



INSTITUTE FOR NUTRITIONAL SCIENCES- WORKING GROUP INTERNATIONAL NUTRITION

# Food and Nutrition Security – in times of climate change

# Definitions of Food Security and Insecurity, 1975-1991

1. "Availability at all times of adequate world supplies of basic food-stuffs . . . to sustain a steady production of **basic food-stuffs . . . , to**"
2. "A condition in which the probability of a country's citizens falling below a minimal level of food consumption is low" (Reutlinger and Knapp 1980)
3. "The ability to meet target levels of consumption on a yearly basis" (Siamwalla and Vaidya 1987)

4. "Everyone has enough to eat at any time — enough for life, health and growth"

5. **20. "Access to adequate food by and for households over time" (Eide 1990)**

6. "Freedom from food deprivation for all of the world's people all of the time"

7. **"Ensuring that all people at all times have both physical and economic access to the basic food they need" (FAO 1983)**

9. "A basket of food, nutritionally adequate, culturally acceptable, procured in keeping with human dignity and enduring over time" (Okinaka 1985 in Eide et al 1985)

10. "Access by all people at all times to enough food for an active and healthy life" (Reutlinger 1985)

11. "Access by all people at all times to enough food" (World Bank 1986)

12. "Always having enough to eat" (Zipperer 1987)

27. **"(Low) risk of on-going lack of access by people to the food they need to lead healthy lives" (Von Braun 1991)**

13. "An assured supply and distribution of food for all social groups and individuals adequate in quality and quantity to meet their nutritional needs" (Barracough and Utting 1987)

14. "Both physical and economic access to food for all citizens over both the short and the long run" (Falcon et al 1987)

15. "A country and people are food secure when their food system operates efficiently in such a way as to remove the fear that there will not be enough to eat" (Maxwell 1988)

16. "Adequate food available to all people on a regular basis" (UN World Food Council 1988)

17. "Adequate access to enough food to supply the energy needed for all family active and productive lives" (Sahn 1989)

20. "Access to adequate food by and for households over time" (Eide 1990)

21. "Food insecurity exists when members of a household have an inadequate diet for"

23. "The absence of hunger and malnutrition" (Kennes 1990)

24. "The assurance of food to meet needs throughout every season of the year" (UNICEF 1990)

25. "The inability . . . to purchase sufficient quantities of food from existing supplies" (Amenor 1990)

27. "(Low) risk of on-going lack of access by people to the food they need to lead healthy lives" (Von Braun 1991)

# What means food insecurity?

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In 1970s: “food security” matter of national or global food supplies

In 1980: focus shifted towards: access to food at household and individual level

In 1980/90: introduction of nutritional and cultural aspects, human right to food

In 1990: perception matters, intra-household issues are central

-> food security = multi-objective phenomenon,  
identified by food insecure people themselves

# Definition in use:

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

The four pillars of food security are **availability, access, utilization and stability.**” [FAO/CFS 2012]

**Household food security** is the application of this concept to the family level, with individuals within households as the focus of concern.

# Terms..

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**Adequacy** refers to the **dietary needs** of an individual which must be fulfilled not only in terms of quantity but also in terms of nutritious quality of the accessible food. It also includes the importance of taking into account non-nutrient-values attached to food, be they cultural ones or consumer concerns.

**Availability** refers to enough food being produced for both the present and the future generations, therefore entailing the notions of sustainability, or long-term availability, and the protection of the environment.

**Accessibility (economic)** implies that the financial costs incurred for the acquisition of food for an adequate diet does not threaten or endanger the realization of other basic needs (e.g housing, health, education).

**Physical** accessibility implies that everyone, including physically vulnerable individuals, such as infants and young children, elderly people, the physically disabled, the terminally ill, and persons with persistent medical problems, including the mentally ill, should be ensured access to adequate food.

# What is “nutrition”?

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Nutrition = Food?

Nutrition = Health?

Nutrition = nice meal?

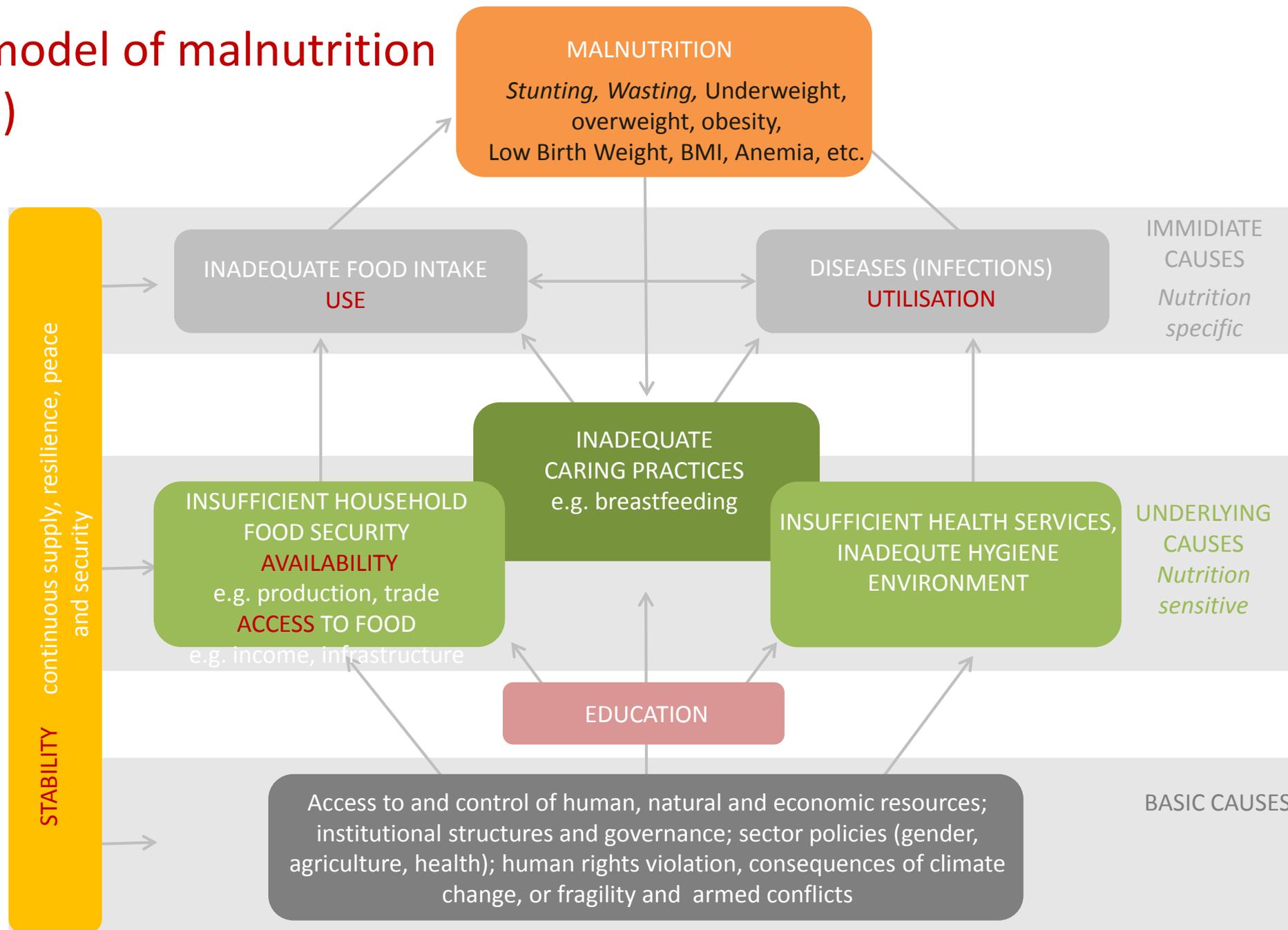
Nutrition = ??????

# Def. of Food and Nutrition Security

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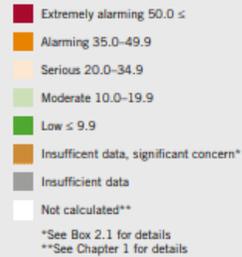
“Food and nutrition security exists when all people at all times have physical, social and economic access to food, which is consumed in sufficient quantity and quality to meet their dietary needs and food preferences, and is supported by an environment of adequate sanitation, health services and care, allowing for a healthy and active life.”

# Causal model of malnutrition (UNICEF)



Source: adapted from UNICEF (1991); slide prepared by and adopted from Ines Reinhard et al., GIZ

# 2018 GLOBAL HUNGER INDEX BY SEVERITY



Source: Authors.

