



WAGENINGEN
UNIVERSITY & RESEARCH



LONDON
SCHOOL of
HYGIENE
& TROPICAL
MEDICINE



Centre on
Climate Change &
Planetary Health



Sustainable diets an introduction to methods and metrics



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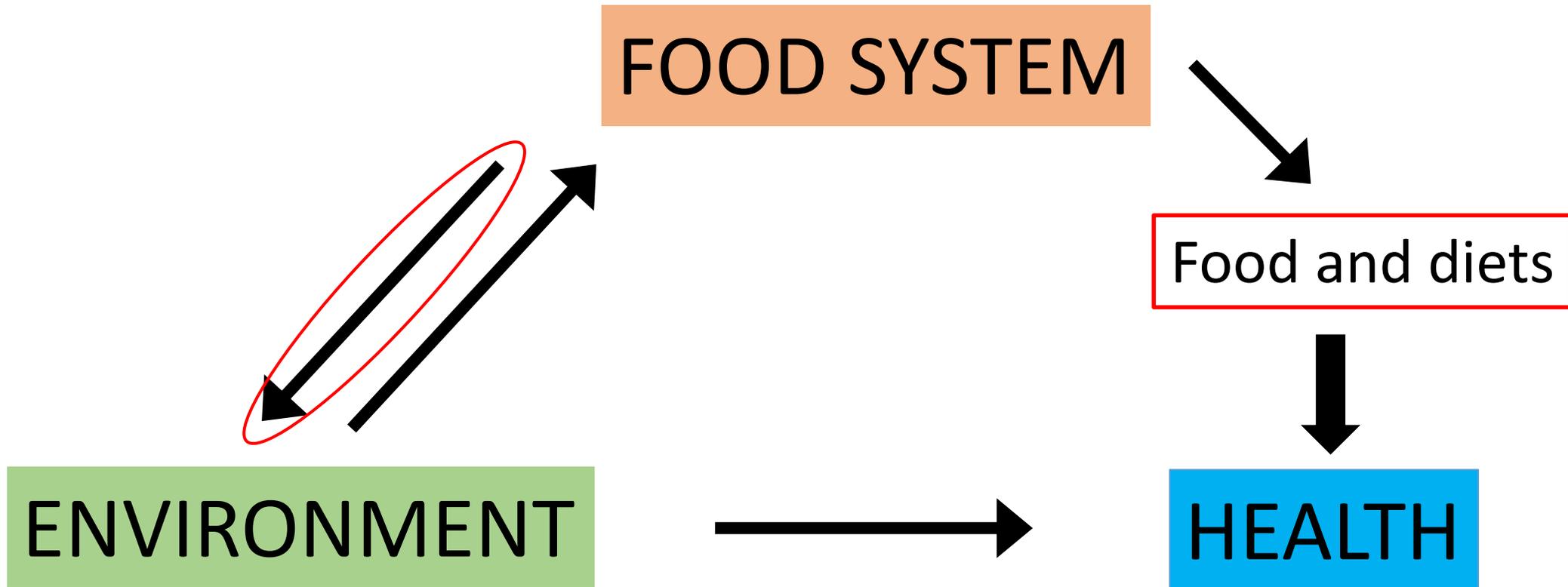


