Health Advice Disclaimer

Nutritional and food science content presented is for educational purposes only and should not be applied to individual health. Current scientific evidence should only be taken into consideration on an individual basis after consultation with a health care provider. For the purpose of this event, Dr Anneline Padayachee is a scientist, not a private nutritionist.

Industry Disclosure

Dr Anneline Padayachee provides paid and unpaid scientific translation and advice to food industry peak bodies and private companies internationally, including by not limited to Meat and Livestock Australia, Australian Wagyu Association, FoodIQ, Australian Meat Industry Council, Zanda McDonald Award Foundation, Future Food Asia, Food and Drink Business, Pro.Pack, via consultative advisory services, scientific articles and/or educational speaking events. She is a member of the Australian Academy of Sciences Nutrition Committee, Food and Agriculture Committee, a Global Expert with the International Science Council, and an Adjunct Senior Lecturer with The University of Queensland.

Presentation Material

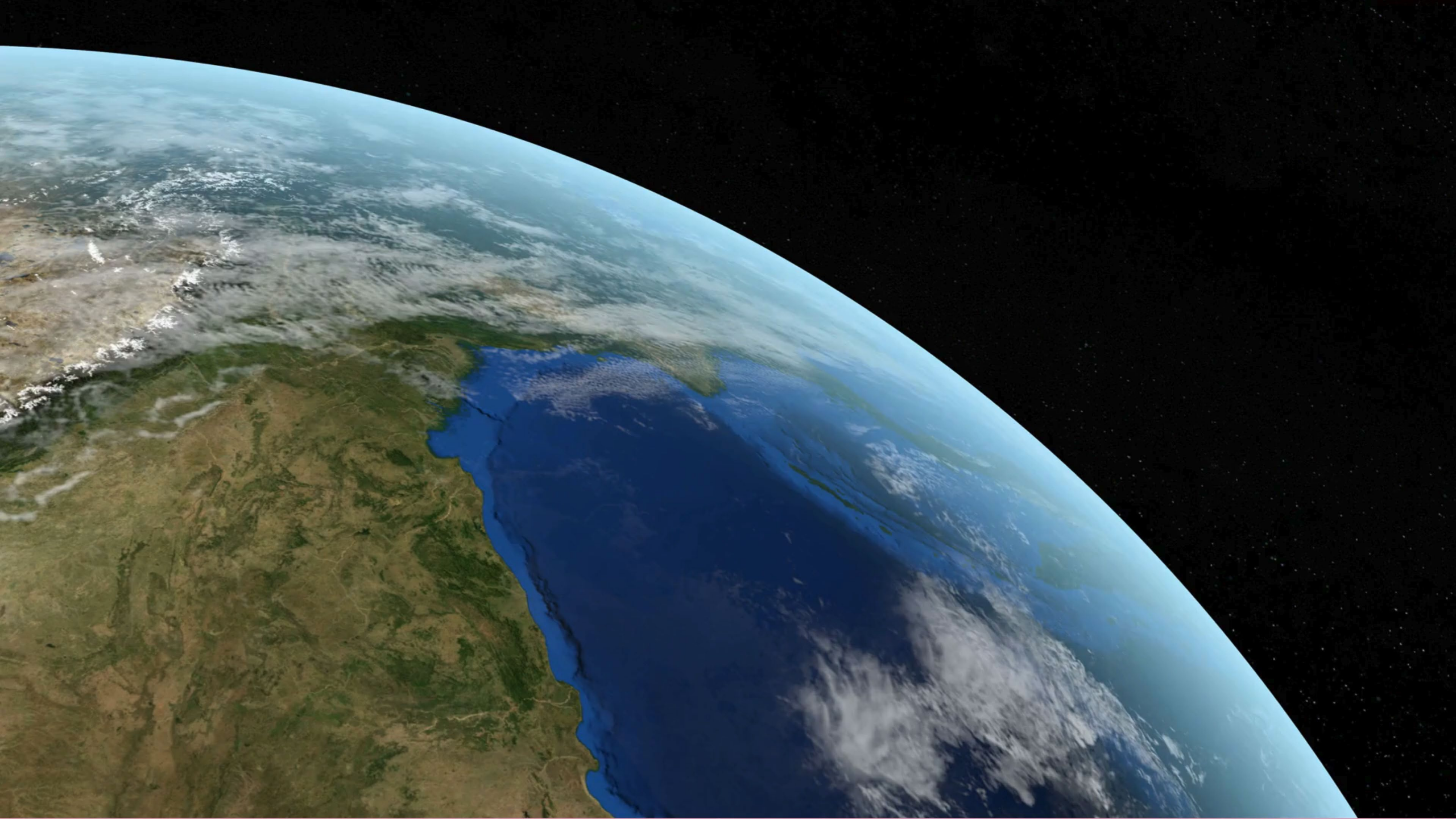

AMASUS
EEMS ROVER

WHAT DOES NUTRITION MEAN TO YOU?

WHAT DO YOU MEAN TO NUTRITION?

MENU

1. Context and Challenges: The world you operate in
2. Nutrition 101 Crash Course
3. Factors that affect Nutrition Quality (& Health)
4. Nutrition Inequality drives Malnutrition
5. Reframing Live Export(ers)



The Audio Long Read
Farming

‘Farming is a dirty word now’: the woman helping farmers navigate a grim, uncertain future – podcast

In a moment of crisis for the industry, Heather Wildman tours the country helping farmers face up to the toughest of questions – not just about the future of their business, but about their family, their identity and even their mortality. By Bella Bathurst

● How to listen to podcasts: everything you need to know

00:00:00 00:34:44

15 15

● Read the text version here

▲ Photograph: ArtistGNDphotography/Getty Images

More ways to listen

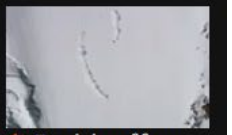
Apple Podcasts
Google Podcasts
Spotify
RSS Feed
Download

Written by **Bella Bathurst** and read by Diane Brooks. Produced by **Jessica Beck**. The executive producer was **Ellie Bury**

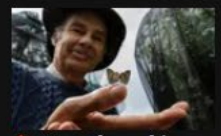
Mon 26 Feb 2024 16.00 AEDT

More from this series

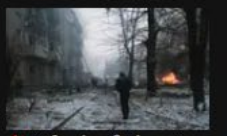
The Guardian’s new podcast series about AI: Black Box –...



Precipice of fear: the freerider who took skiing to its limits –...



From the archive: How maverick rewilders are trying to...



‘Ukraine fatigue’: why I’m fighting to stop the world forgetting u...

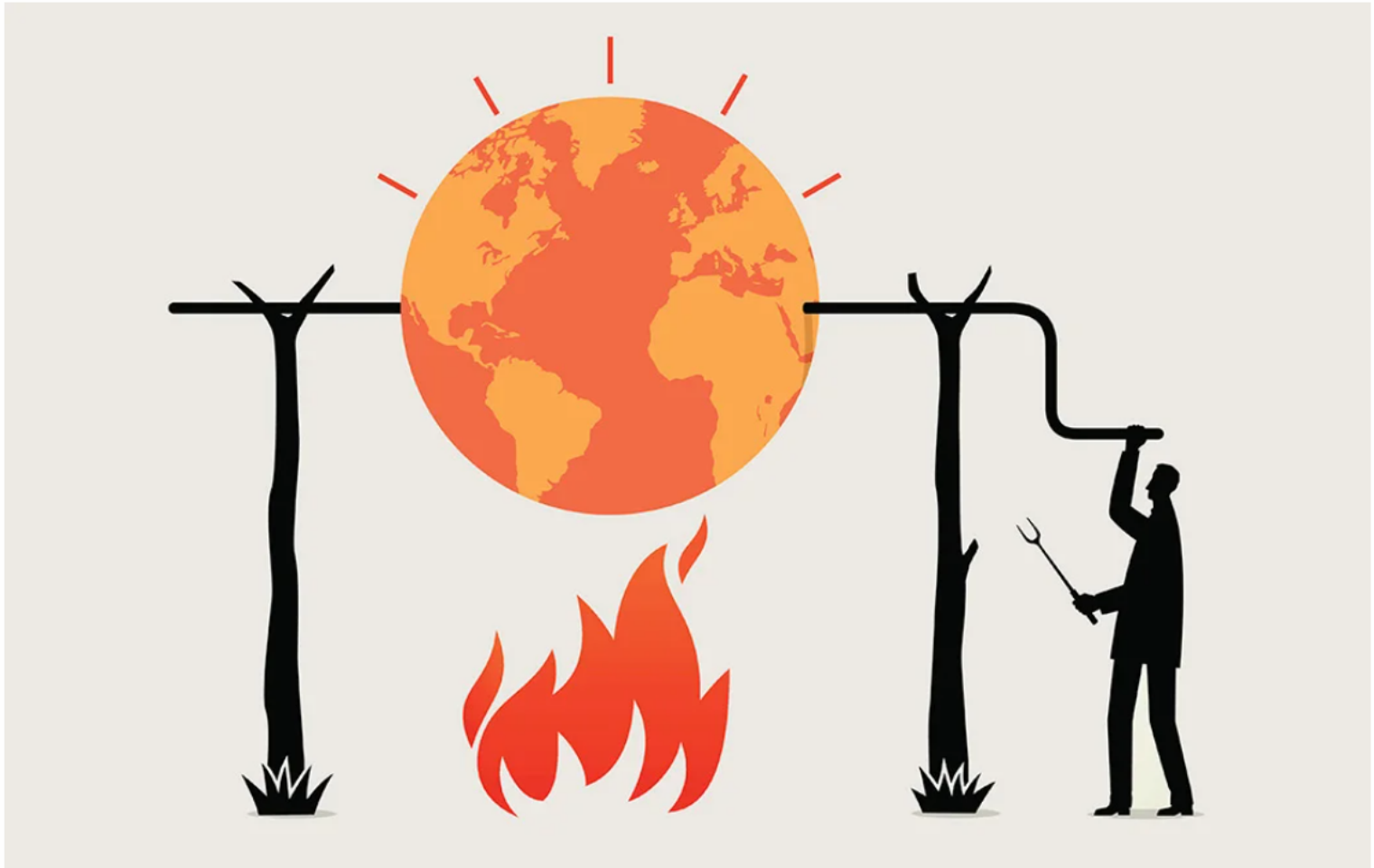
JSTOR DAILY from JSTOR, nonprofit library for the intellectually curious

Newsletters

UNEARTHING JUSTICE

Grilling the Globe

Could meat taxes help to curb over-consumption of beef and mitigate climate change?



If the world adopted a plant-based diet, we would reduce global agricultural land use from 4 to 1 billion hectares

We could reduce the amount of land used for grazing and croplands used to grow animal feed.