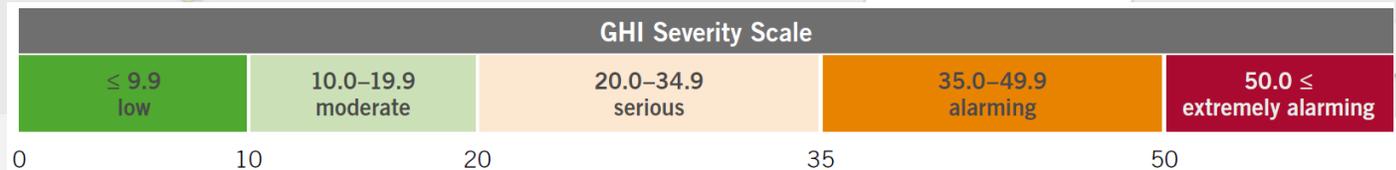
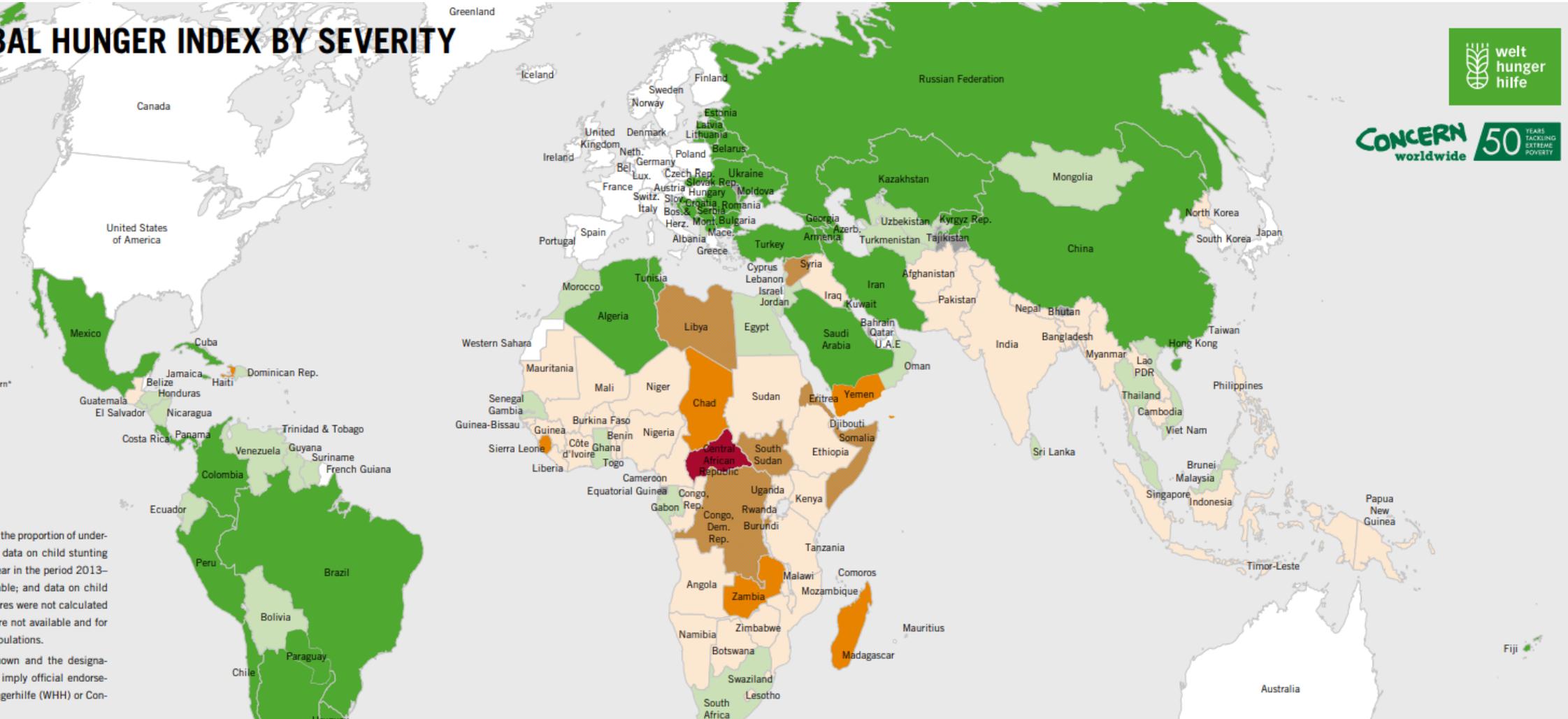
Note: For the 2018 GHI, data on the proportion of undernourished are for 2015–2017; data on child stunting and wasting are for the latest year in the period 2013–2017 for which data are available; and data on child mortality are for 2016. GHI scores were not calculated for countries for which data were not available and for certain countries with small populations.

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by Welthungerhilfe (WHH) or Concern Worldwide.

Recommended citation: "Figure 2.4: 2018 Global Hunger Index by Severity." Map in *2018 Global Hunger Index: Forced Migration and Hunger*, by K. von Grebmer, J. Bernstein, L. Hammond, F. Patterson, A. Sonntag, L. Klaus, J. Fahlbusch, O. Towe, C. Folev.

GHI scores are based on the following four indicators:

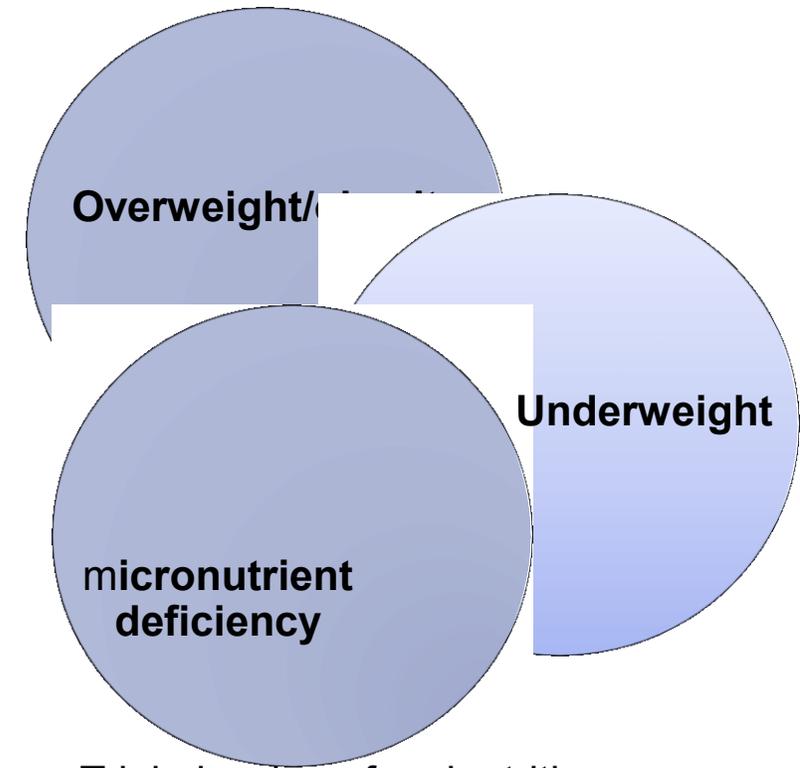
- Undernourishment (the proportion of undernourished people as a percentage of the population)
- Child stunting (the proportion of children under the age of five who are stunted)
- Child wasting (the proportion of children under the age of five who are wasted)
- Child mortality (the mortality rate of children under the age of five)



# Malnutrition as a global challenge

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- 821 million people suffer from hunger (SOFI 2018)
- 2 billion adults are overweight (GNR 2017) and 672 million obese (SOFI 2018)
- 2 billion suffer from micronutrient deficiency (GNR 2017)