Alan Dangour

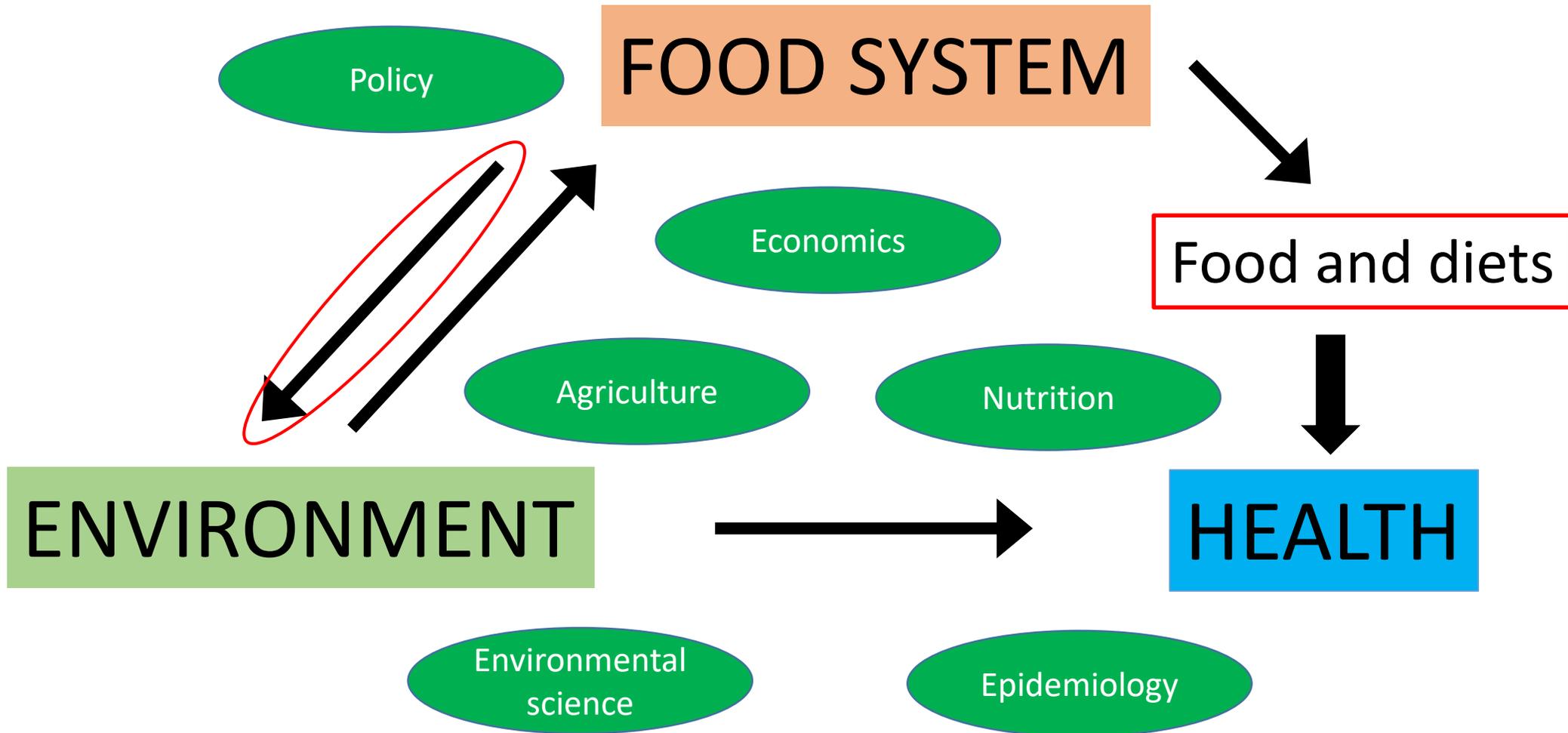
Objectives

- Appreciation of diet-related aspects of planetary health
- Understand and hands-on experience of common methods in food-environment analysis
- Incorporation of environmental sustainability into food based dietary guidelines