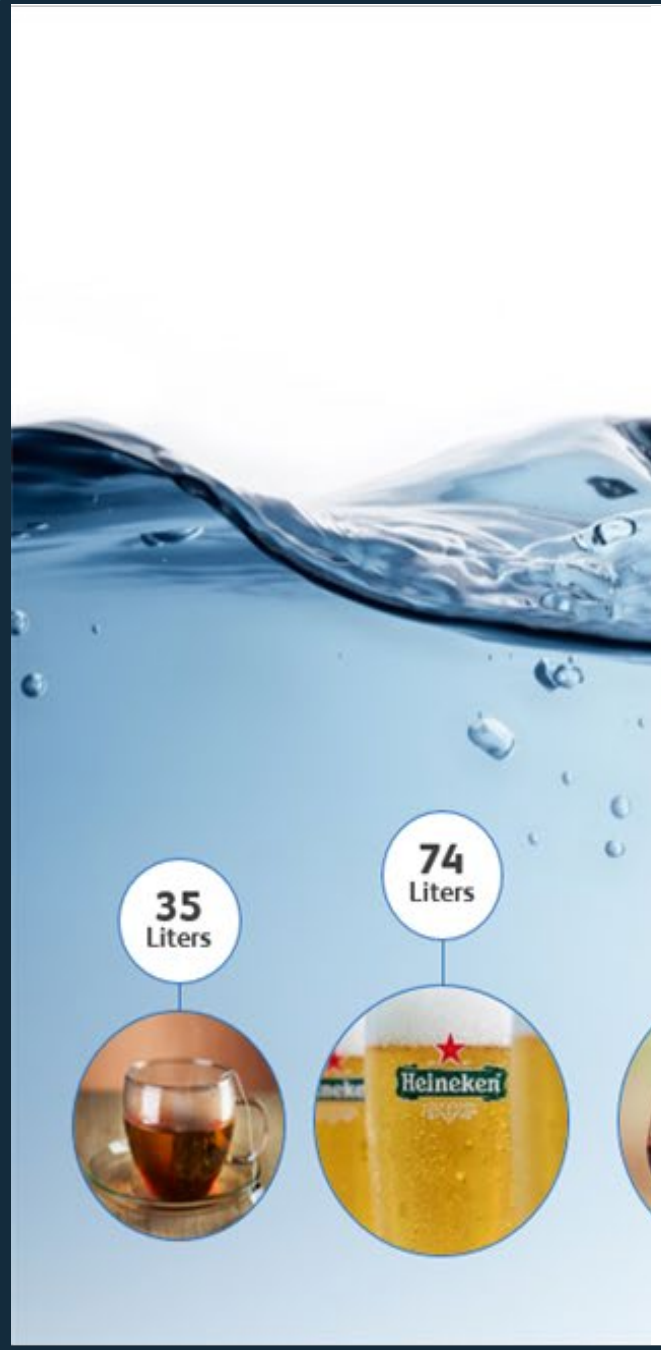
By: Hannah Ritchie

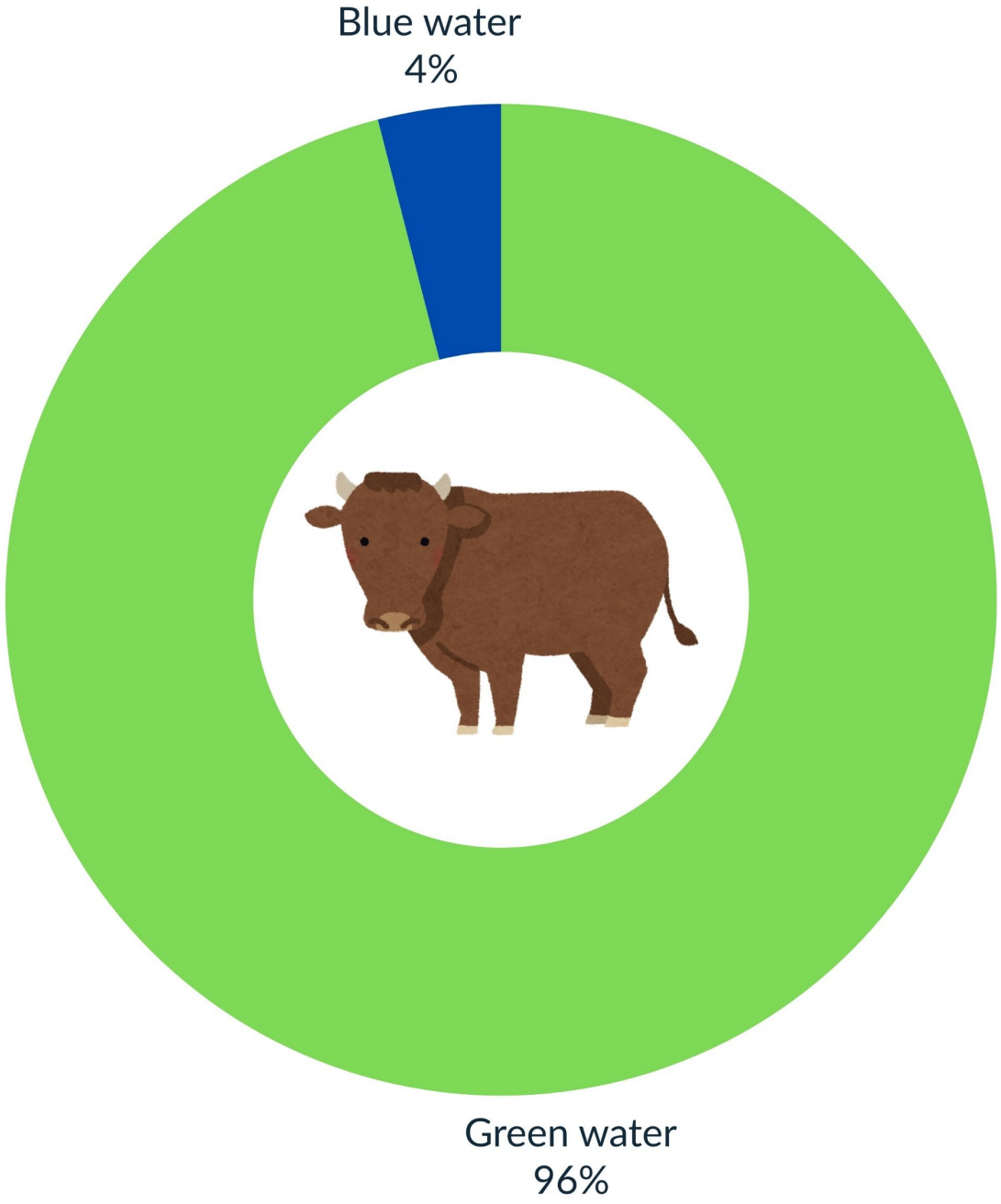
March 4, 2021

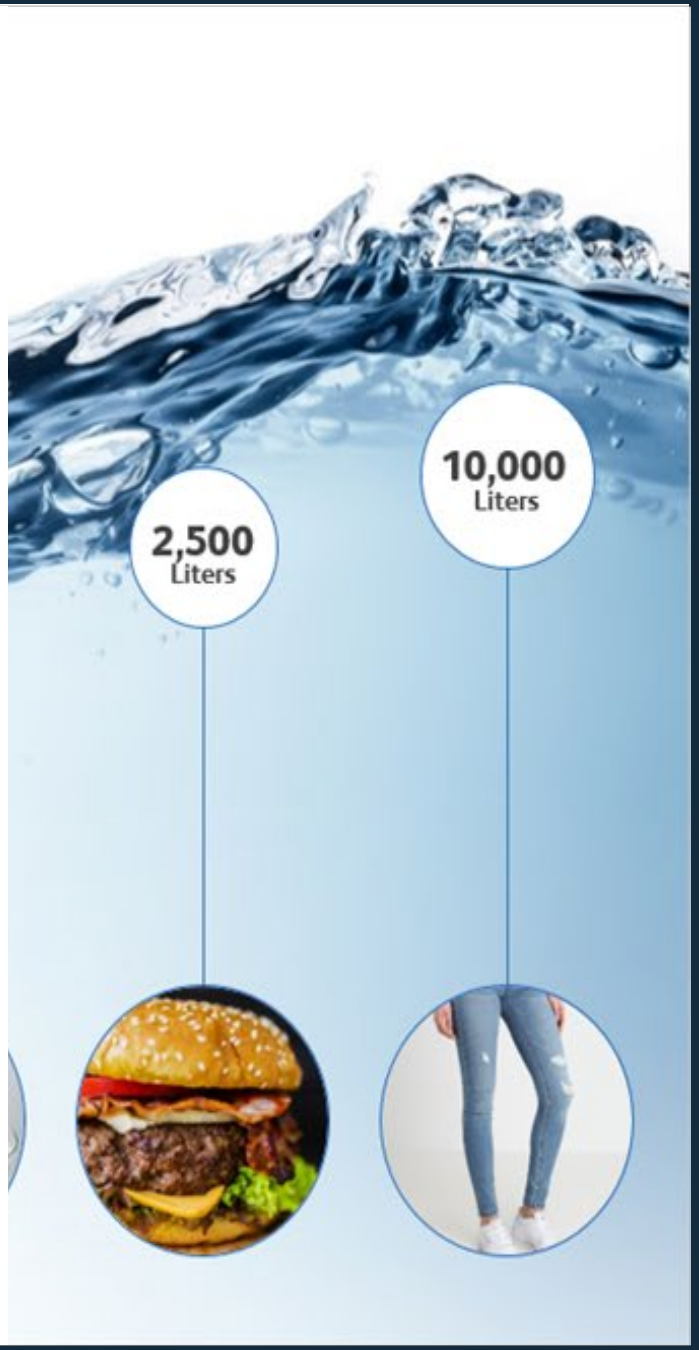
Cite this article

Reuse our work freely

Ritchie 2021





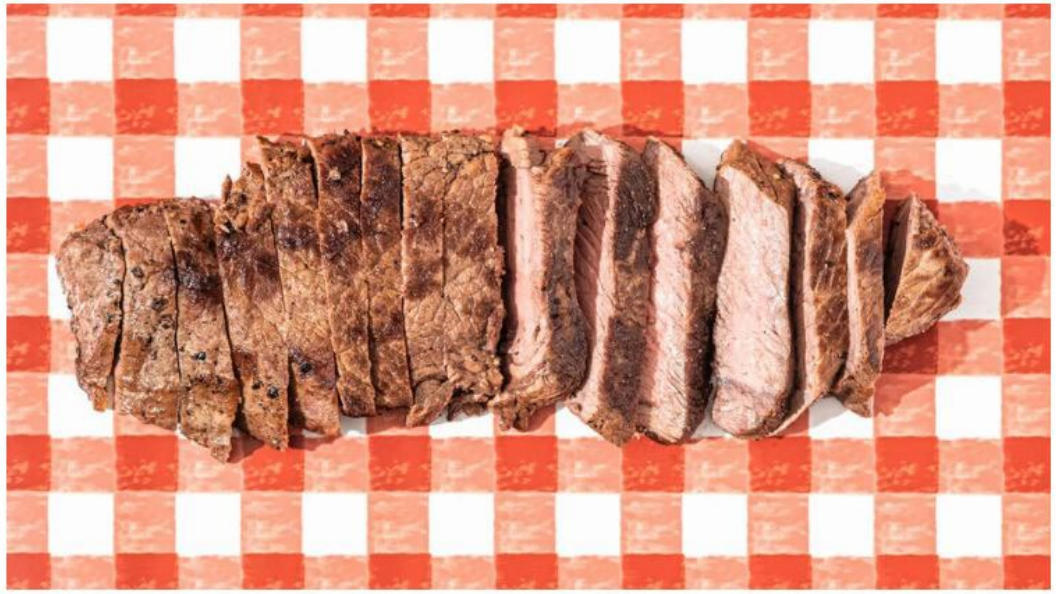


Doreau, M., Corson, M.S. and Wiedemann, S.G., 2012; Mekonnen, M. and Hoekstra, A.Y., 2010; Heineken 2019


FUELED
BY
THE
TRUTH
THE GAME
CHANGERS

MEDICALNEWSTODAY Health Conditions Health Products Disc

Red meat, sugar may be causing colorectal cancer in younger adults



Excessive red meat consumption has been linked to an increased risk of cancer.

Written by Paul Ian Cross, PhD on August 21, 2024 — Fact checked by Jill Seladi-Schulman, Ph.D.

