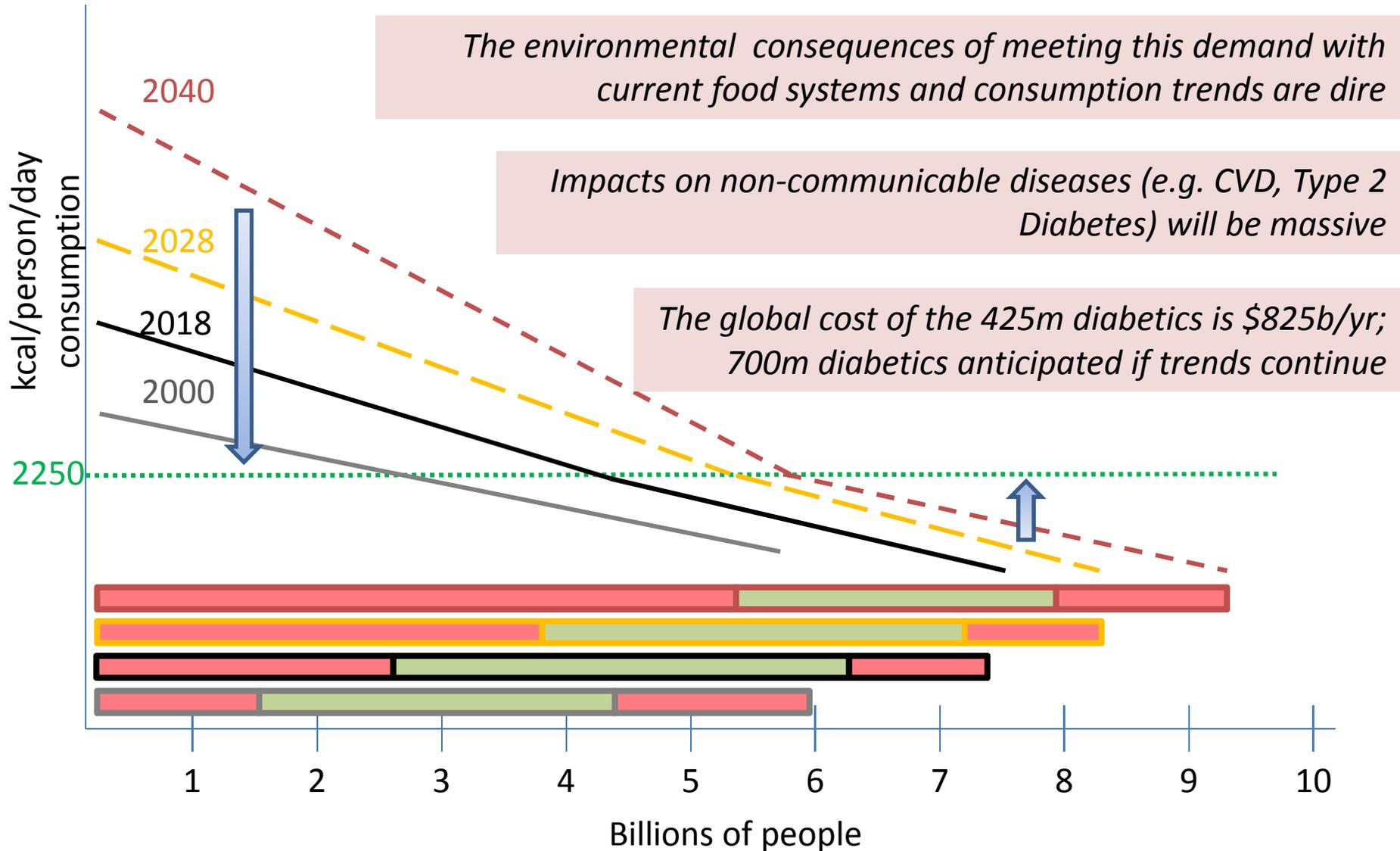
Fat is becoming a weighty economic issue. Almost a third of the world's population is overweight or obese, levying an economic cost that rivals that of armed conflict or smoking, according to research by McKinsey consultants.

The strain on healthcare budgets is set to mount because unless current trends are curbed, half the global adult population will be overweight in 15 years' time. In a 150-page report, published on Thursday, the consultants put the global annual cost of obesity at \$2tn – equivalent to 2.8 per cent of the world's economic output.

“unless trends are curbed, half the global adult population will be overweight in 15 years time”

Calorie consumption: dietary trends

(indicative; not to scale)



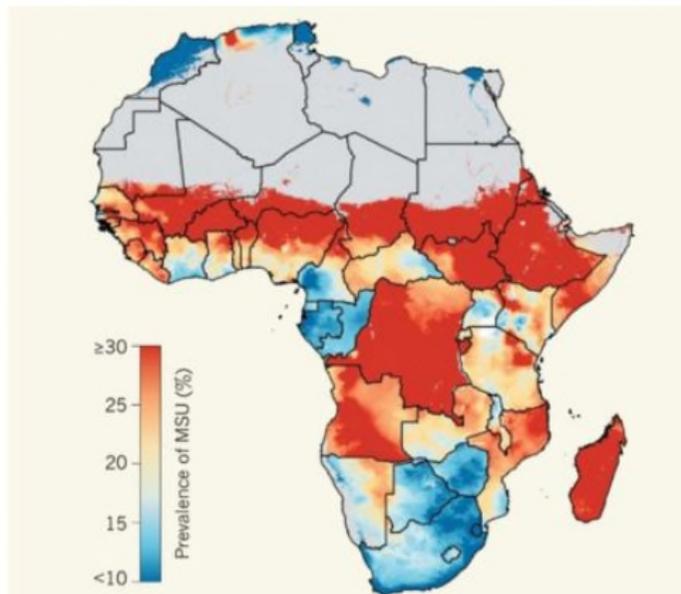
Looking ahead ...

Africa 'set to miss UN development goal on malnutrition'

By Victoria Gill
Science correspondent, BBC News

1 March 2018

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NATURE

% of children classed as moderately or severely underweight (MSU) in each pixel in the year 2000

No African country set to end childhood malnutrition by 2030.

Food System challenges are interconnected

To achieve food security for a growing, wealthier, urbanising population while minimising further environmental degradation

against a background of

- natural resource depletion
and
- many stagnating rural economies
and
- changing climate
and
- social and socio-cultural changes

Today and Tomorrow

- **Current Situation:** Increasing and systemic failings in food systems
- **Upcoming Situation:** Problems will be exacerbated unless more effective and efficient food systems are urgently developed and implemented
- ✓ **Great entrepreneurial opportunities** for food system development

Why is it so hard to make progress?

- Complex adaptive system, many interactive 'drivers' and feedbacks
- Set of dynamic actors and activities
- Interactive socioeconomic and environmental outcomes
- Wide range of power and vested interests; fragmented governance

However...

- Many policy, fiscal, social and technical options for change
- Multiple options for cooperation among actors
- Many plausible futures
- Many great careers in food system analysis and management