Assessing environmental impacts of diets



Always an interdisciplinary undertaking

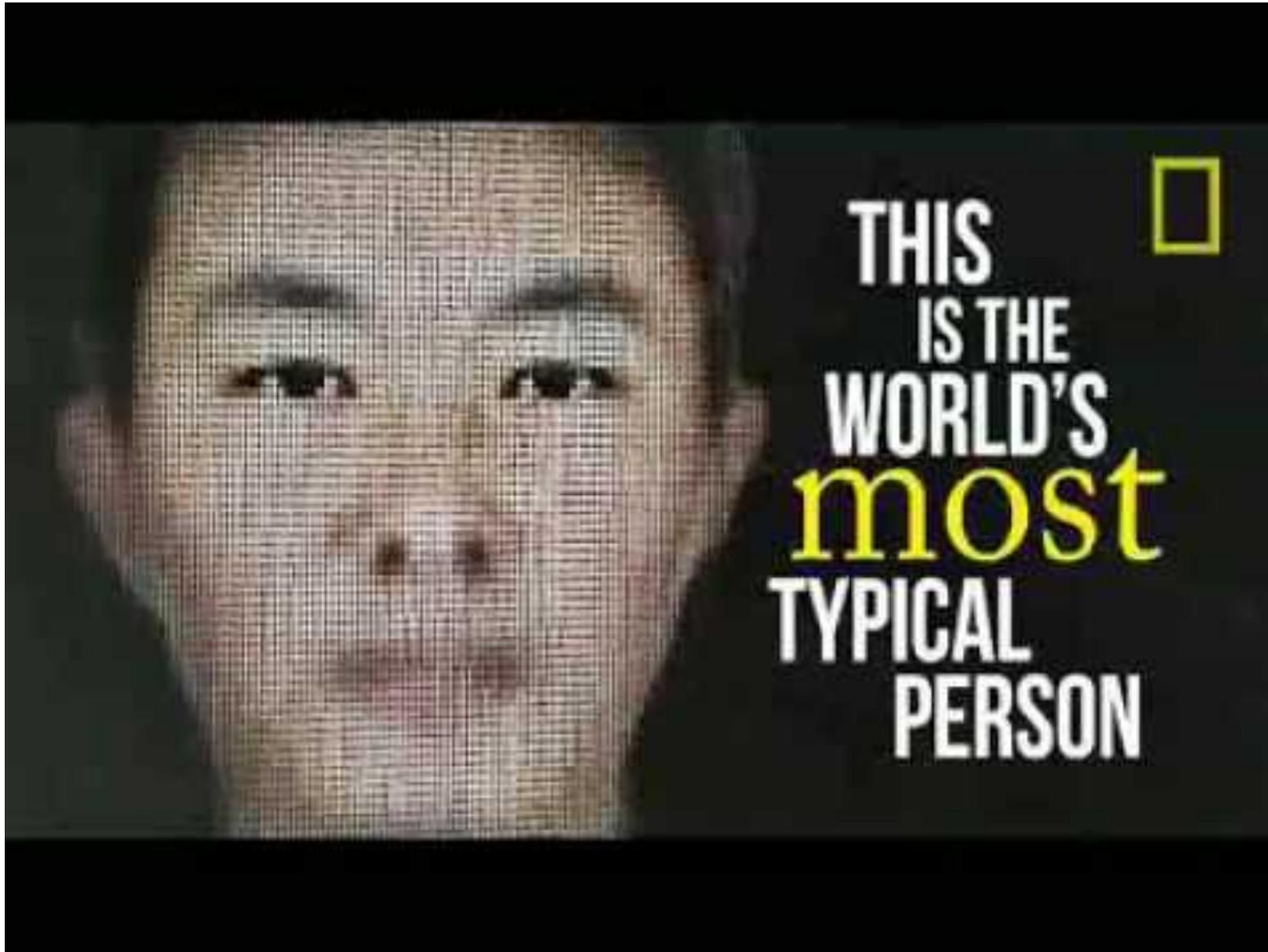


Assessing environmental impacts of diets

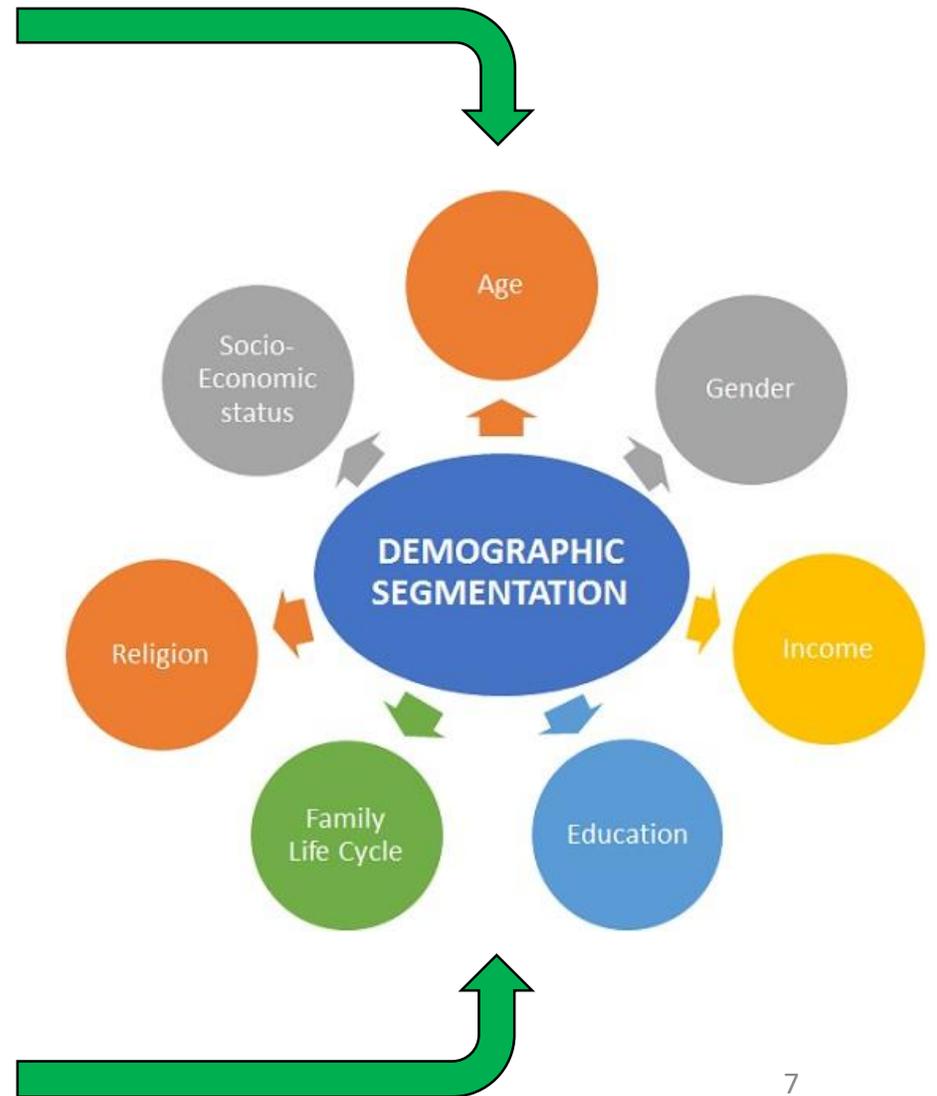
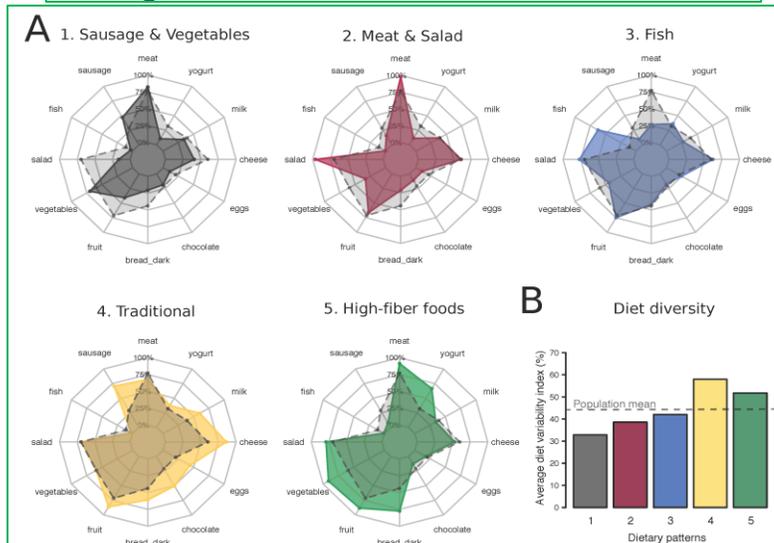
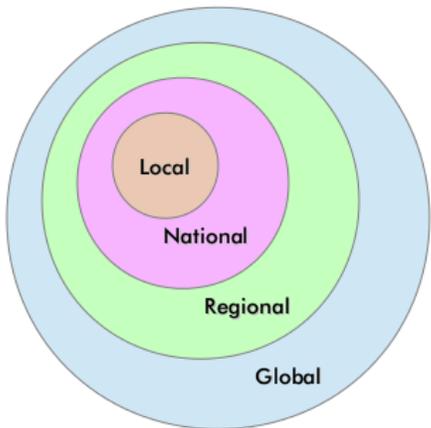
Questions we need to answer:

1. Whose diets are we measuring?
2. How are we measuring them?
3. What environmental impacts are we measuring?
4. How are we measuring them?
5. How do we assign impacts to foods?
6. How do we account for all the uncertainties in these measurements?
7. How to incorporate environmental considerations into food based dietary guidelines?