The Guardian

School meals

This article is more than 7 months old

Thousands of schools serving meals that could contain cancer-causing chemicals

Education authorities across England and Wales shown to use meat that has been treated with either nitrites or nitrates

Denis Campbell *Health policy editor*

Sat 2 Sep 2023 09.00 AEST

Share

Children and young people are potentially being exposed to 'hidden health risks' in canteens. Photograph: Gary Calton/The Observer

For the first time in history farmers need to defend themselves that they are not responsible for everything from obesity to global warming. The problem is they generally like to get on with it in the background. But now they are being focused upon from every angle. It's a hard position being the global scape-goat."

Professor Brent Kaiser, University of Sydney.

Google Trends Home Explore Trending now Australia

Explore what Australia is searching for right now

southeastern queensland storm Explore

Search interest, past 24 hours

Why is **southeastern queensland storm** trending?

Search it

'Unusually active': Ten giant hail warnings for SEQ this storm...

19 hours ago • ABC News

Tens of thousands without power as storms continue smashing...

2 hours ago • Brisbane Times

Insurance Catastrophe declared for SEQ hailstorms

23 hours ago • Insurance Council of...

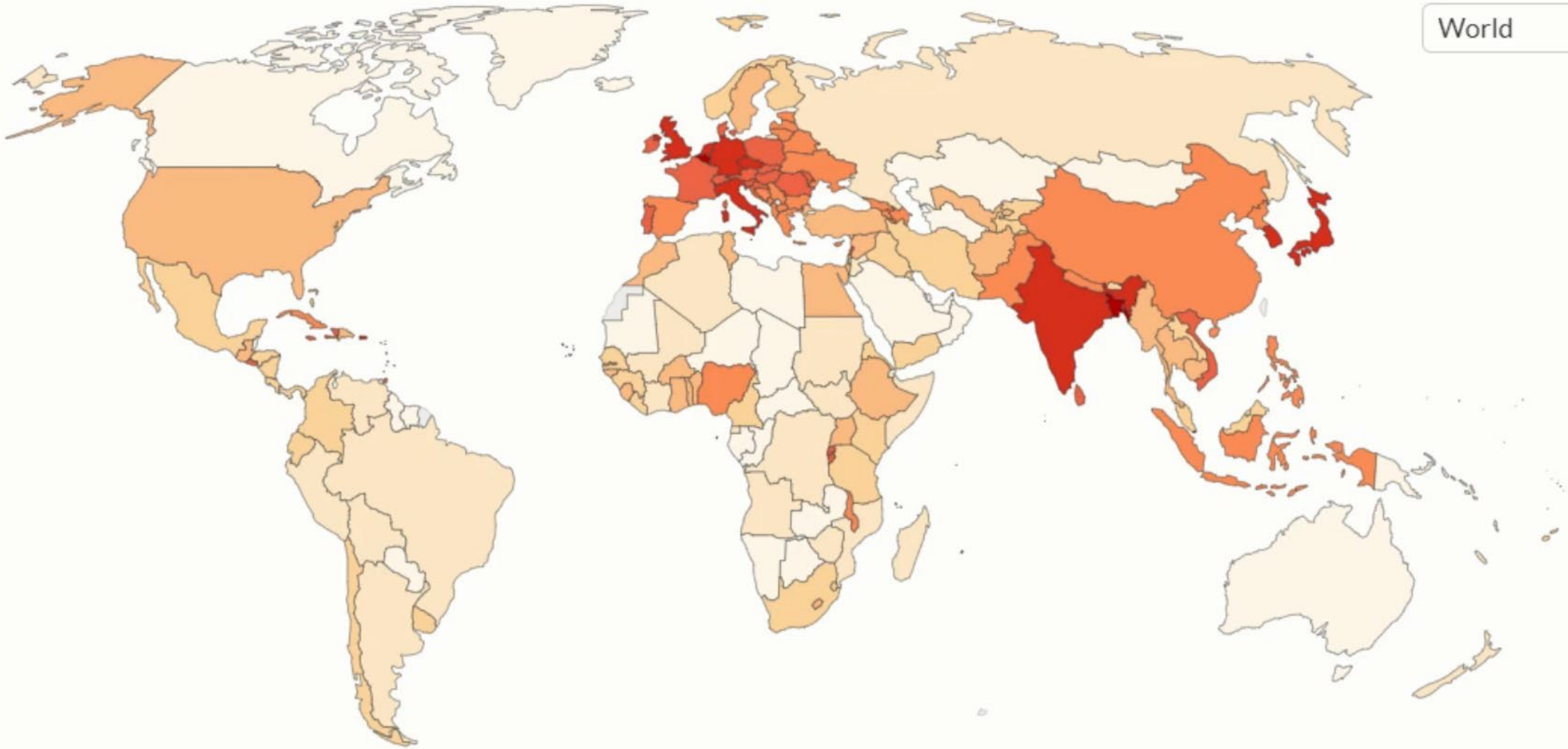
Data Commons 2024; Worldometer 2024

Population density, 1915

The number of people per km² of land area.

Our World in Data

World



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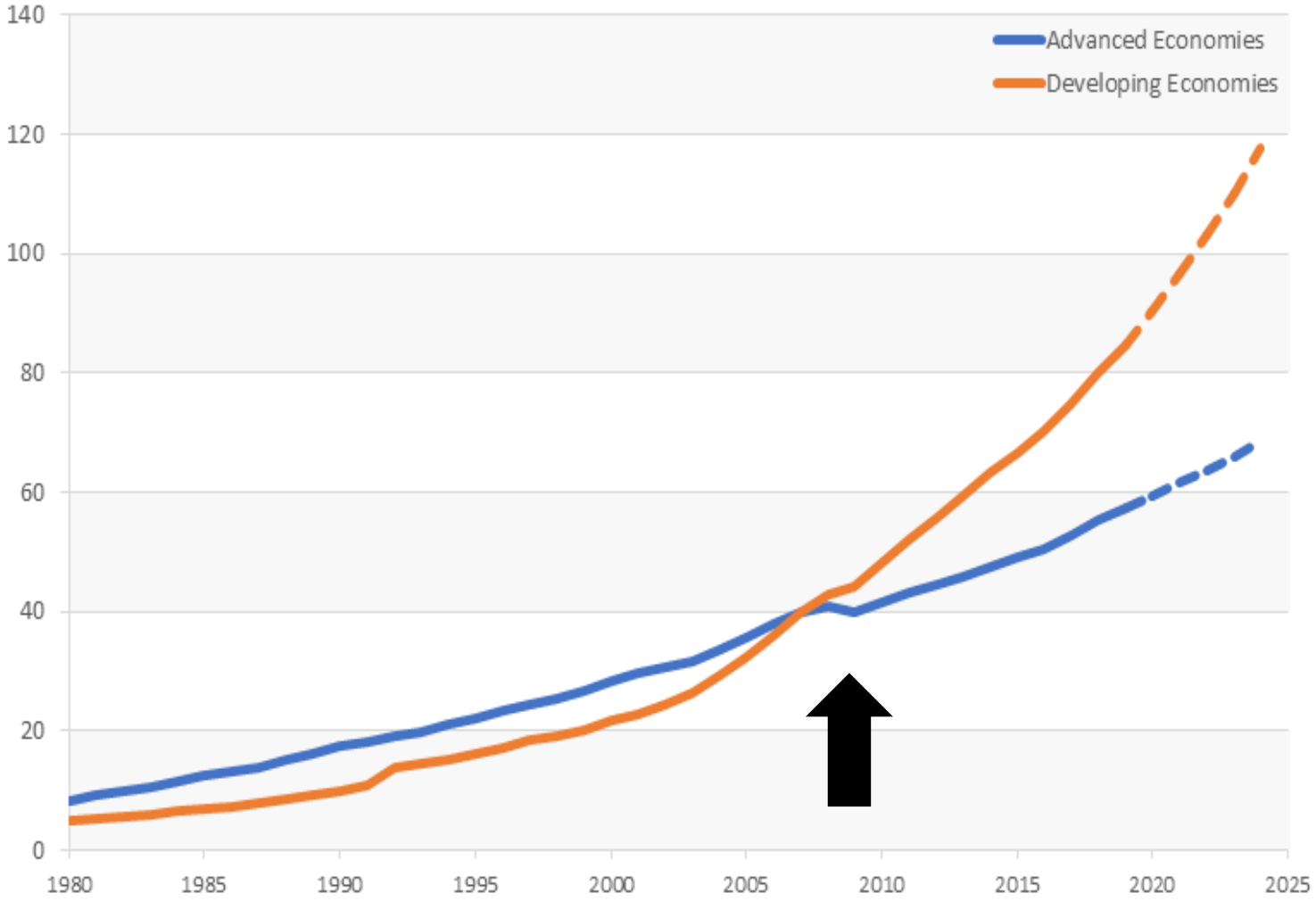
Our World in Data 2024

WORLD GDP, 1980-2024 ADVANCED vs DEVELOPING ECONOMIES



GDP purchasing power parity (PPP)/trillions of international dollars

IMF estimates the world GDP PPP to reach $142 trillion during 2019. IMF estimates that advanced economies total GDP PPP would reach $57 trillion and developing economies total GDP PPP would reach $85 trillion during 2019.

The world GDP PPP has nearly doubled during the 14-year period from 2005 to 2019.

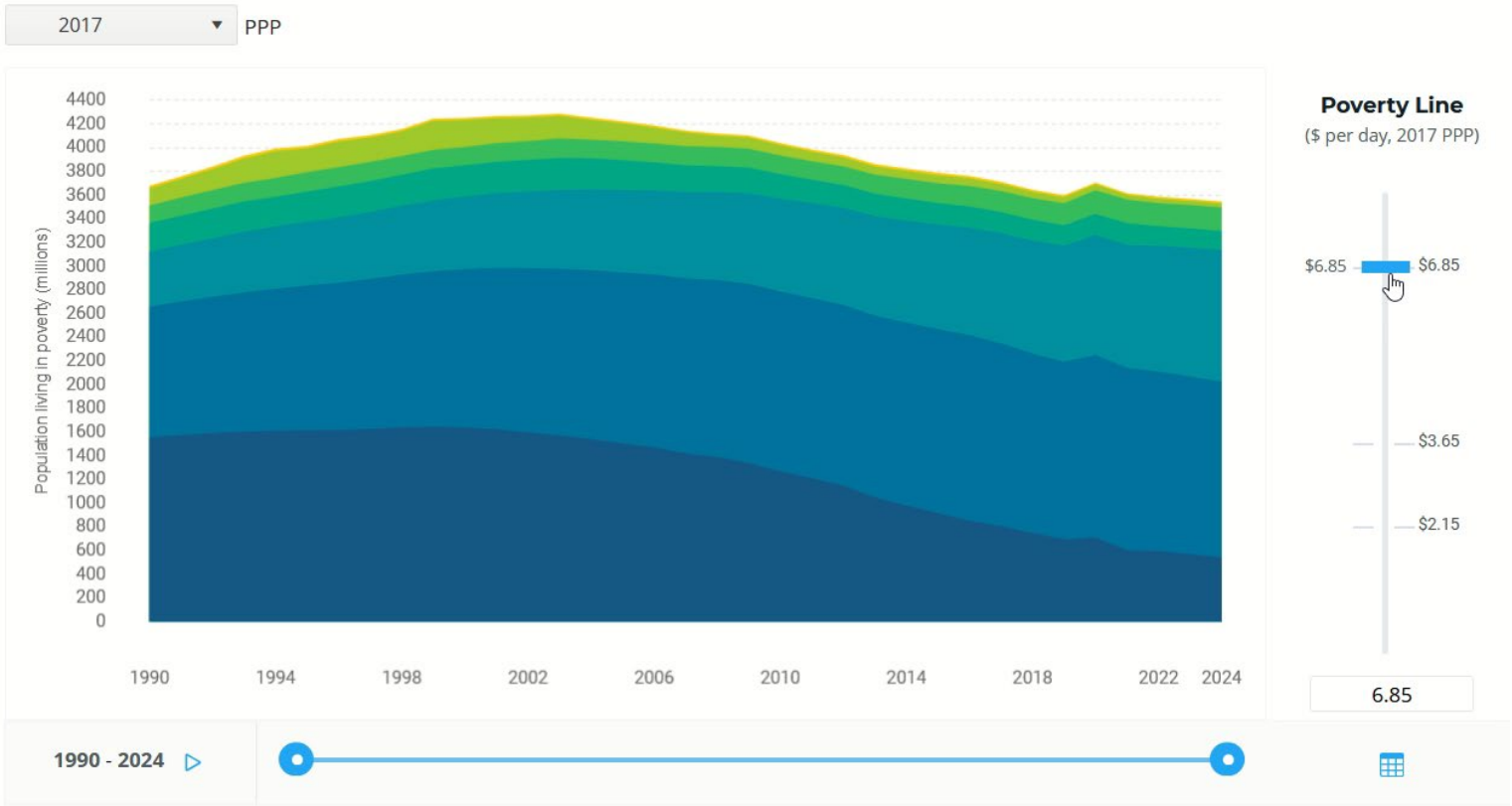
Developing economies took over the advanced economies in the total GDP PPP during 2008.