Triple burden of malnutrition

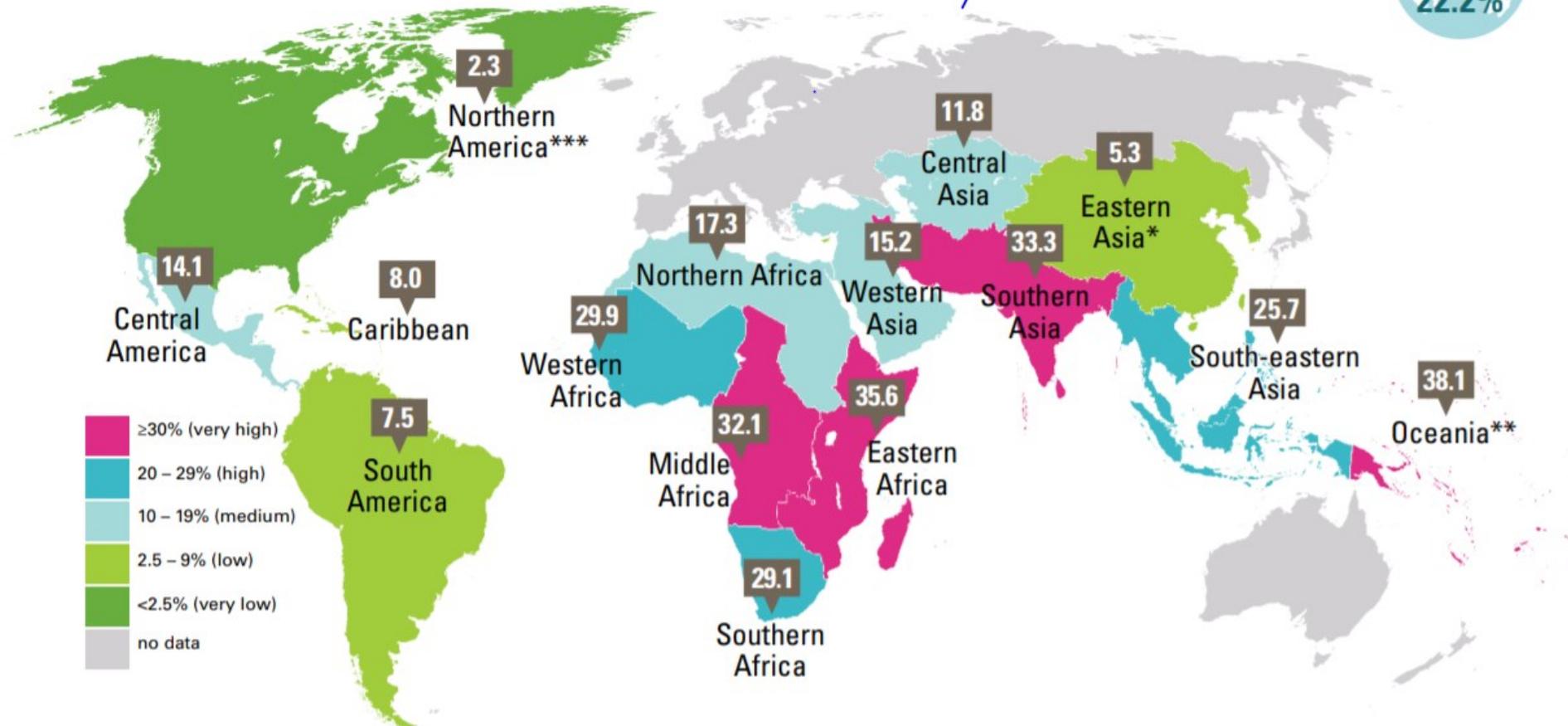


Stunting

# PREVALENCE

**In 7 sub-regions, at least one in every four children under 5 is stunted**

Percentage of stunted children under 5, by United Nations sub-region, 2017

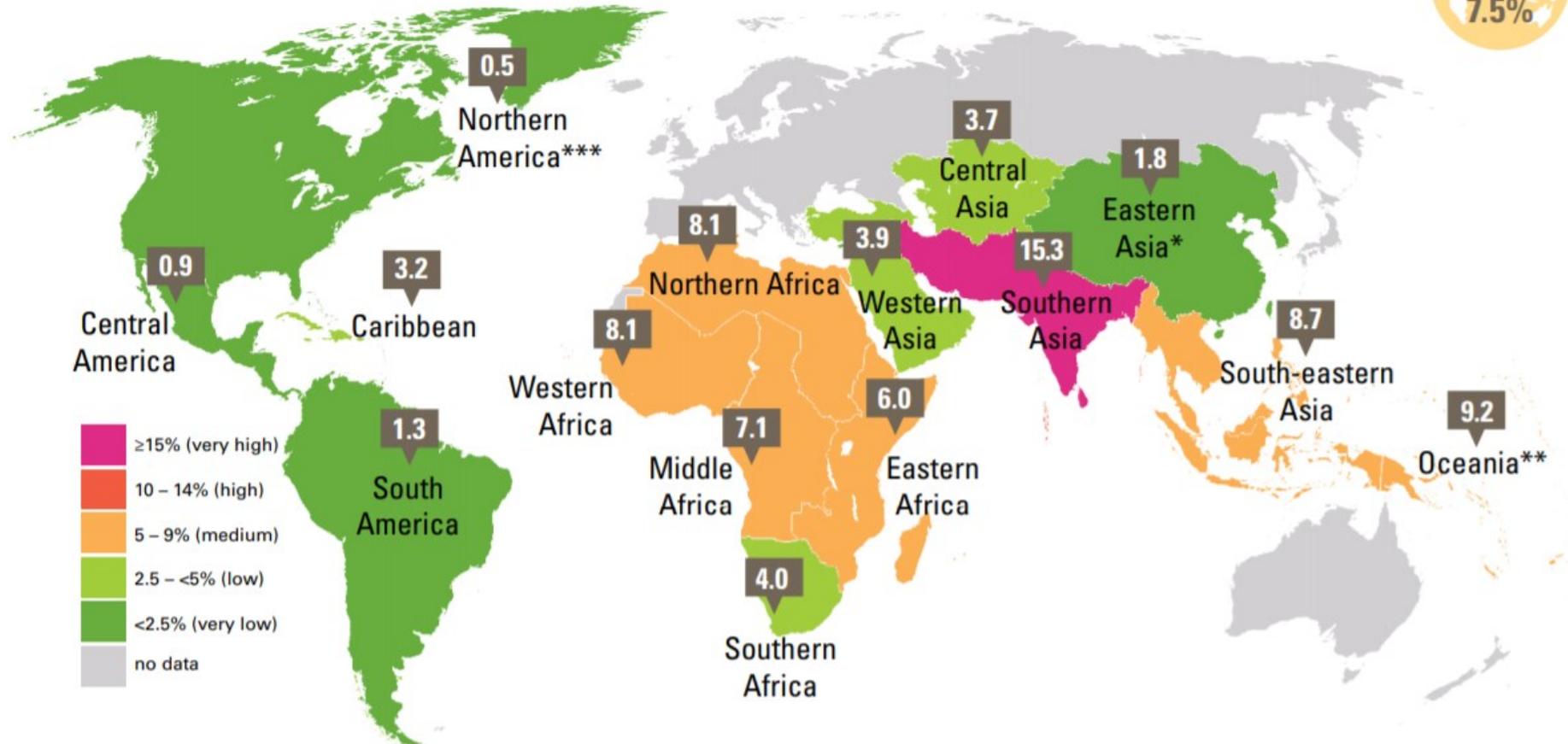




# Wasting PREVALENCE

## Wasting in Southern Asia constitutes a critical public health emergency

Percentage of wasted children under 5, by United Nations sub-region, 2017

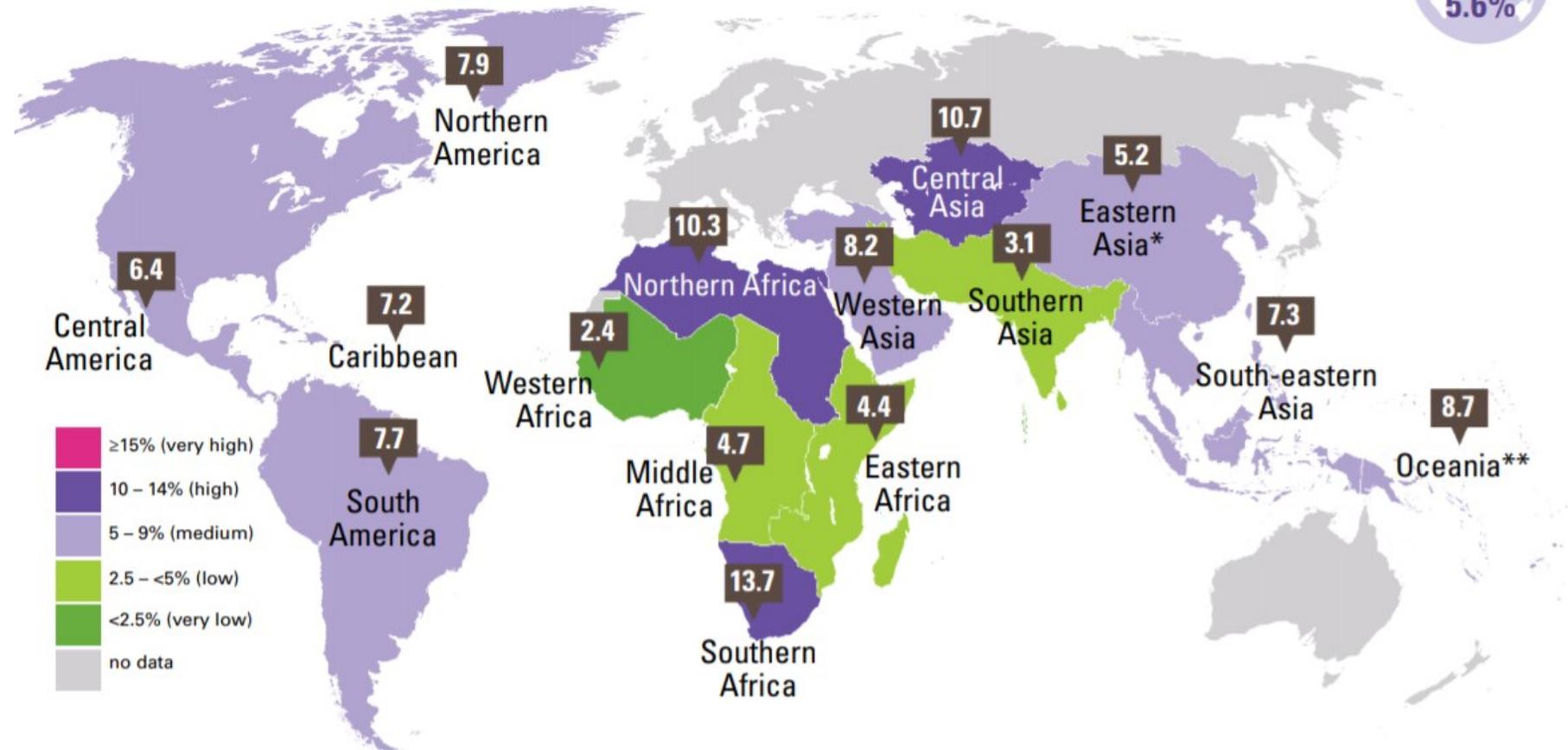




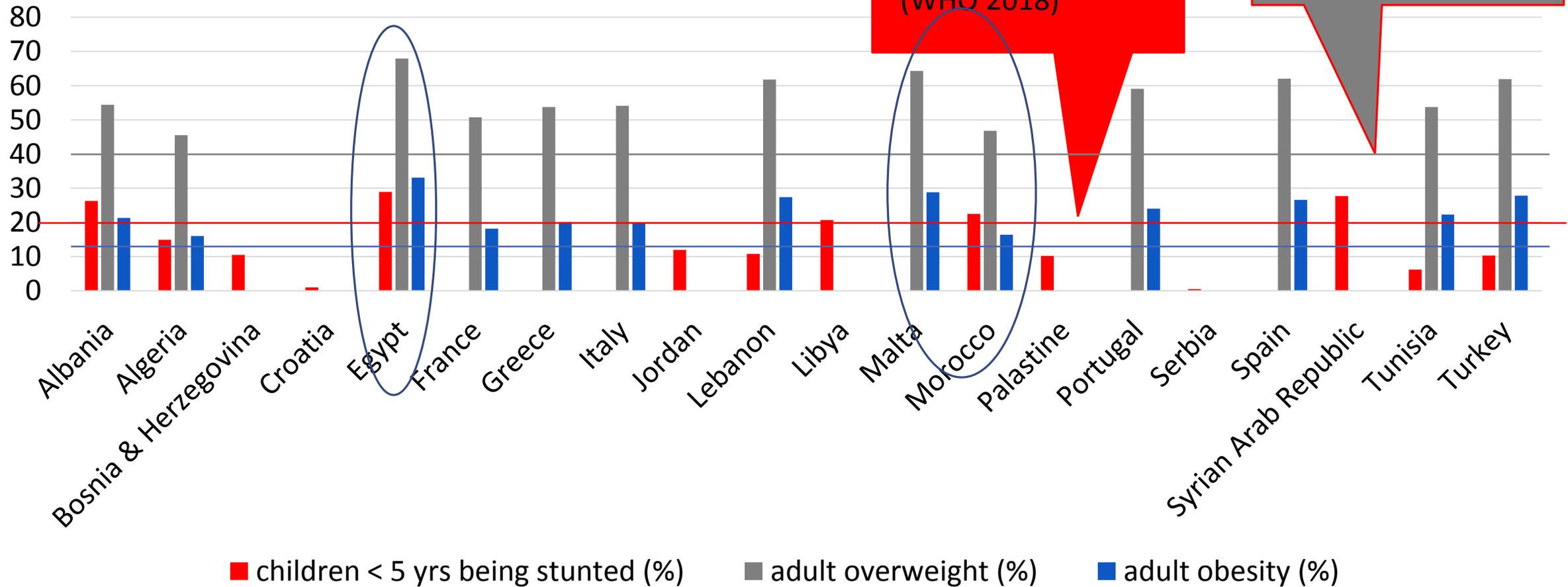
# Overweight PREVALENCE

**In three sub-regions, at least one in every ten children under five is overweight**

Percentage of overweight children under 5, by United Nations sub-region, 2017



# Malnutrition rates in the Mediterranean



In 2010, the inscription of the Mediterranean diet on the UNESCO Representative List of the Intangible Cultural Heritage of Humanity was approved with the following description:

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“The Mediterranean diet constitutes a set of skills, knowledge, practices and traditions ranging from the landscape to the table, including the crops, harvesting, fishing, conservation, processing, preparation and, particularly, consumption of food.

**The Mediterranean diet is characterized by** a nutritional model that has remained constant over time and space, consisting mainly of

**olive oil, cereals, fresh or dried fruit and vegetables, a moderate amount of fish, dairy and meat, and many condiments and spices, all accompanied by wine or infusions,** always respecting beliefs of each community.

However, the Mediterranean diet (from the Greek *diaita*, or way of life) encompasses more than just food. It promotes social interaction, since communal meals are the cornerstone of social customs and festive events." (UNESCO, 2010)