1. Whose diets are we measuring?



1. Whose diets are we measuring?



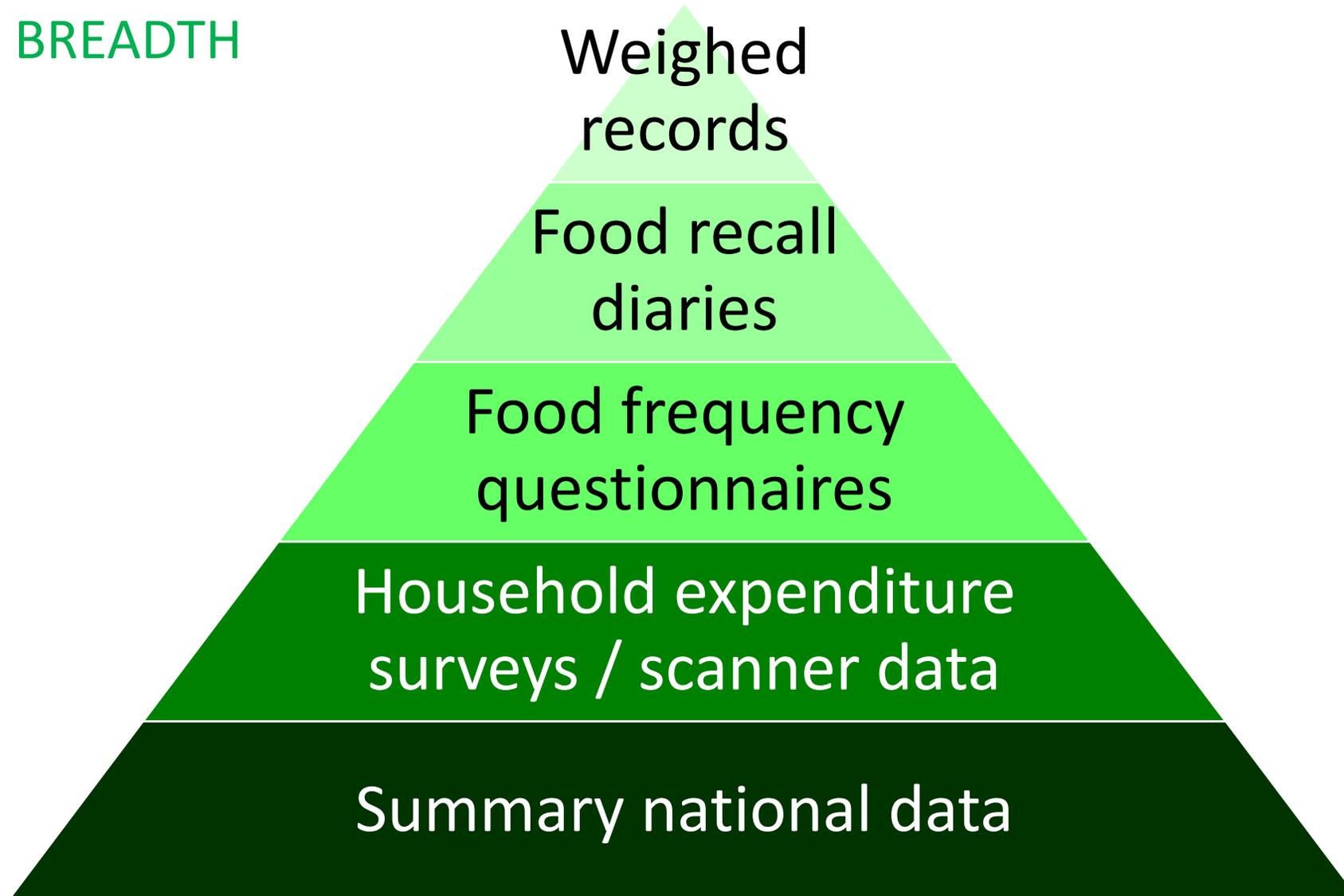
2. How are we measuring them?

Question: What types of dietary data have you mostly worked with?

1. Food balance sheets
2. Household expenditure surveys
3. National dietary surveys
4. Local dietary surveys
5. None

2. How are we measuring them?

DEPTH vs BREADTH



2. How are we measuring them?

Potential problems:

1. Is an apple an apple?
2. Do people tell the truth about what they eat?
3. Do people eat the same thing every day or every season?

3. What environmental impacts are we measuring?

| Area of concern | SDG targets | Diet x environment studies, % |
|--------------------------------------|------------------------|-------------------------------|
| Water scarcity | 6.4 | 27 |
| Natural resource depletion | 8.4, 12.2 | 12 |
| Urban air quality | 11.6 | 4 |
| Ozone depletion | 12.4 | 4 |
| Human and ecotoxicity | 3.9, 6.3, 12.4 | 7 |
| Climate change | 13.1, 13.2, 13.3, 14.3 | 74 |
| Marine debris | 14.1 | 0 |
| Marine eutrophication | 14.1 | 18 |
| Freshwater ecosystem quality | 6.6, 15.1 | 12 |
| Depletion of fish stocks | 14.4, 14.6 | 1 |
| Deforestation | 15.1, 15.2, 15b | 41 |
| Land degradation and desertification | 2.4, 15.3 | |
| Biodiversity loss | 15.4, 15.5, 15.9, 15a | |
| Invasive species | 15.8 | 0 |

From Ridoutt *et al* (2017)

3. What environmental impacts are we measuring?

Question: What environmental data have you mostly worked with?