IMF World Economic Outlook & MGM Research 2019

GLOBAL AND REGIONAL POVERTY TRENDS

3.53
billion

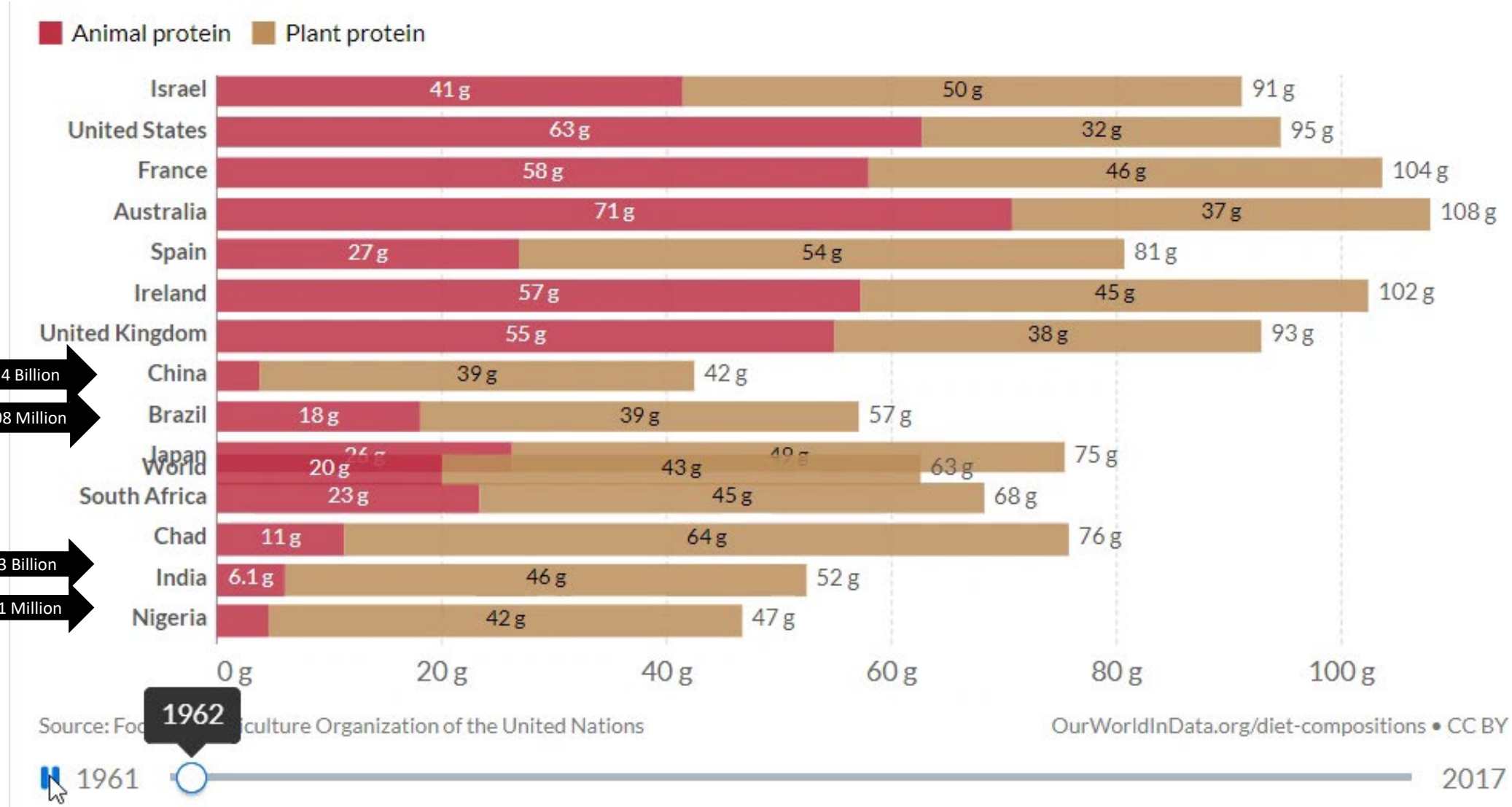
people lived below the **$6.85** per day poverty line in 2024



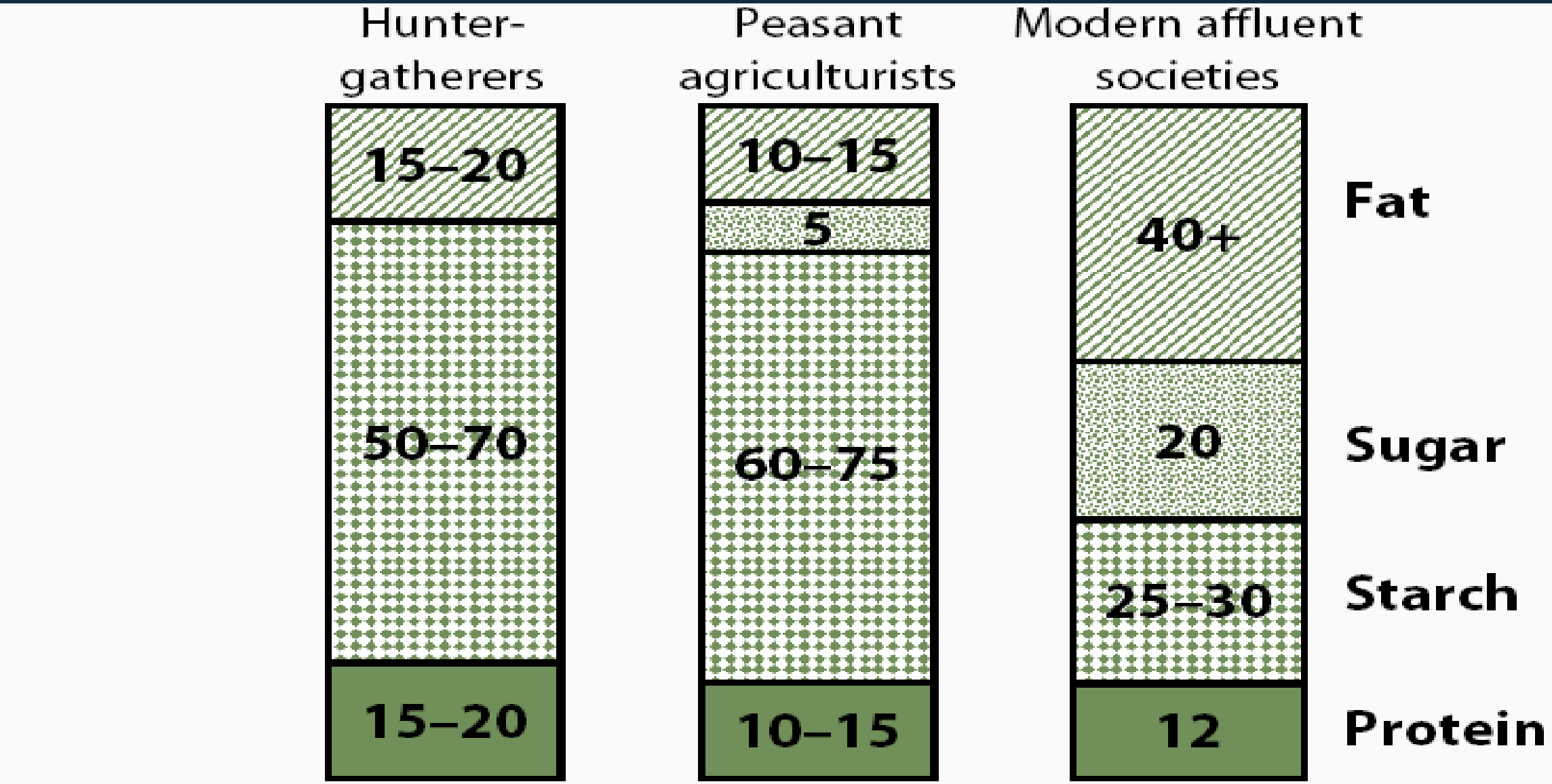
Source: World Bank (2025), Poverty and Inequality Platform (version 20240627_2017_01_02_PROD) [data set]. pip.worldbank.org. Accessed on 2025-02-27

PPP: per person per day.

GLOBAL PROTEIN DEMANDS



FAO, OurWorldInData.org/diet-composition // https://ourworldindata.org/grapher/daily-protein-supply-from-animal-and-plant-based-foods



Caballero, Allen & Prentice 2005

Australia: The Browns of Riverview, QLD
Food expenditure for one week: **USD $376.45.**
Favourite foods: Peach Pie & Yogurt.

China: The Dong family of Beijing.
Food expenditure for one week: **USD $155.06.**
Favorite foods: Fried shredded sweet and sour pork.