Mediterranean diet pyramid: a lifestyle for today  
guidelines for adult population

Serving size based on frugality  
and local habits



Wine in moderation  
and respecting social beliefs



© 2010 Fundacion dieta mediterranea the use and promotion  
of this pyramid is recommended without any restriction



# Nutrition Education increases women's dietary diversity in Karamoja, North-East Uganda

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Presented by Tina Koch

4th FANUS Conference,

August 27<sup>th</sup> 2019, Kigali



# Nutrition Education

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*‘(...) a combination of educational strategies, accompanied by environmental supports, designed to facilitate voluntary adoption of food choices and other food and nutrition-related behaviours conducive to health and well-being.’*

*Contento (2016, p.13)*

# Nutrition Education

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*‘(...) a combination of educational strategies, **accompanied by environmental supports**, designed to facilitate voluntary adoption of food choices and other food and nutrition-related behaviours conducive to health and well-being.’*

*Contento (2016, p.13)*

# The Social Ecological Model

Theory-based framework

Understanding versatile and interactive effects of personal and environmental factors of behaviour

- Identification leverage points
- Context-specific interventions
- Here: individual, interpersonal and community level addressed

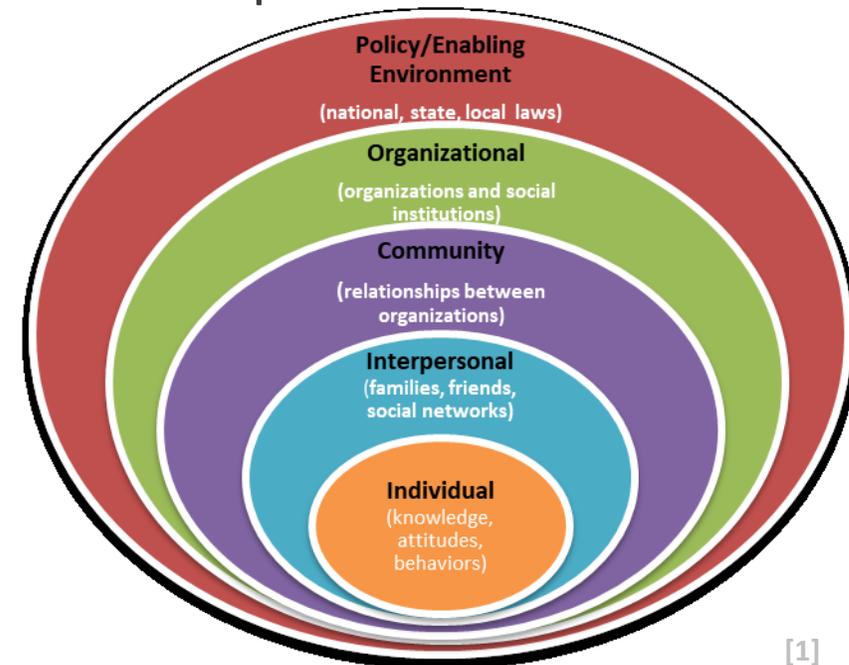


Figure 1: The Social Ecological Model.