1. Greenhouse gas emissions
2. Water
3. Land use and biodiversity
4. Air / water quality
5. Other – please add to slide

3. What environmental impacts are we measuring?

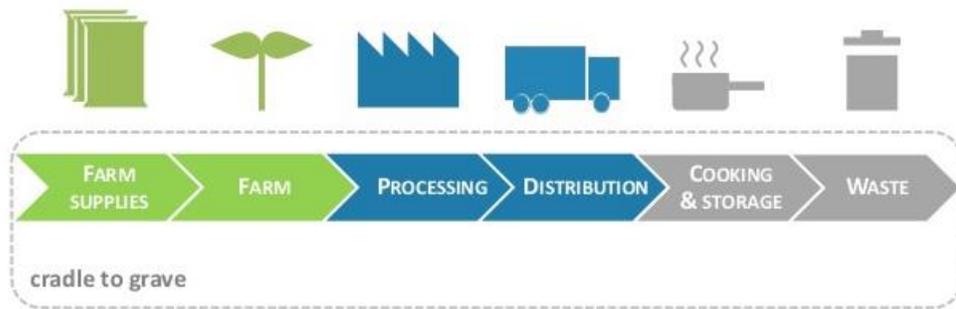
The “big three”

- Greenhouse gas emissions – but which ones?
- Water use – different measures and types
- Land use and biodiversity – not comparable to other measures

4. How are we measuring them?

LIFE CYCLE ANALYSIS

Life cycle of food



GHGs

Resource
depletion

Ozone
depletion

Human
toxicity

Eco-
toxicity

Eutrophi-
cation

Water
use

OR

FOOTPRINTS



Usually from production stages only but useful for quantifying water and land used to produce food