Luxembourg: Kuttan-Kasses of Erpeldange
Food expenditure for one week: **USD $465.84.**
Favourite foods: Shrimp pizza, chicken in wine sauce, Turkish kebabs

Egypt: The Ahmed family of Cairo
Food expenditure for one week: **USD $68.53**
Favorite foods: Okra and Mutton


Nutrition
Protein
Calcium
Iron
Sodium
Calories
Cholesterol

1984

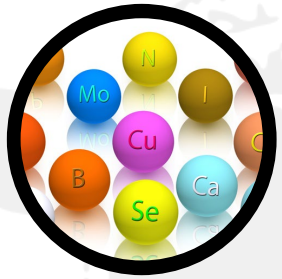
1996

2014

Time Magazine Archives

NUTRITION SCIENCE ERAS

DISCOVERIES AND OPPORTUNITIES



1920-1950
Nutrient discoveries
RDA
Specific deficiencies addressed

1960-2000
Chronic disease causes
Fat vs sugar vs salt

Dietary recommendations based on nutrients

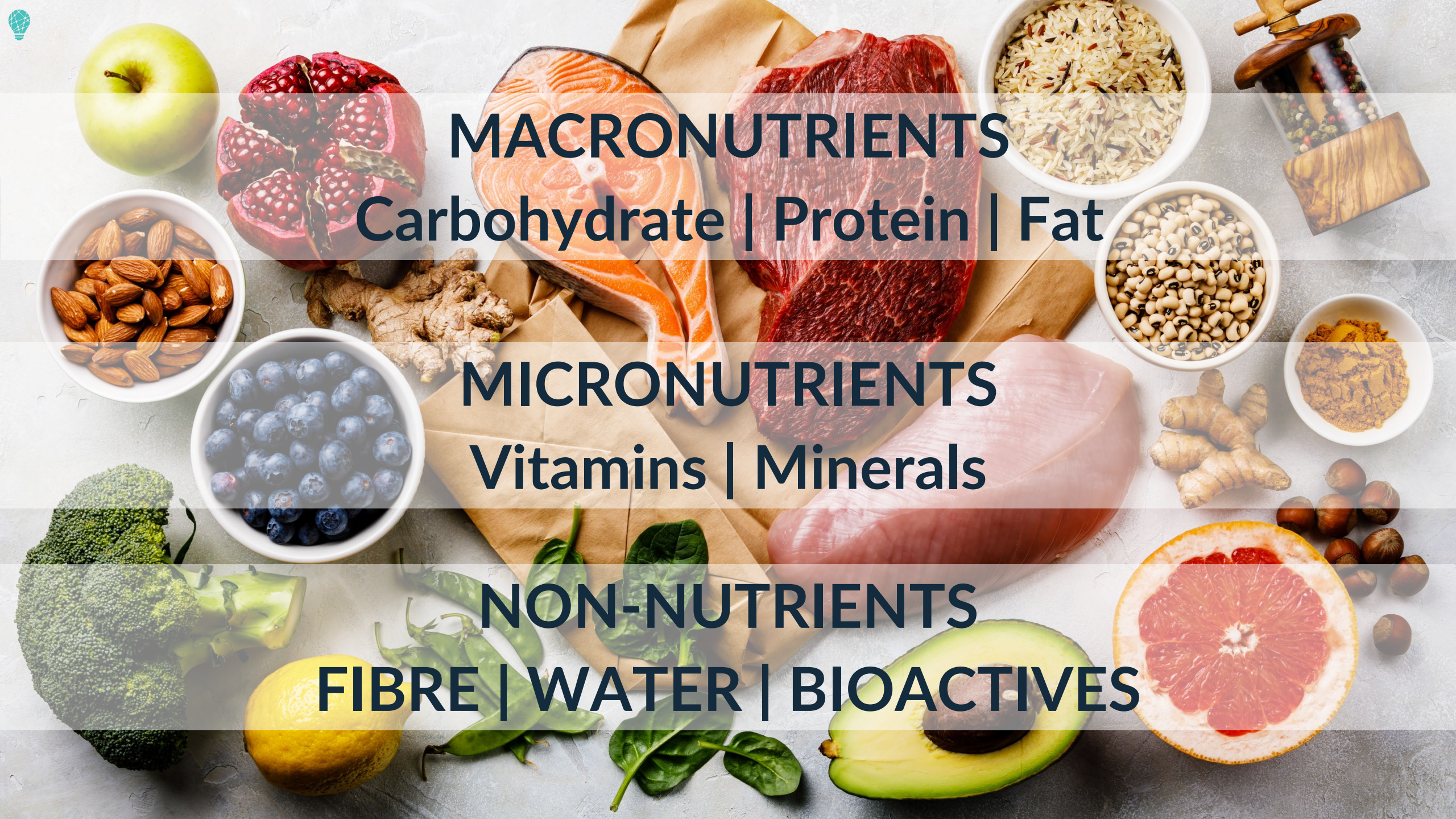
2010-2020
Population Health
Gut Health
Genotypes
Omic Technology
Dietary guidelines based on food groups

2020-2030 +
Mechanisms of Action
Personalised Nutrition
Food System Frameworks

2000-2010
Food and dietary patterns

Gidley, Simpson et al. 2019


WE EAT FOOD
NOT NUTRIENTS

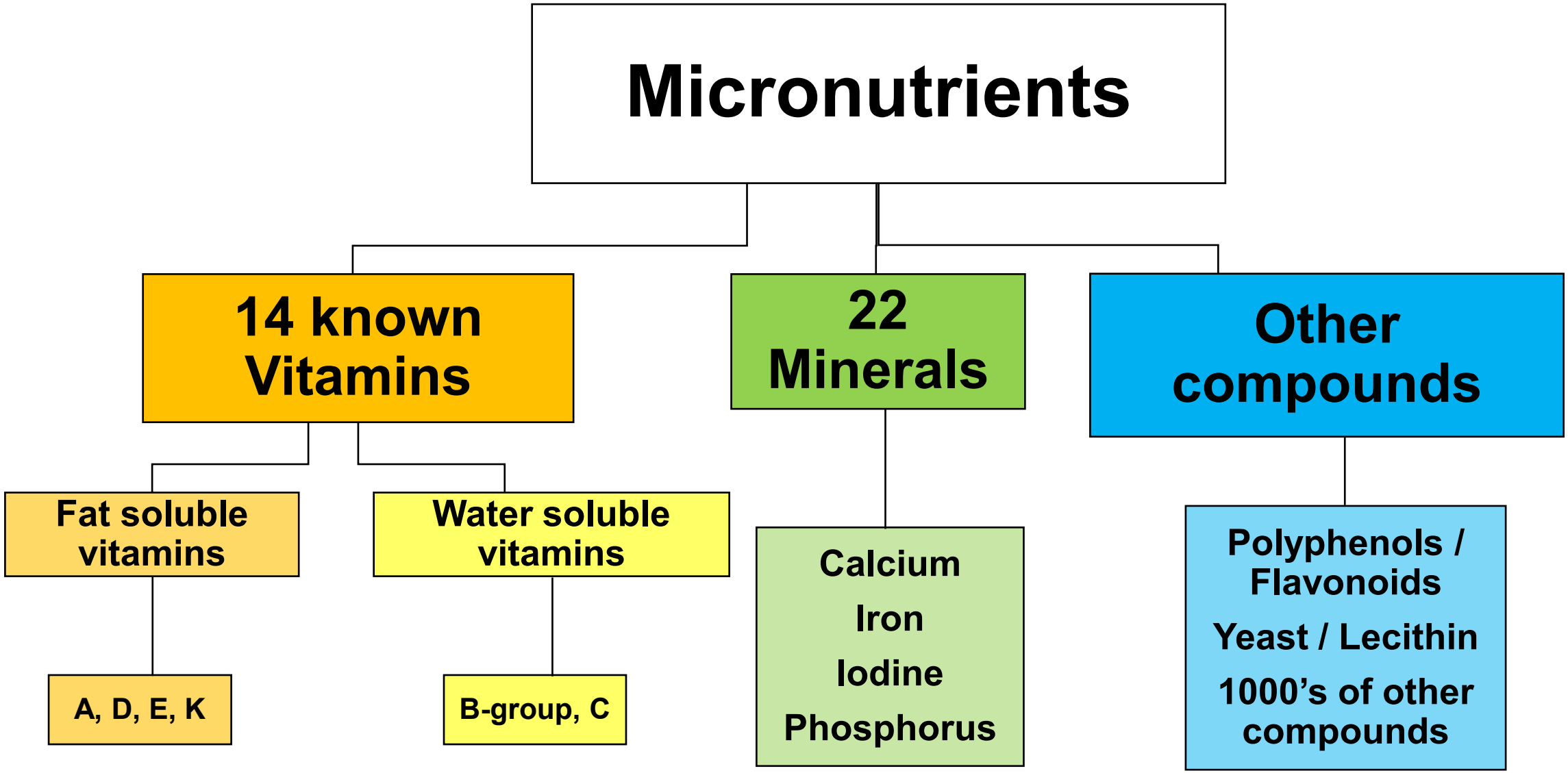

MACRONUTRIENTS
Carbohydrate | Protein | Fat
MICRONUTRIENTS
Vitamins | Minerals
NON-NUTRIENTS
FIBRE | WATER | BIOACTIVES

MACRONUTRIENTS

- **Maroncutrients =** fat, protein, and carbohydrate (CHO); required in amounts of greater than 1 gram/day.

Digestion/absorption /end products differ

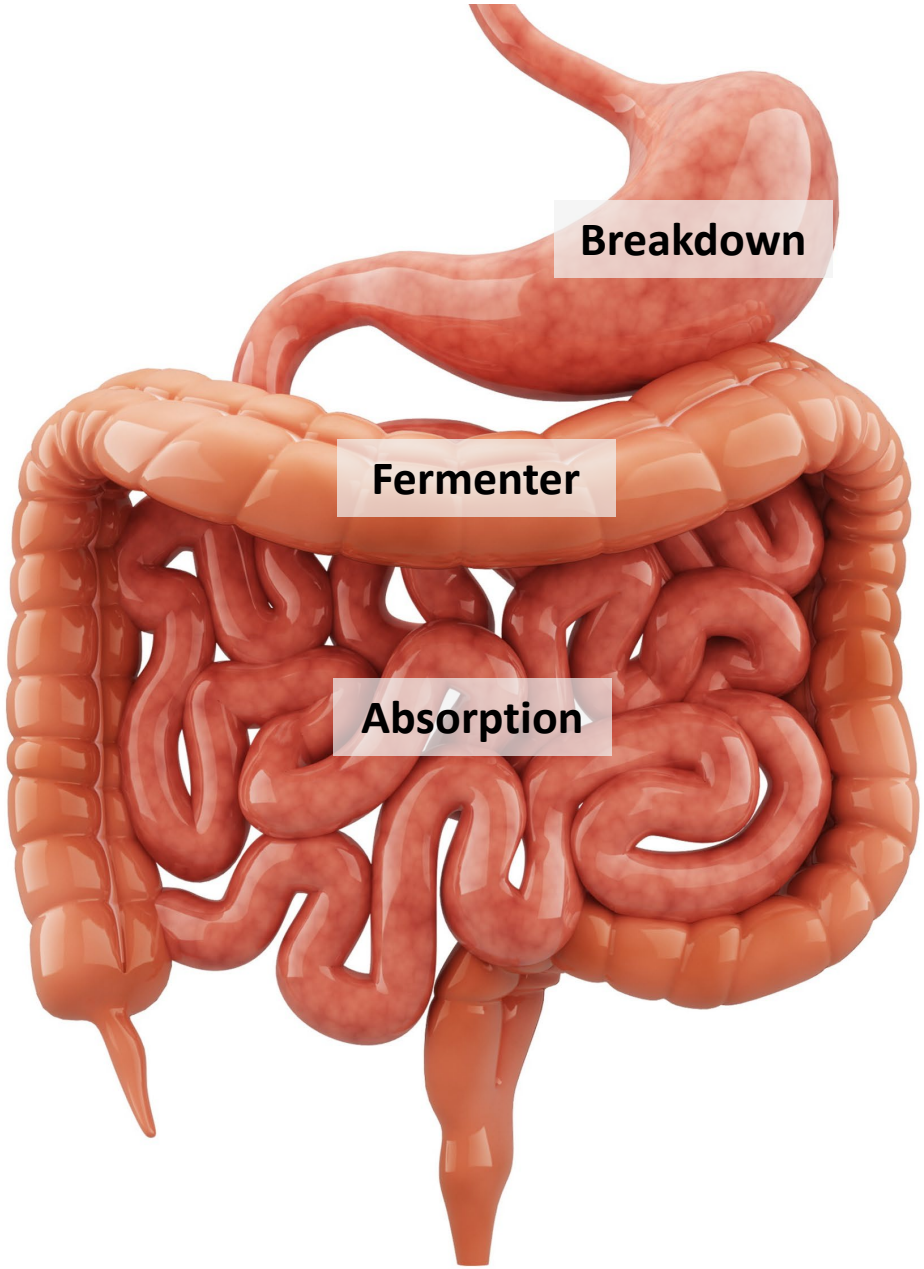
Macronutrient	Gross energy Kj/g	Net energy (available for metabolism) Kj/g	Kcal/g
CHO	17	16	4
Sugar	17	16	4
Fat	39	37	9
Protein	23	17	4
Alcohol	29	27	7