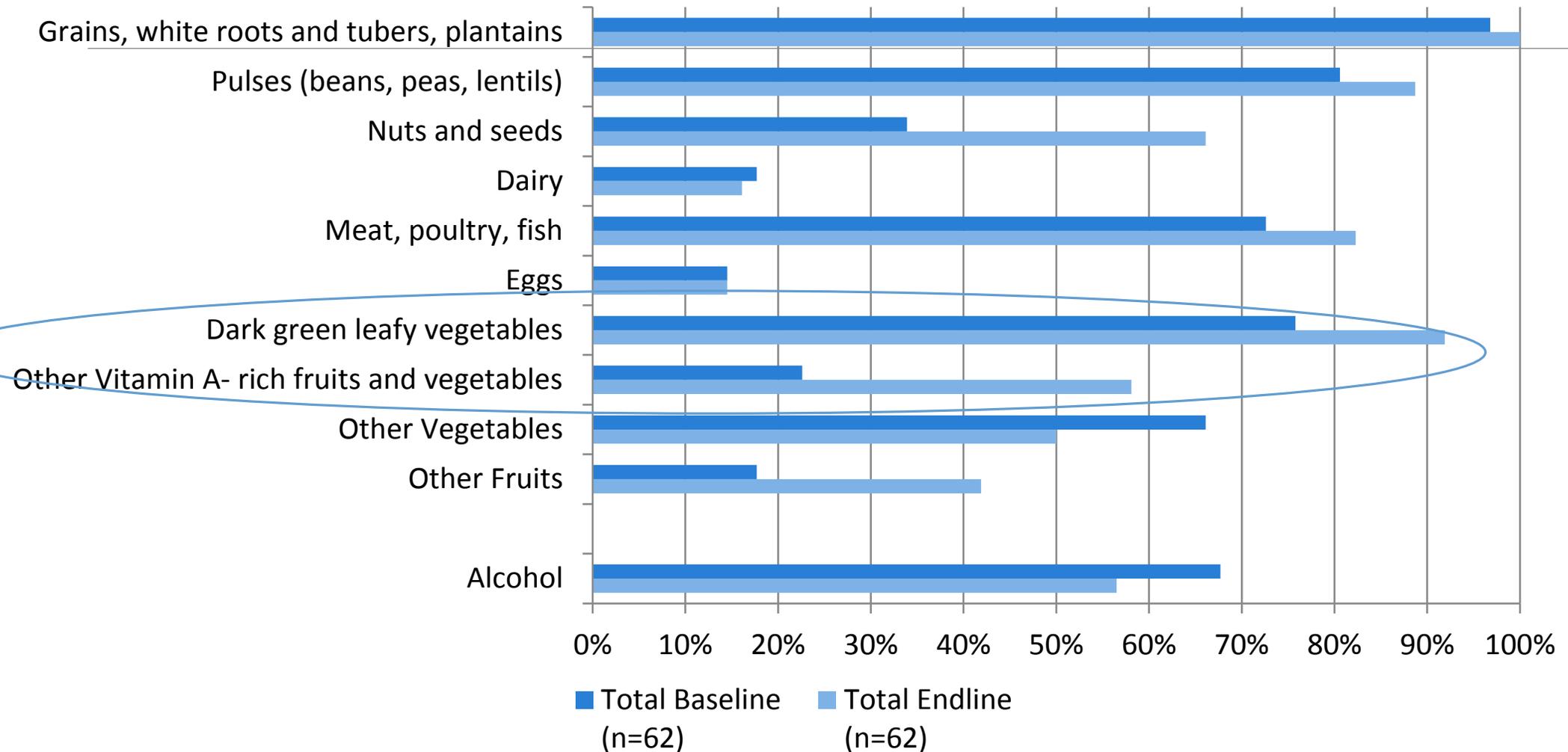
[1]

# Stunting

= children below five years of age are too short for their age in comparison to the Global Standard (WHO)



Consumption of food groups from women (%), using a 7-day recall.



# Daily nutrient requirement

→ Adult female, 31-50 years old, not pregnant or lactating, sedentary lifestyle

Macronutrients = 5		RDA		Vitamins = 14		RDA		Minerals = 12		RDA	
Carbohydrate	130g	Vitamin A	500µg RE	Calcium	1000mg						
Dietary Fiber	25g	Vitamin C	50mg	Chromium	25µg						
Linoleic Acid	12g	Vitamin D	200IU	Copper	0.9mg						
Alpha-Linolenic Acid	1g	Vitamin E	15mg	Flouride	3mg						
Protein	47g	Vitamin K	90µg	Iodine	150µg						
RDA=Recommended dietary allowance		Thiamin	1.1mg	Iron	18mg						
		Riboflavin	1.1mg	Magnesium	320mg						
		Niacin	14mg	Manganese	1.8mg						
		Vitamin B6	1.3mg	Molybdenum	45µg						
		Folate	400µg	Phosphorus	700mg						
		Vitamin B12	2.4µg	Selenium	55µg						
		Pantothenic Acid	5mg	Zinc	8mg						
		Biotin	30µg								
		Choline	425mg								

→ 31 nutrients to be covered

# Nutrition Education to enhance dietary diversity

a case study in Kapchorwa, Uganda

**Irmgard Jordan**

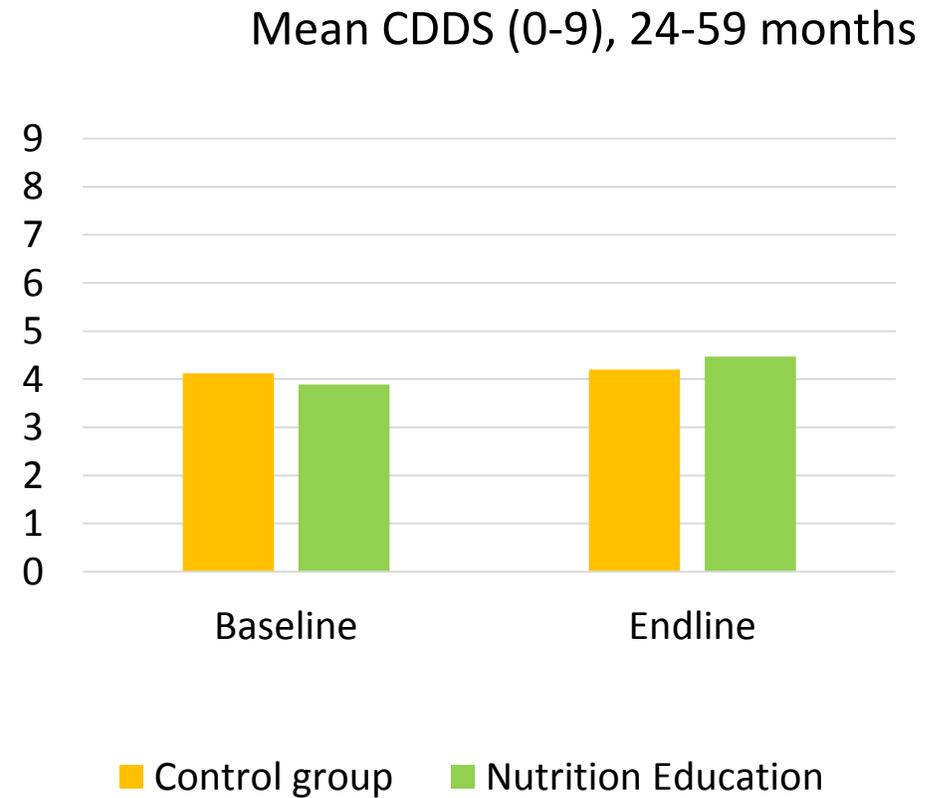
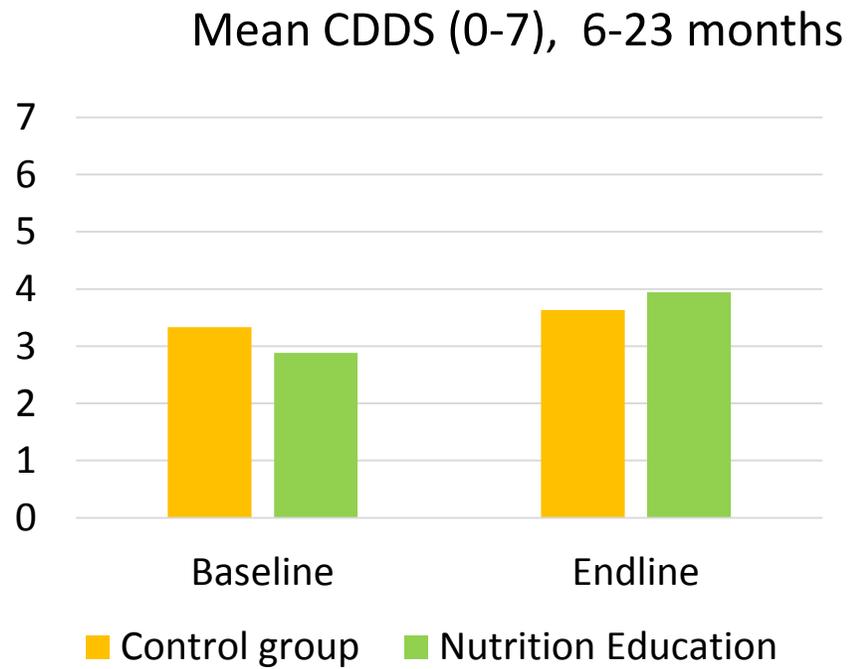
On behalf of the Nutrition Team