5. How do we assign impacts to foods?


650 Wheat
(lvs of water for one packet 300g)


1400 Sorghum
(lvs of water for one packet 300 g)


750 Cane Sugar
(lvs of water for one packet 300 g)


90 Tea
(lvs of water for one packet 300 ml)

Edible portions

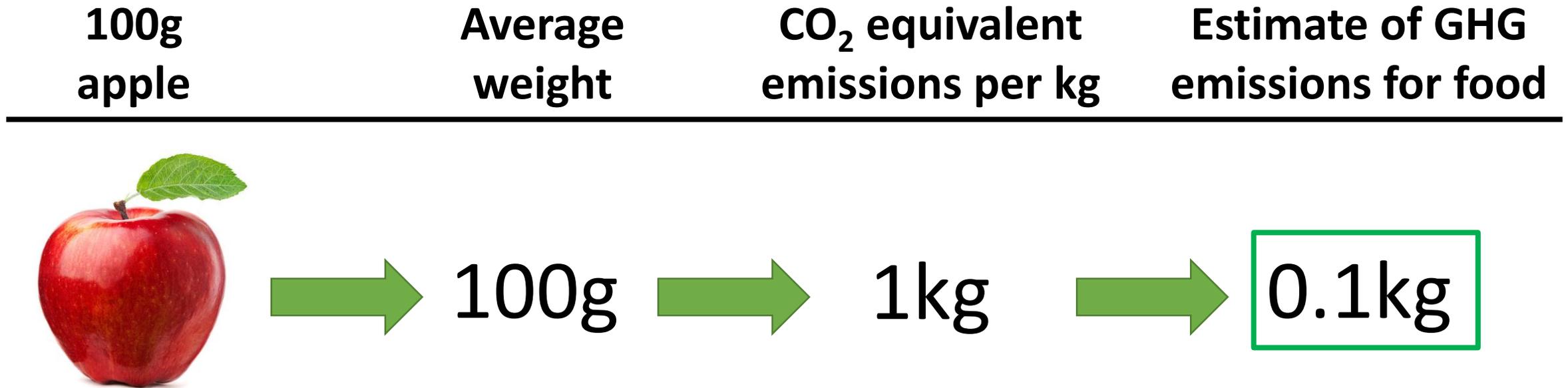
Main ingredients

Other uses

Aggregate into groups



5. Simple and combination foods

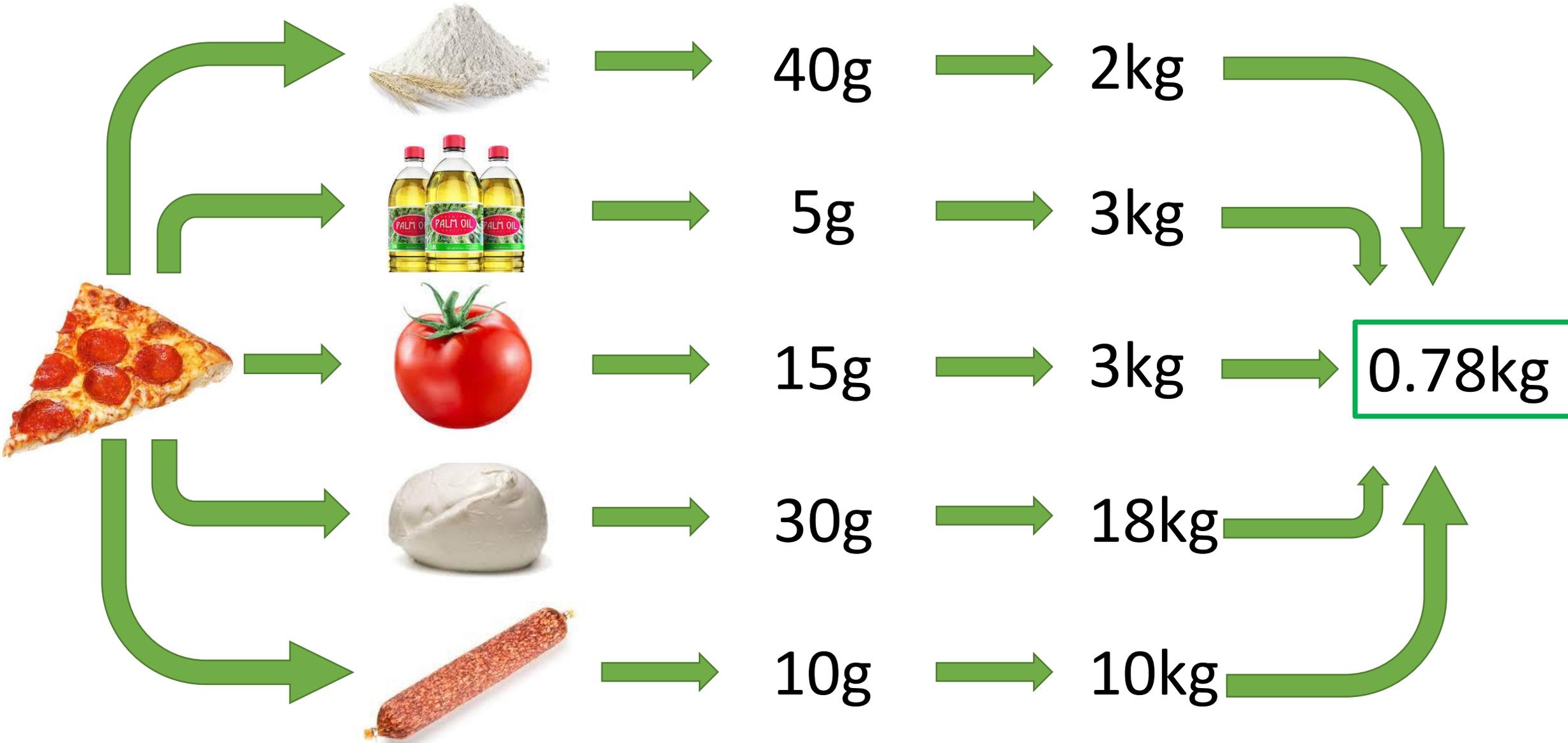


100g pizza slice

Average weight

CO₂ equivalent emissions per kg

Estimate of emissions



5. How do we assign impacts to foods?

Units of measurement:

- Impacts per gram food – only looks at how much is produced
- Impacts per calorie – less heavily weighted towards energy-dense foods
- Impacts per gram protein – less heavily weighted towards meat
- Others – micronutrients?

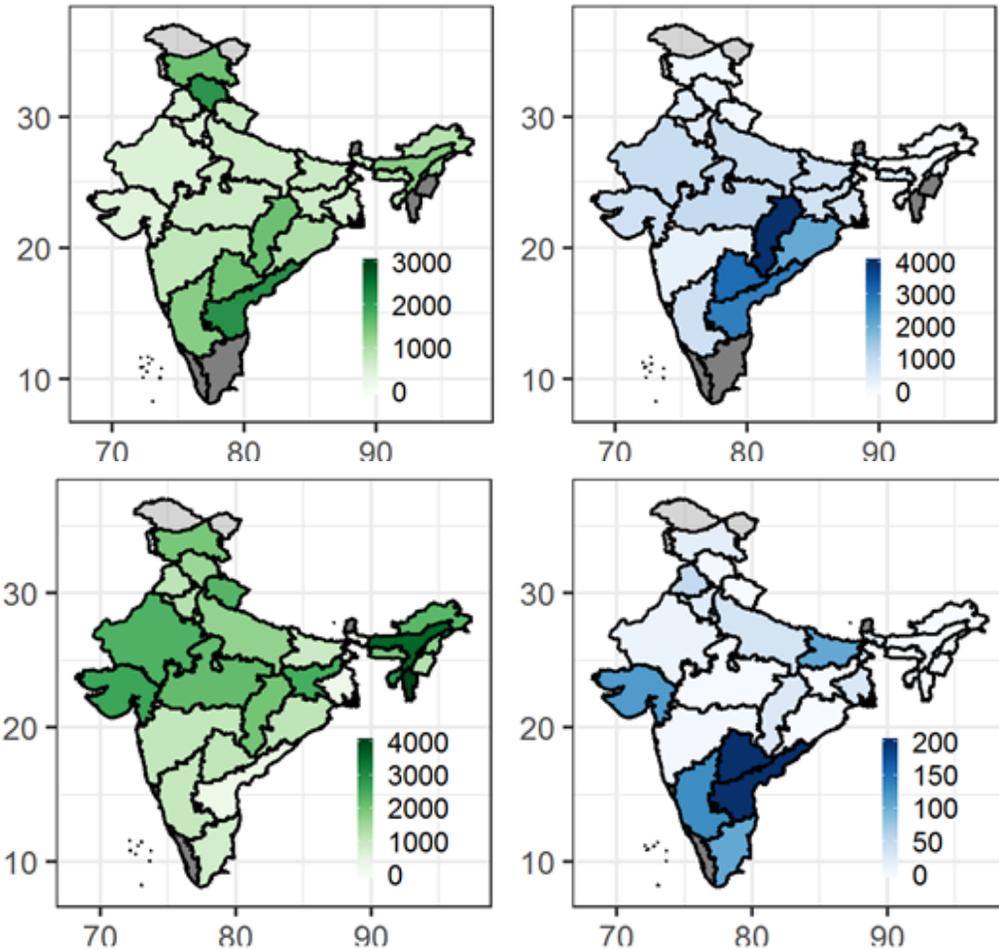
6. How do we account for uncertainties?