Micronutrients
14 known Vitamins
22 Minerals
Other compounds
Fat soluble vitamins
Water soluble vitamins
A, D, E, K
B-group, C
Calcium
Iron
Iodine
Phosphorus
Polyphenols / Flavonoids
Yeast / Lecithin
1000's of other compounds

pH 1-2
Contents: pepsin, amylase (from salivary glands), mucus

pH 6-7
Duodenum
Jejunum
Ileum
Contents: pancreatic acid, bile salts, mucus

pH 5-7
Ascending, Transverse & Descending colon
Contents:
Bicarbonate, mucus



Aerobic bacteria

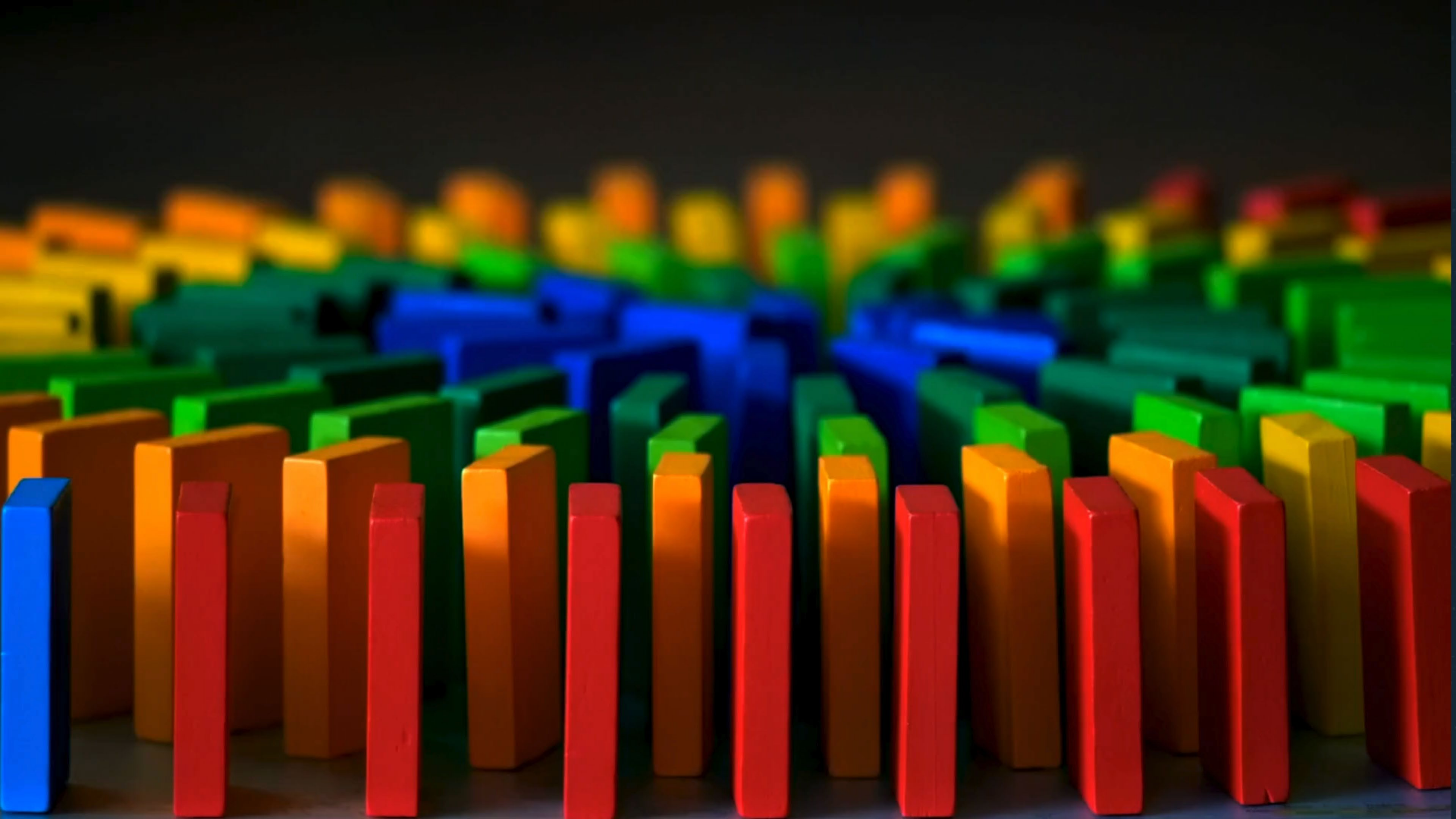
$<10^3$
- *Lactobacilli*
- *Streptococci*

$<10^{4-7}$
- *Lactobacilli*
- *E. coli*
- *Enterococcus faecalis*

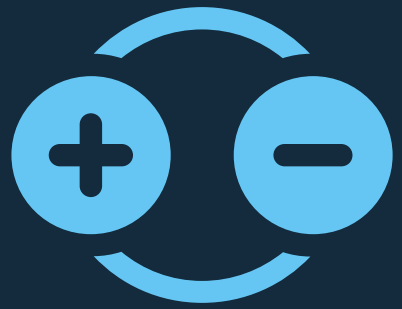
$<10^{10-12}$
- Lactic acid (producing) bacteria
- *Bacteroides*
- *Bifidobacterium bifidum*

Anaerobic bacteria

Adapted from Prakash, Tomaro-Duchesneau et al. 2011



4 FACTORS THAT AFFECT PROTEIN (OR ANY NUTRIENT) QUALITY



Quantity

Digestibility
+
Absorption

Type

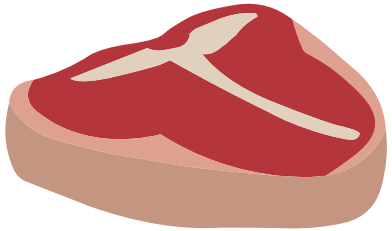
Network

Protein requirements:

- **Males (19-70yrs): 0.68g-0.84g/kg**
- **Females (19-70yrs): 0.60g-0.75g/kg**
- **Up to 2.5g/kg for elite athletes**

Adhikari, Schop et al. 2022

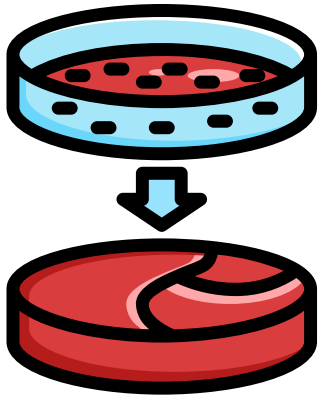
PROTEIN QUANTITY g/200KCAL SERVE



Steak

20.9g protein

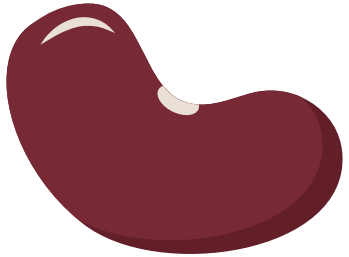
83g serve



Cultured meat

20.9g protein

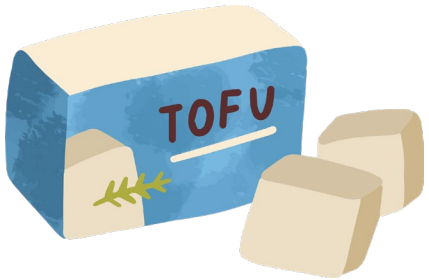
83g serve



Kidney Beans

13.7g protein

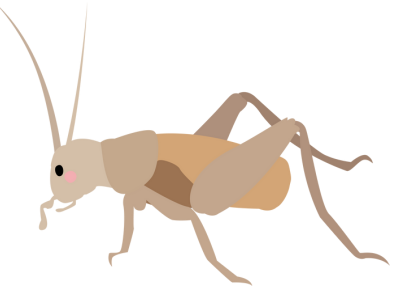
157g serve



Tofu

24.1g protein

241g serve



Crickets

27.5g protein

43g serve

When it comes to food

…and the nutrients it contains…

PROTEIN QUALITY:DIGESTIBILITY & ABSORPTION

"How much of which AAs are in the food?"

Protein Digestibility & Absorption

"How much of the available AAs is the body able to use?"

FAO/WHO 1991

PROTEIN TYPE: AMINO ACIDS

- 20,000 unique protein encoding genes → 100,000+ unique proteins
- 20-22 amino acids → all the proteins found in the human body
- The 20 to 22 amino acids:

1. Alanine
2. Arginine
3. Asparagine
4. Aspartic Acid
5. Cysteine
6. Glutamic acid
7. Glutamine
8. Glycine
9. Histidine IA
10. Isoleucine IA
11. Leucine IA
12. Lysine IA
13. Methionine IA
14. Phenylalanine IA
15. Proline
16. Serine
17. Threonine IA
18. Tryptophan IA
19. Tyrosine
20. Valine IA

21. Selenocysteine
22. Pyrolysine (not used in human protein synthesis)

Lopez and Mohiuddin 2024

Table 2: Nutritional composition of meat. **g/100g**

Essential amino acids				
Amino acids	Category	Beef	Lamb	Pork
Lysine	Essential	8.2	7.5	7.9
Leucine	Essential	8.5	7.2	7.6
Isoleucine	Essential	5.0	4.7	4.8
Cystine	Essential	1.5	1.5	1.2
Threonine	Essential	4.2	4.8	5.2
Methionine	Essential	2.2	2.4	2.6
Tryptophan	Essential	1.3	1.2	1.5
Phenylalanine	Essential	4.1	3.8	4.3
Arginine	Essential	6.4	6.8	6.6
Histidine	Essential	2.8	2.9	3.1
Valine	Essential	5.6	5.1	5.2
Nonessential amino acids				
Amino acid	Category	Beef	Lamb	Pork
Proline	Nonessential	5.2	4.7	4.4
Glutamic acid	Nonessential	14.3	14.5	14.6
Aspartic acid	Nonessential	8.9	8.6	8.8
Glycine	Nonessential	7.2	6.8	6.0
Tyrosine	Nonessential	3.3	3.3	3.1
Serine	Nonessential	3.9	3.8	4.1
Alanine	Nonessential	6.3	6.2	6.4

Geletu et al 2021

DIAAS Protein quality ratings of Animal and Plant Proteins

Plant Protein	DIAAS
Almonds	40
Chickpeas	83
Lentils (red)	50
Lentils (yellow)	73
Pinto beans	70
Pea protein concentrate	82
Red kidney beans	58
Soybean	99.6
Soy protein	91.5
Tofu	52

Note: DIAAS >100 is high-quality protein; DIAAS >75 is a good quality protein; and DIAAS <75 is a low-quality protein.
Source: (Marinangeli & House, 2017)