JUSTUS-LIEBIG-  
UNIVERSITÄT  
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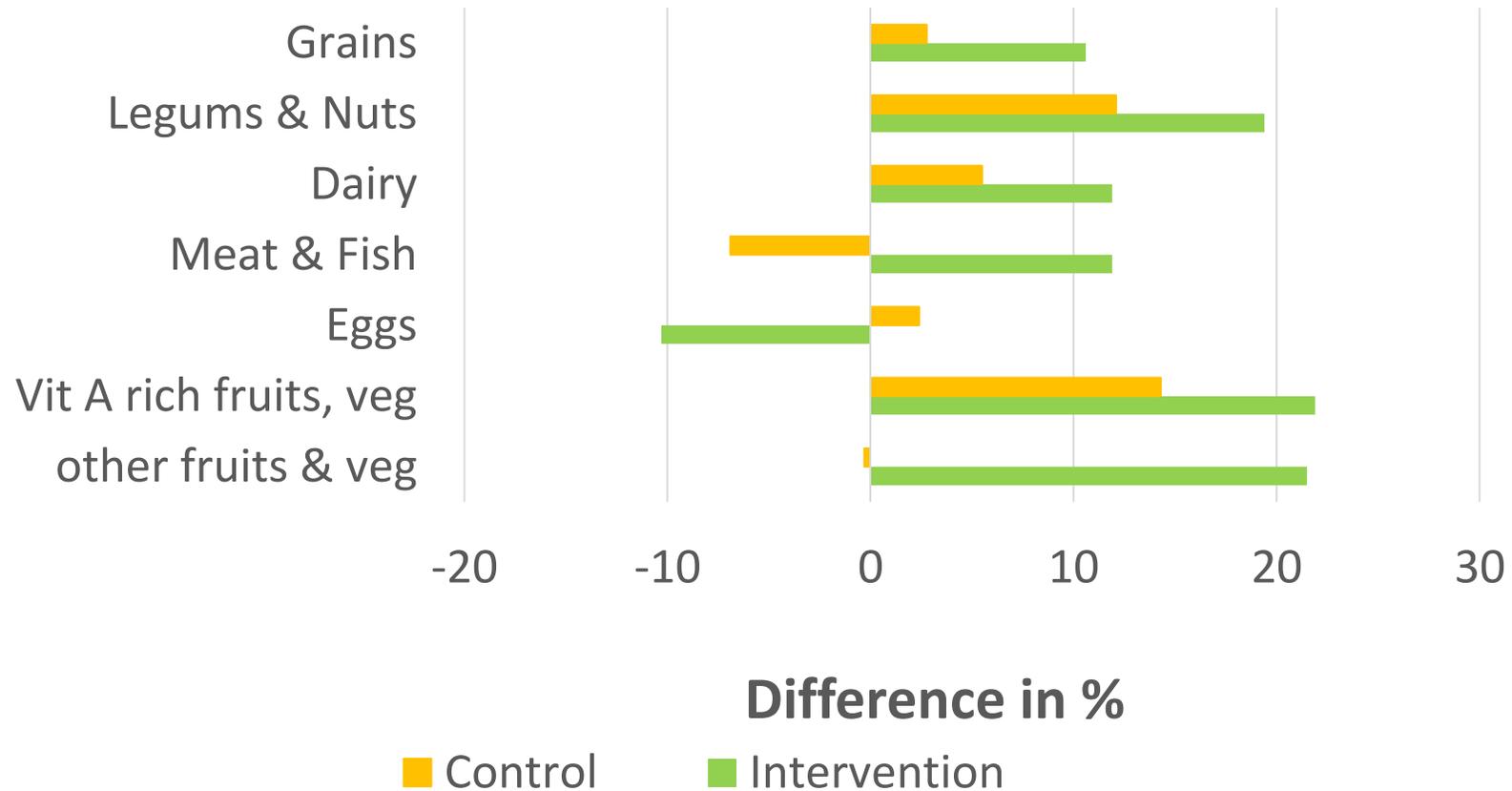
# Child dietary diversity



Children 6-23 months at baseline

## Food consumption per food group (7 Groups)

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# Impact of severe drought on food composition

Findings from the HealthyLAND project

Slides from Sahrah Fischer

**Table 2**

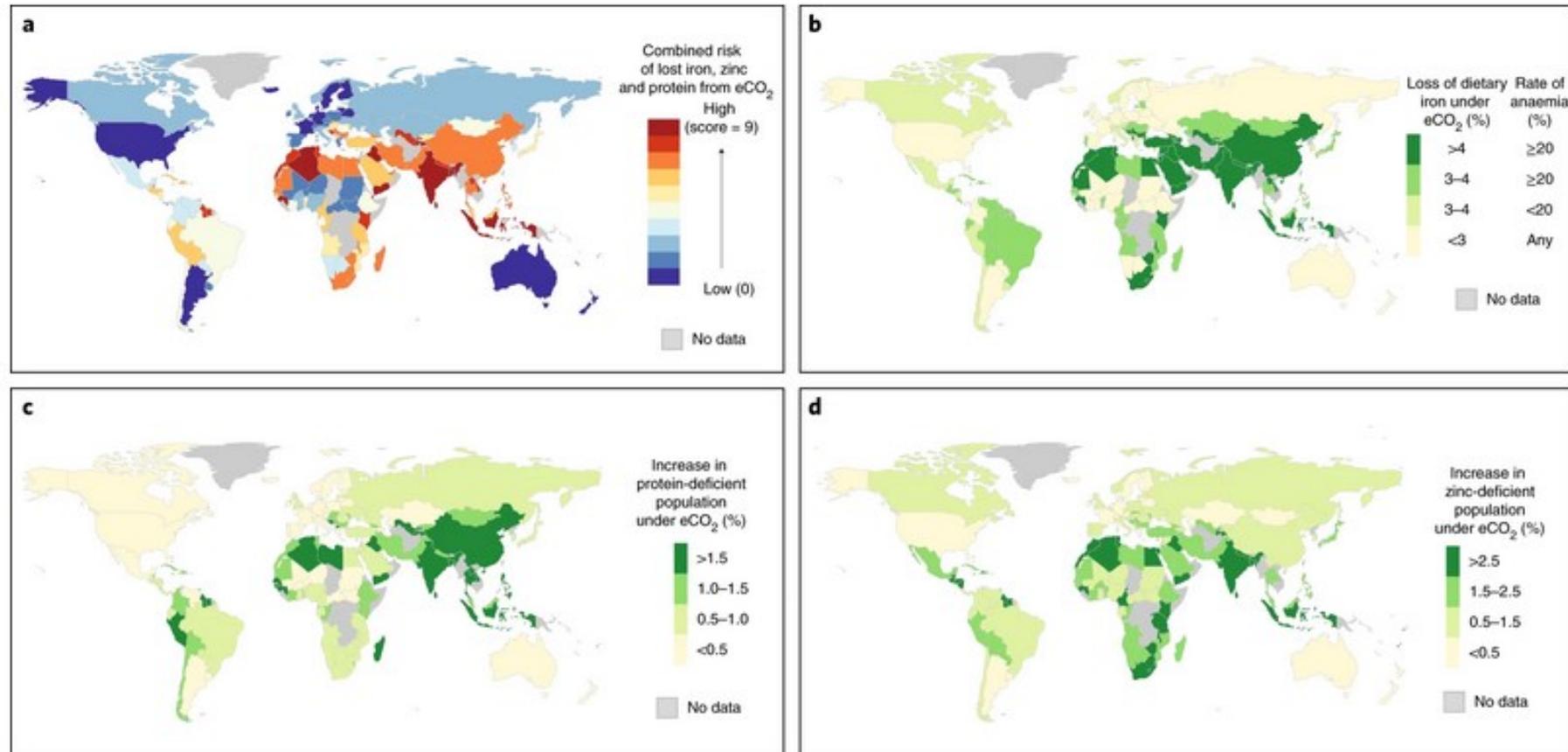
Percent differences between the means of first growing season 2016 (FGS) and second growing season 2016 (SGS) calculated for each nutrient per region and crop. Negative values indicate a decrease between the FGS and the SGS whereas positive values mark an increase between FGS and SGS. Table with detailed descriptive data can be found in the Supplementary material (Table S3).

% difference between FGS and SGS	Variable	Teso South, Kenya		Kapchorwa, Uganda	
		Maize grain	Cassava tuber	Maize grain	Matooke fruit
Yield	Yield	−2%	−67%*	−28%*	−1%
Macronutrients	Mg	19%*	23%*	−12%	−68%***
	P	49%**	52%***	−2%	−27%***
	S	−9%*	59%**	−23%	−77%***
	K	−6%	25%	−48%	−33%***
	Ca	79% ***	60%**	−4%	−86%***
Micronutrients	Fe	68% ***	15%	−67%*	−83%***
	Cu	12%	8%	−89% **	4%
	Zn	41%**	12%*	−17%	24%*
	Mn	17%	−51%**	−81% **	−99%***

Asterisks (\*) signify level of significance, categorized into:  $p < 0.05^*$ ;  $p < 0.005^{**}$ ;  $p < 0.0005^{***}$ .