The list so far....

1. Uncertain measurements of diets
2. Variation of content between the “same” foods
3. Difficulty of mapping foods as eaten onto crops/livestock
4. Differences in environmental impacts between contexts
5. Any others?

6. How do we account for uncertainties?

Context-specific measurements



RICE

Measures of variability

A. Using high and low estimates of the same measure

B. Trying to simulate different contexts

C. Sampling from a distribution

WHEAT

What is this research used for?

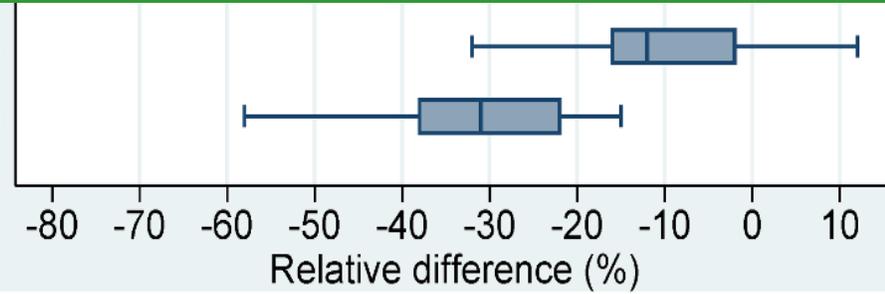
1. Measuring sustainability of diets – trade-offs with health, economic concerns etc.
2. Increasing awareness of the impact of our food systems on the environment
3. Providing local context to global problems, e.g. applying the most appropriate environmental measures to diets in particular areas
4. Exploring trade-offs between different environmental impacts

What is this research used for?

GHG emissions

Healthy guidelines (n=21, mdn=-12)

Vegetarian (n=20, mdn=-31)

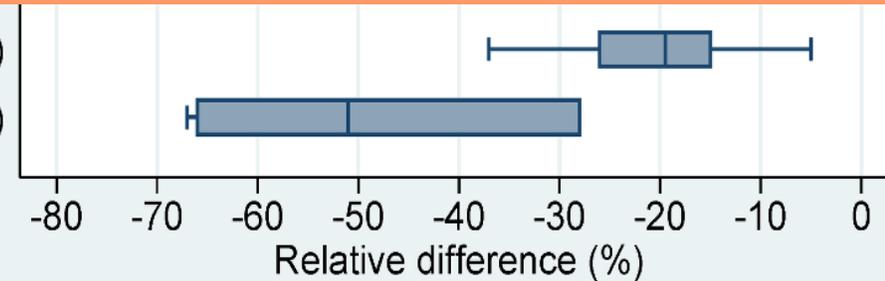


-12%
-31%

Land use

Healthy guidelines (n=10, mdn=-20)

Vegetarian (n=7, mdn=-51)

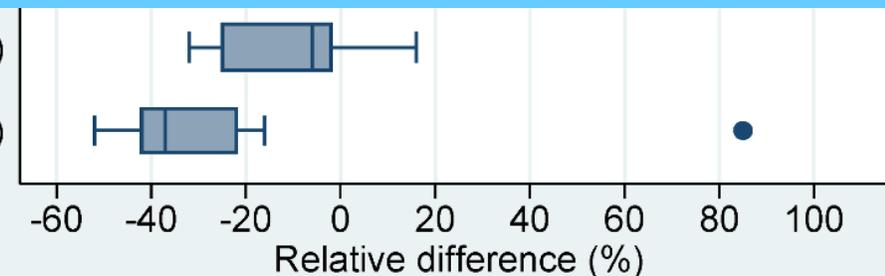


-20%
-51%

Water use

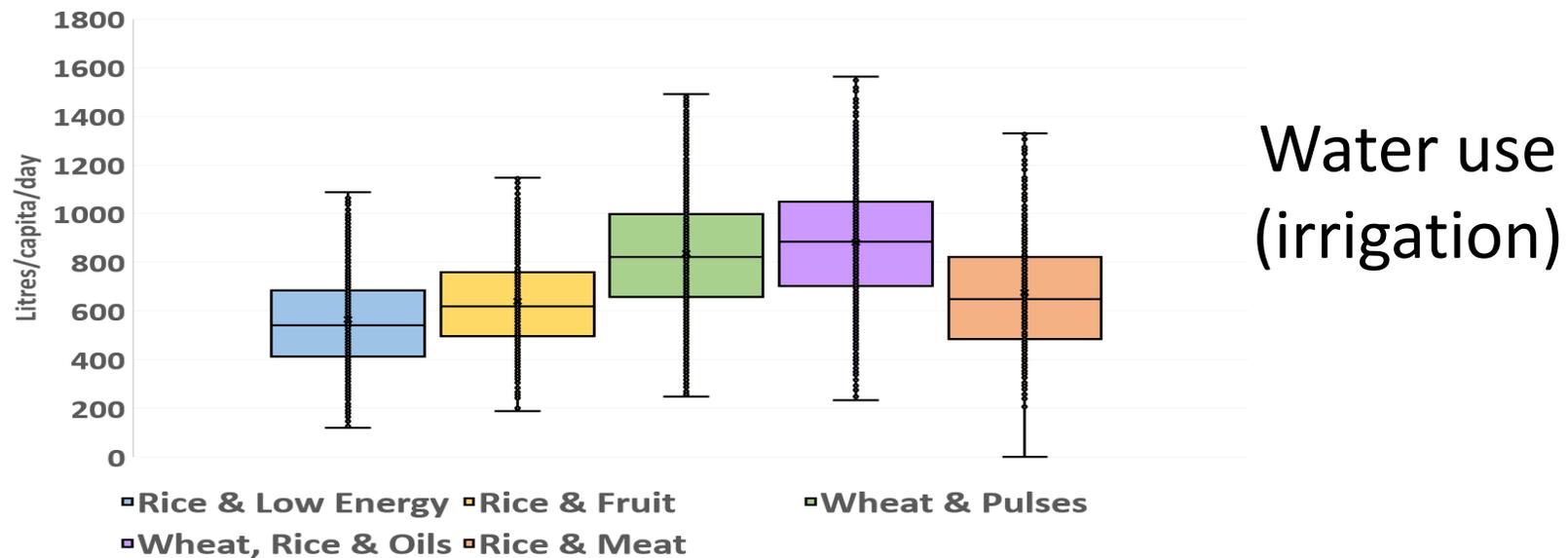
Healthy guidelines (n=9, mdn=-6)