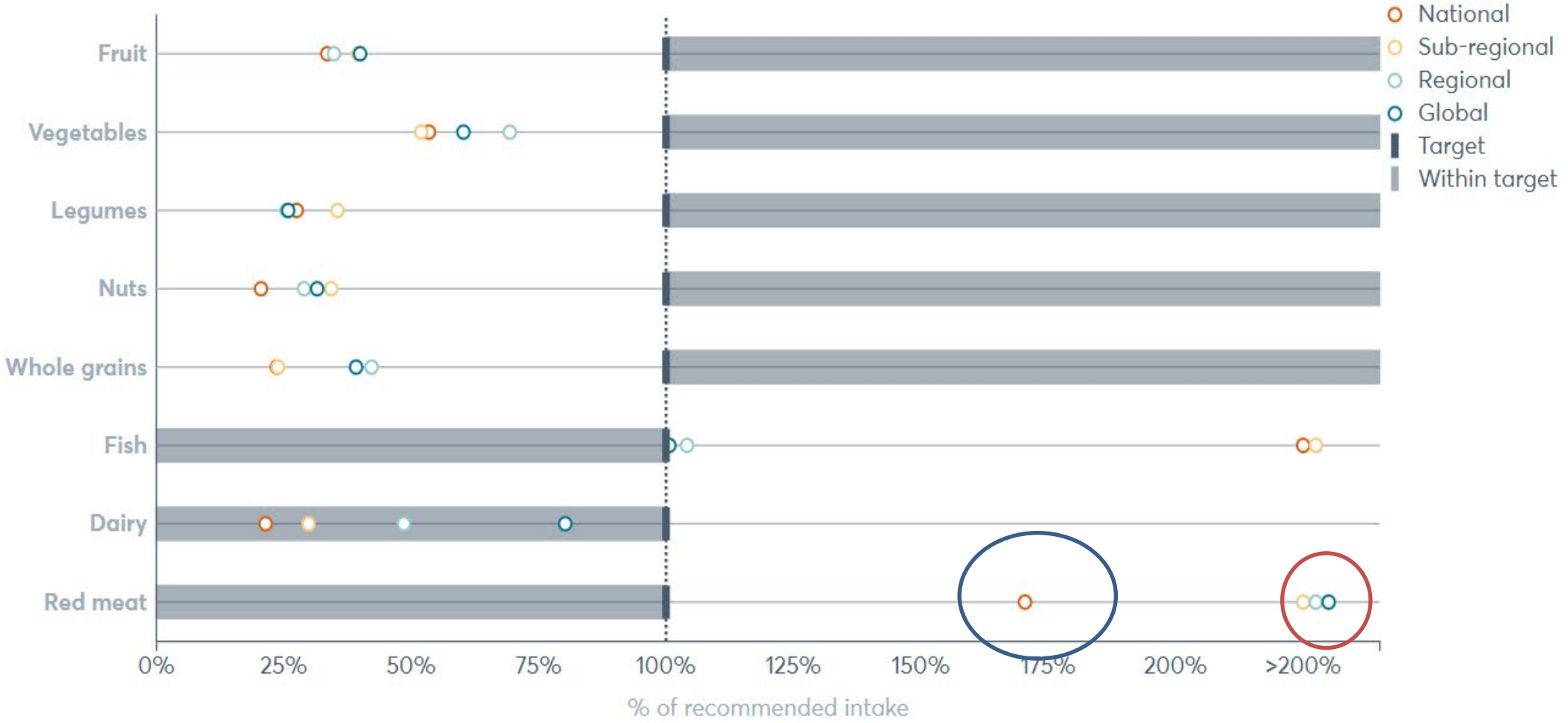
Admassu, Fox et al. 2020


The quality of a protein (and thus the food source) is vital when considering the nutritional benefits that it can provide.
Determining the quality of a protein is determined by assessing its essential amino acid composition, digestibility and bioavailability of amino acids.
(FAO/WHO)
FAO / WHO 1991


E
S
G

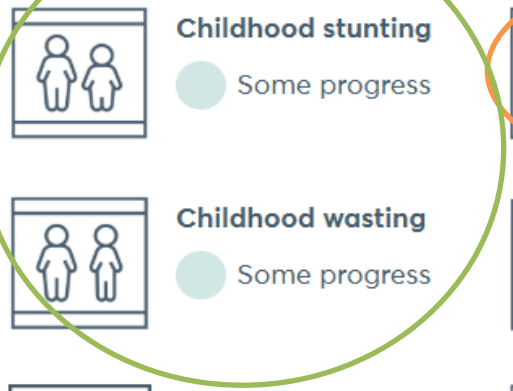
INDONESIAN DIETARY INTAKE

Dietary intakes of key foods and nutrients in adults aged 20 years and over compared against minimum and maximum targets



INDONESIAN GLOBAL NUTRITION TARGETS

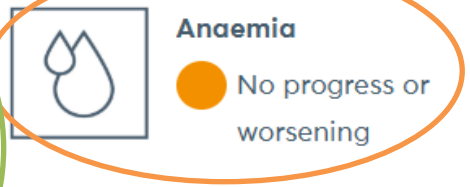
Progress towards the global nutrition targets