## Fig. 2: Risk of inadequate nutrient intake from elevated atmospheric CO<sub>2</sub> concentrations of 550 ppm.

From: Impact of anthropogenic CO<sub>2</sub> emissions on global human nutrition

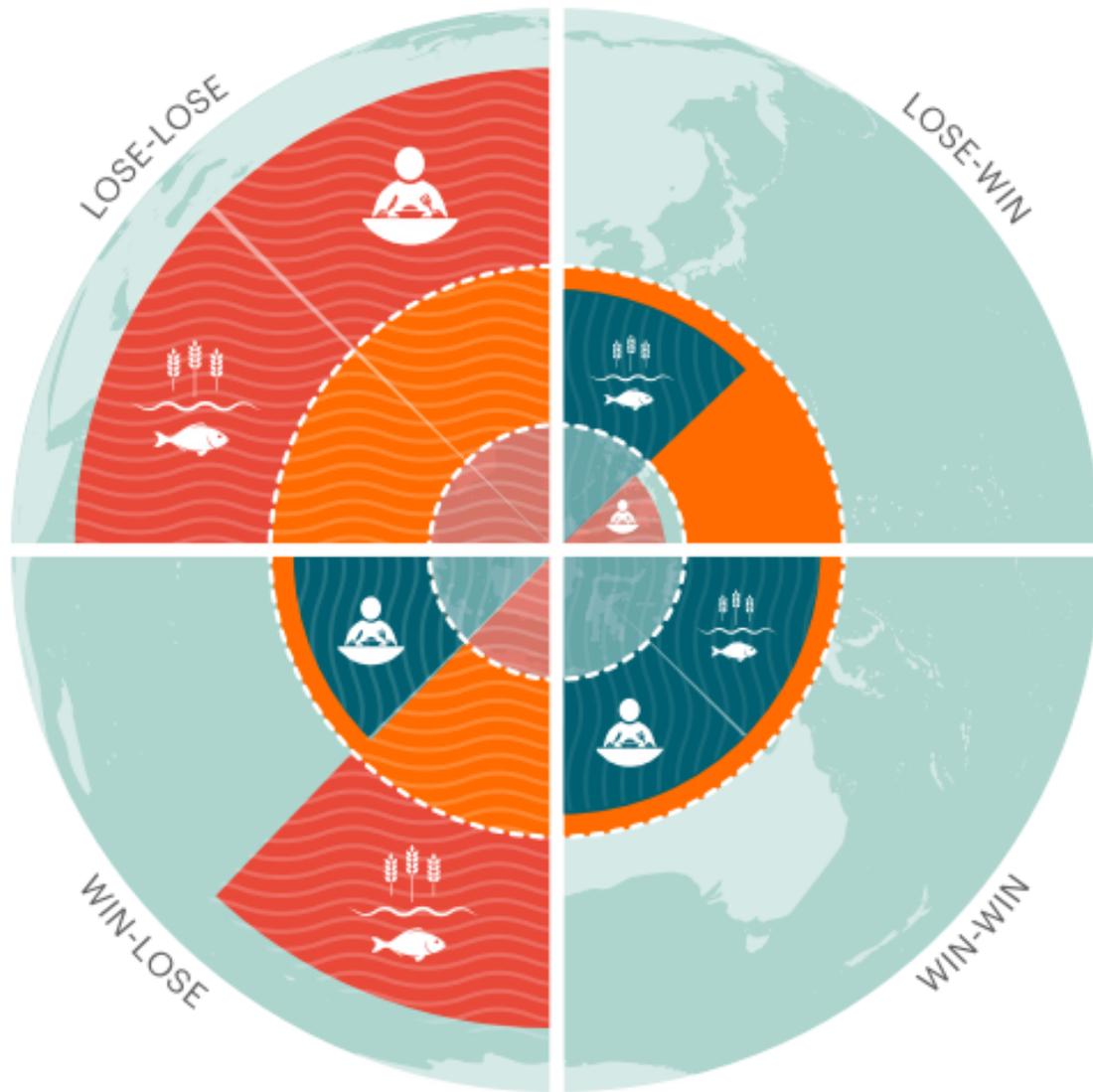


**a-d**, Combined qualitative summed risk from all nutrients (**a**), and individually for iron (**b**), protein (**c**) and zinc (**d**).



**Figure 1**

An integrated agenda for food in the Anthropocene recognizes that food forms an inextricable link between human health and environmental sustainability. The global food system must operate within boundaries for human health and food production to ensure healthy diets from sustainable food systems for nearly 10 billion people by 2050.



**Figure 2**

Scientific targets define the safe operating space for food systems and are represented here by the orange ring. The wedges represent either dietary patterns or food production, and together they reflect various dietary patterns that may or may not meet scientific targets for human health and environmental sustainability, i.e. outside of the safe operating space. These dietary patterns can be “healthy and unsustainable” (win-lose), “unhealthy and sustainable” (lose-win), “unhealthy and unsustainable” (lose-lose) and “healthy and sustainable” (win-win).

# Target 1

## Healthy Diets

Healthy diets have an optimal caloric intake and consist largely of a diversity of plant-based foods, low amounts of animal source foods, contain unsaturated rather than saturated fats, and limited amounts of refined grains, highly processed foods and added sugars.

	Macronutrient intake grams per day (possible range)	Caloric intake kcal per day
 Whole grains Rice, wheat, corn and other	232	811
 Tubers or starchy vegetables Potatoes and cassava	50 (0–100)	39
 Vegetables All vegetables	300 (200–600)	78
 Fruits All fruits	200 (100–300)	126
 Dairy foods Whole milk or equivalents	250 (0–500)	153
 Protein sources		
Beef, lamb and pork	14 (0–28)	30
Chicken and other poultry	29 (0–58)	62
Eggs	13 (0–25)	19
Fish	28 (0–100)	40
 Legumes	75 (0–100)	284
Nuts	50 (0–75)	291
 Added fats		
Unsaturated oils	40 (20–80)	354
Saturated oils	11.8 (0–11.8)	96
 Added sugars		
All sugars	31 (0–31)	120

Table 1

Scientific targets for a planetary health diet, with possible ranges, for an intake of 2500 kcal/day.

Figure 1: Diet gap between dietary patterns in 2016 and reference diet intakes of food  
 Data on 2016 intakes are from the Global Burden of Disease database. 130 The dotted line represents intakes in reference diet (table 1).