Vegetarian (n=9, mdn=-37)

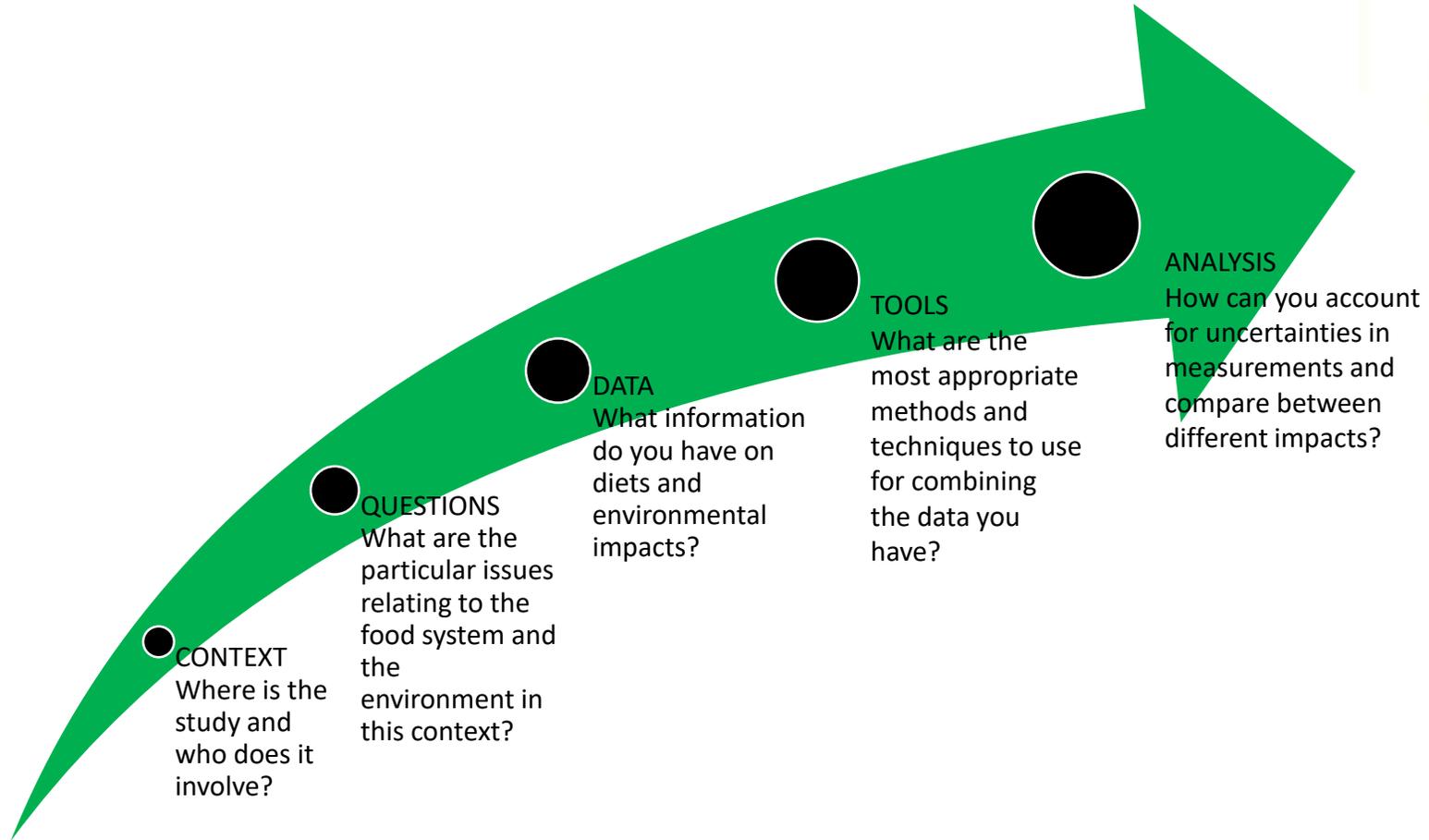


-6%
-37%

What is this research used for?



Where to start?



Where do we go next?

Collating and combining measures?



Could we produce an overall metric that combines environmental impacts and translates them to human health / monetary measures?