Childhood stunting
Some progress

Childhood wasting
Some progress

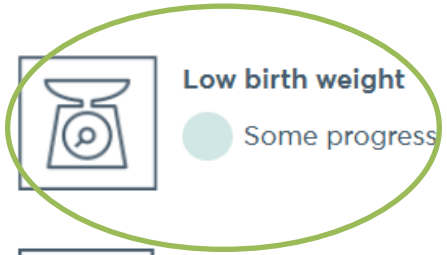
Obesity, men
Off course



Anaemia
No progress or worsening

Sodium intake, women and men
Off course

Diabetes, women
Off course



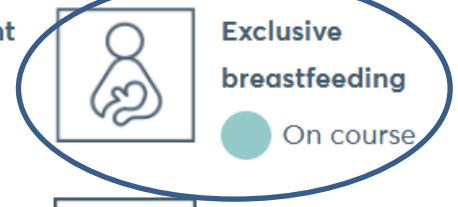
Low birth weight
Some progress

Raised blood pressure, women
Off course

Diabetes, men
Off course

Childhood overweight
Off course

Raised blood pressure, men
Off course

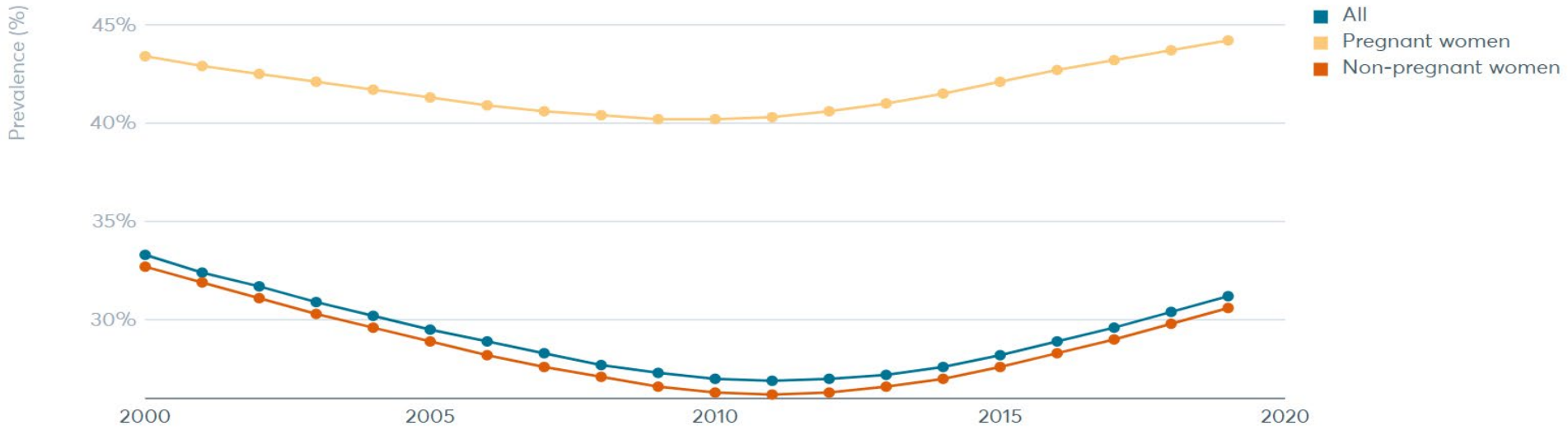


Exclusive breastfeeding
On course

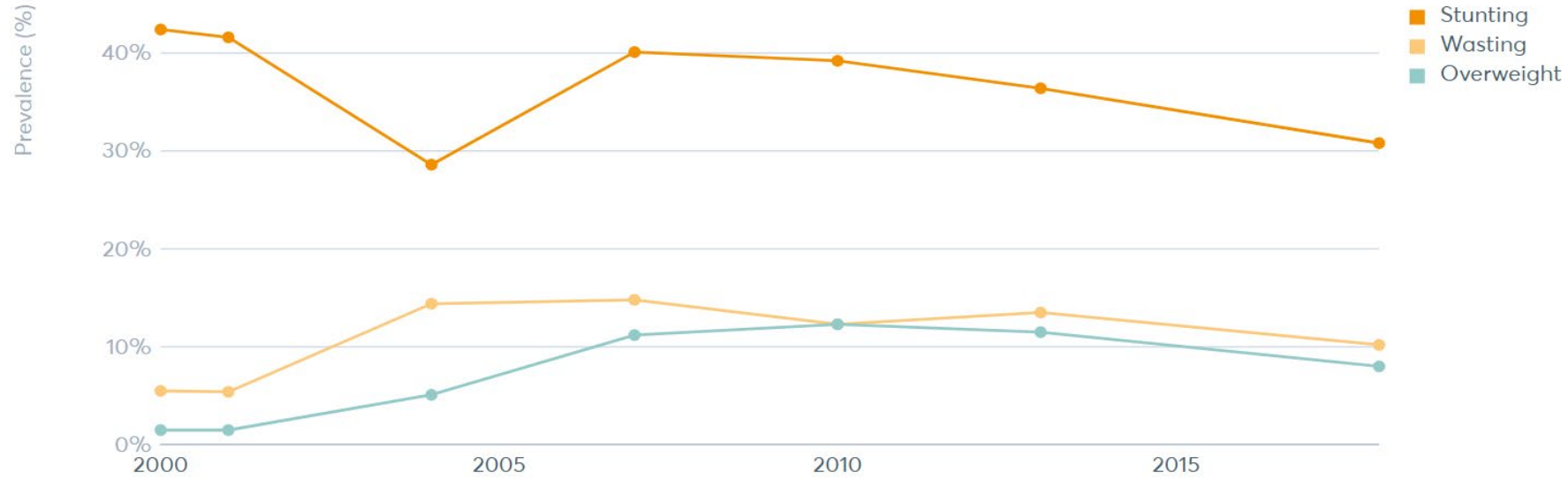
Obesity, women
Off course

INDONESIAN MAJOR HEALTH CONCERNS

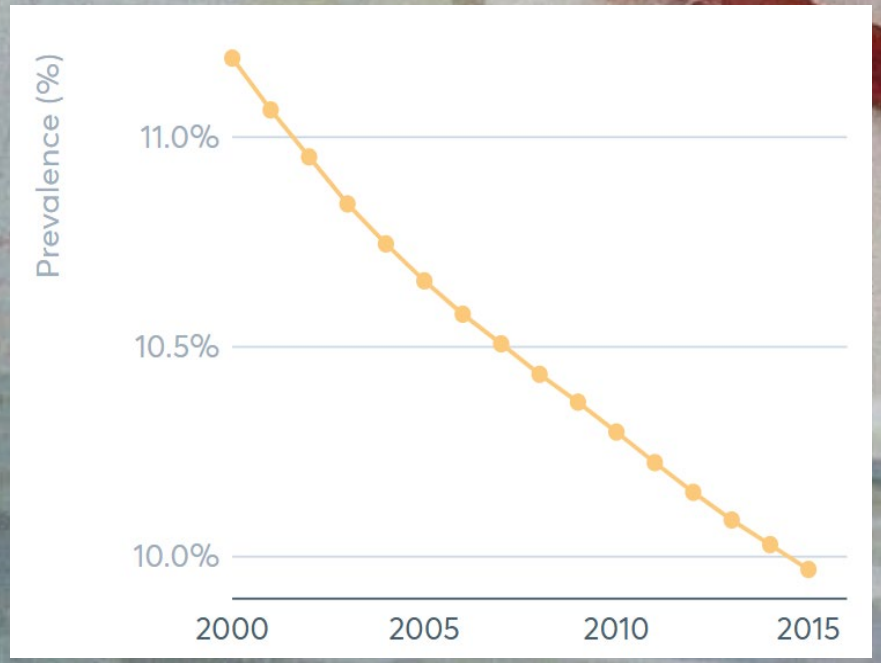
ANAEMIA PREVALENCE%

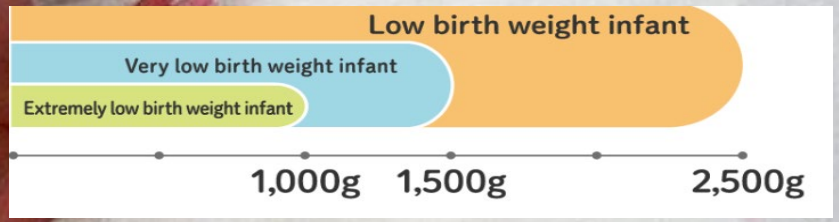


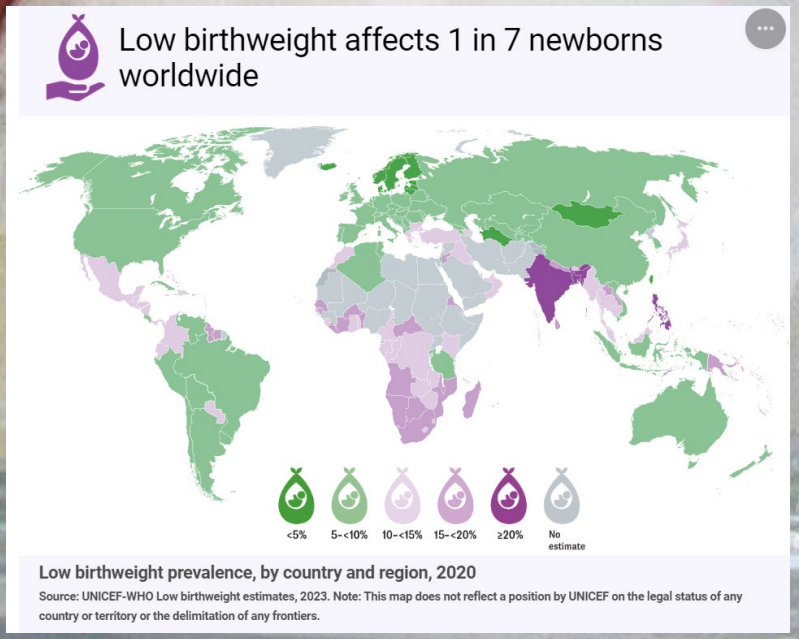
CHILDHOOD STUNTING%



INDONESIA LOW BIRTH WEIGHT PREVALENCE%







Zn

+

- Teratogenic
- Lethal

-

- Preterm birth
- Pregnancy-induced hypertension (PIH)
- Low birth weight
- Pre-eclampsia
- Placental insufficiency

Cu

+

- Fenton's reagent
- Wilson's disease
- Premature birth
- Low birth weight
- Gestational diabetes

-

- Hypochromic anemia
- Intrauterine growth restriction (IUGR)
- Spontaneous delivery
- Spontaneous abortion

Fe

+

- RTF ↑
- Chaemochromatosis
- Prelabor rupture of membranes

-

- Iron deficiency anemia (IDA)
- Low birth weight
- Pre-eclampsia

Cerami, C., 2017.; Grzeszczak, K., Kwiatkowski, S. & Kosik-Bogacka, D., 2020

"Nutrition is not the concept of a single food or a single nutrient. Rather nutrition comes from the sum total of food we eat over time. And nutrition-related health outcomes stems from the combinations of foods (due to their different nutrient qualities) we consume."

Emeritus Prof Mike Gidley
The University of Queensland

- **HIGH BIOLOGICAL VALUE:**
  - **complete protein (contains all essential amino acids)**
  - **vitamin B12, niacin, vitamin B6**
  - **iron, zinc, phosphorus**
- **A SOURCE OF:**
  - **long-chain omega-3 polyunsaturated fats, riboflavin, pantothenic acid, selenium**
  - **antioxidants and other bioactive substances including:**
    - **taurine, carnitine, carnosine, ubiquinone, glutathione and creatine**
- **RELATIVELY LOW in sodium**

Williams 2007; Miller et al. 2018

Thank you Australia.
We are just so grateful that you help us, support us, and allow us to eat meat our way.

- Indonesian uni student

The live cattle are breaking the cycle of poverty for 10 000s of Indonesians. For the first time, many villagers are confident to send their children to university - they know they can finally afford to pay for the children's education because of the cattle.

- Neny

Australians should be so proud that they are helping my country and my people eat good food. And also keep our culture instead of forcing us to lose our history. Thank you Australia.

- Indonesian uni student


1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
8 DECENT WORK AND ECONOMIC GROWTH
10 REDUCED INEQUALITIES
LIVE EXPORT(ERS)
WHAT DO YOU MEAN TO NUTRITION?
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
15 LIFE ON LAND
17 PARTNERSHIPS FOR THE GOALS

THANK YOU

Dr Anneline.

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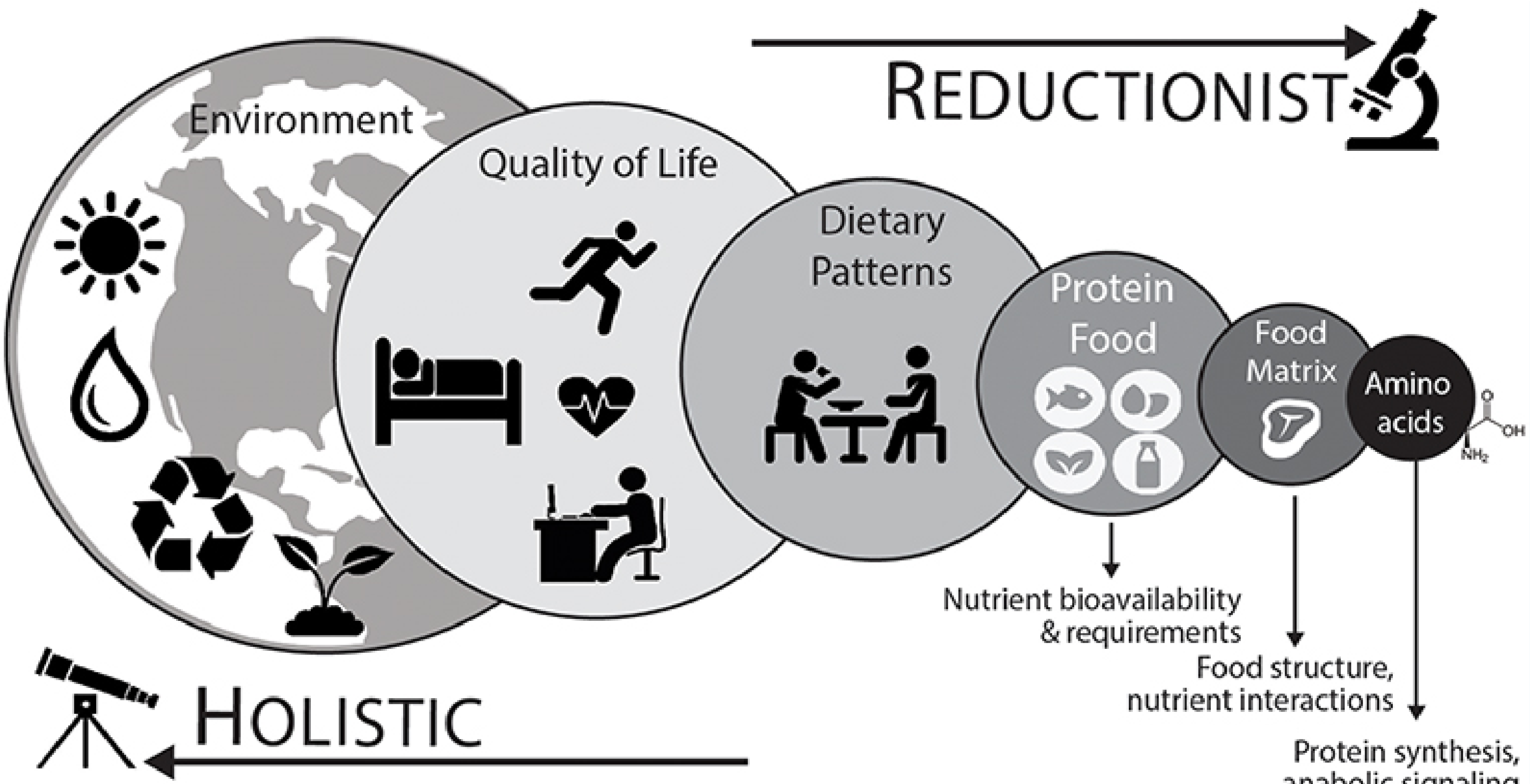
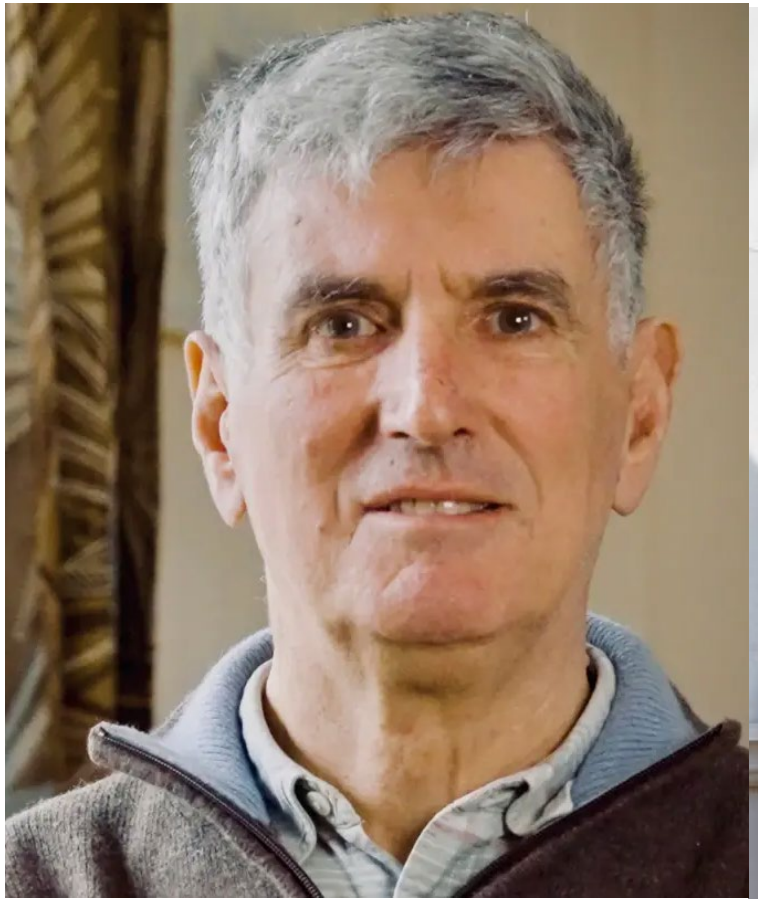


Burd, McKenna et al. 2019



Prof Andre Briend, Paediatrician + Nutritional Scientist, WHO

Michel Lescanne, Food Scientist - Nutriset

Peanuts, Sugar, Skim milk powder, Vitamins, Minerals

Princess, 1 year, Haiti,
4.5kg

12 weeks: Plumpy-Nut 3x per day;
7.5kg