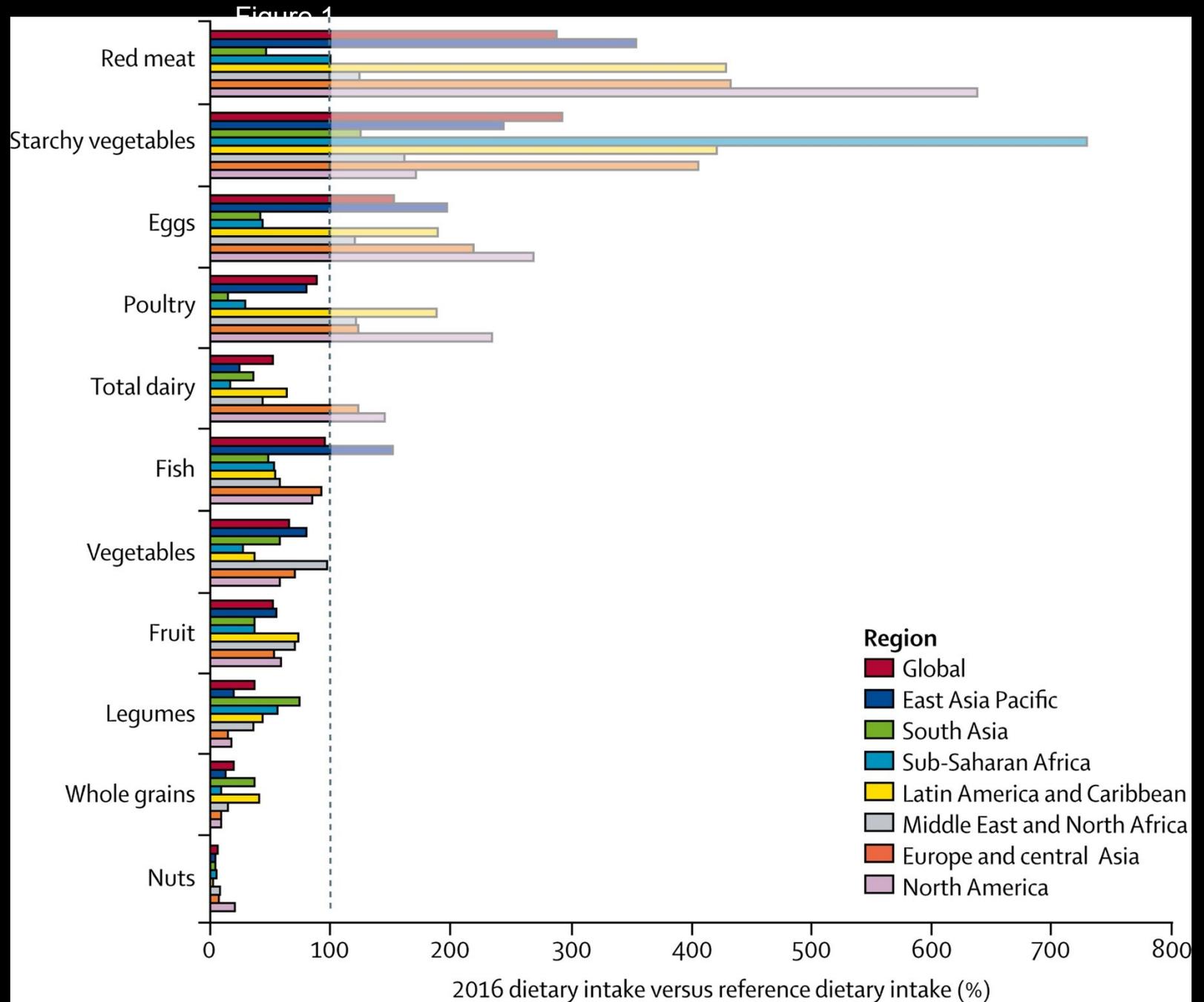


Figure 2

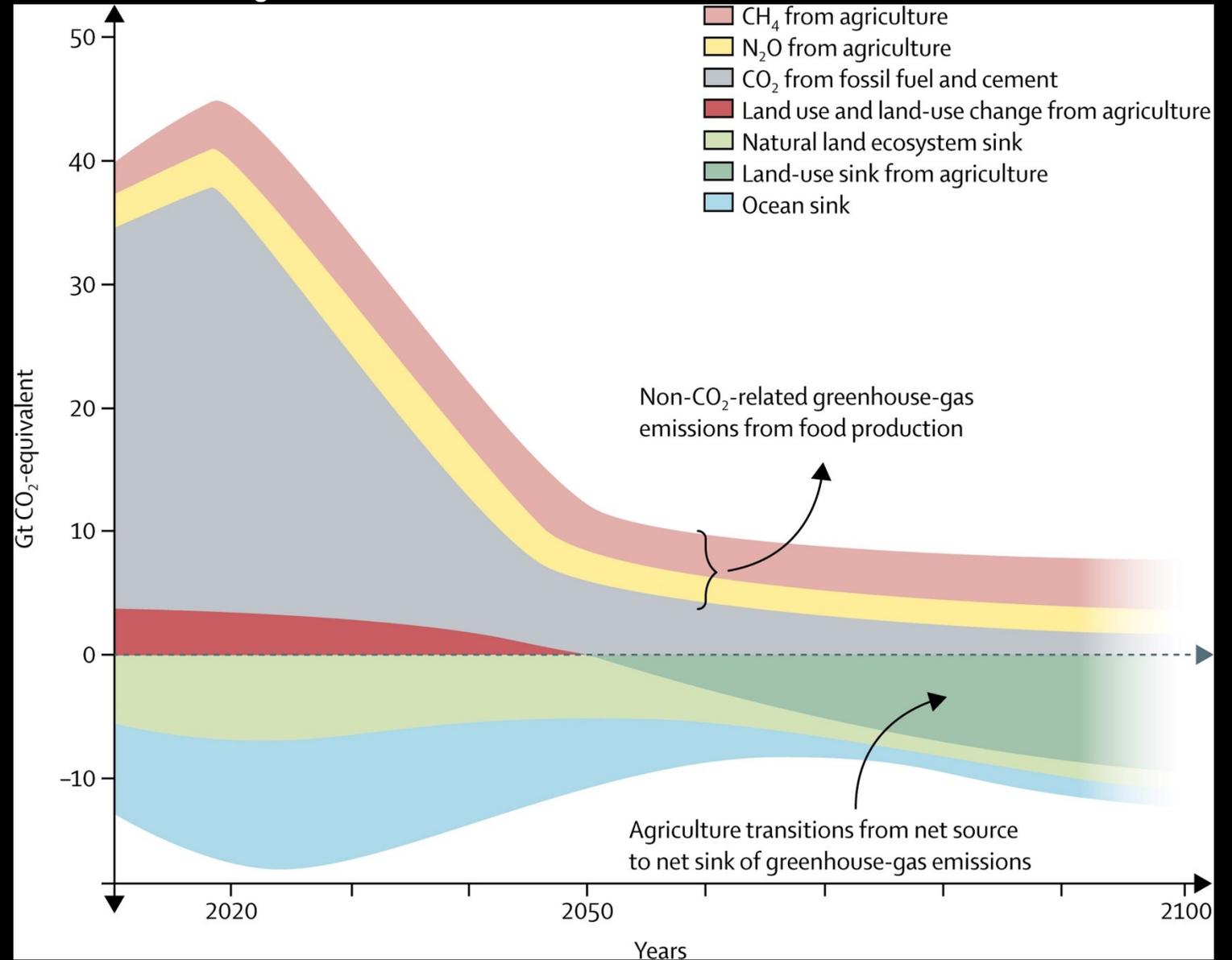


Figure 2: Projections of global emissions to keep global warming to well below 2°C, aiming for 1.5°C

Data are from Intergovernmental Panel on Climate Change fifth assessment report (RCP2.6 data for nitrous oxide and methane) and Rockström and colleagues 28 (for fossil-fuel emissions, land use, land-use change, and forestry, and biosphere carbon sinks).



Figure 4

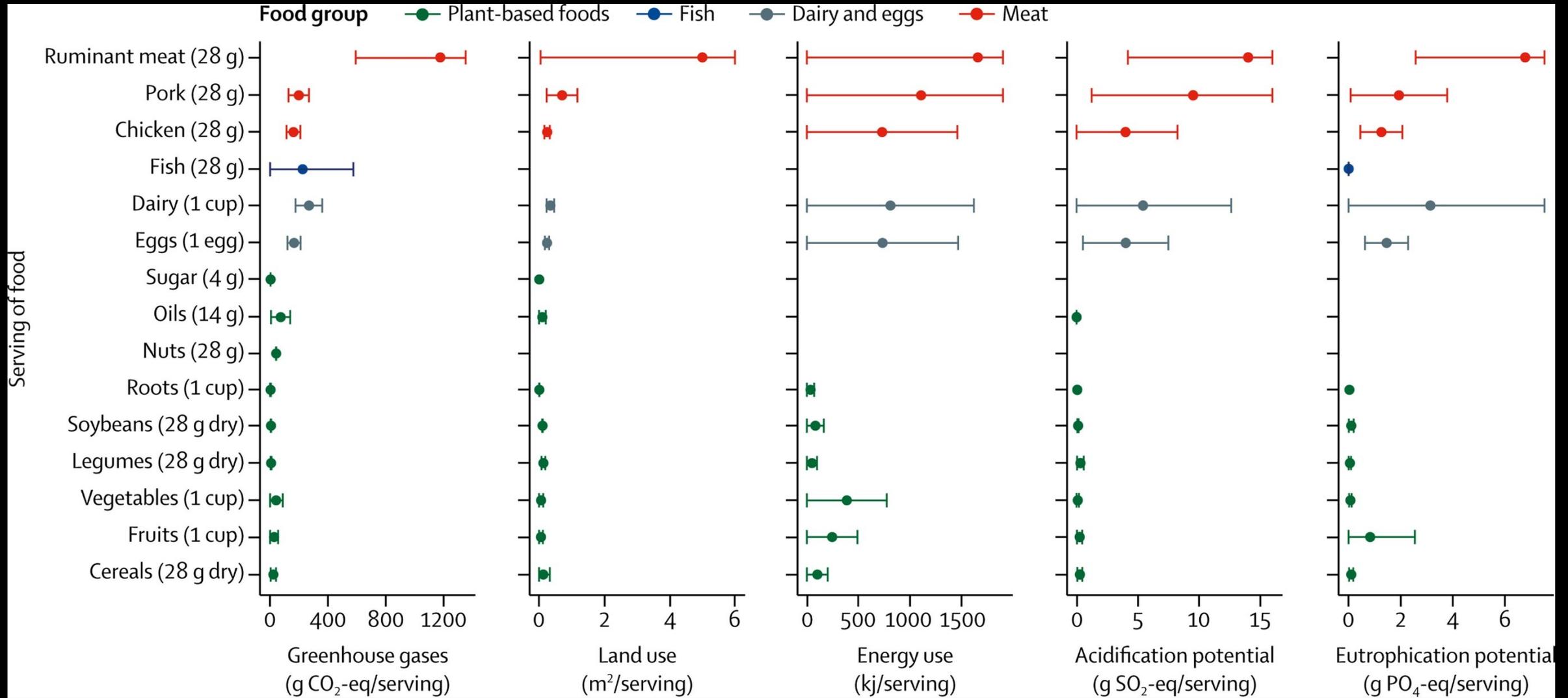


Figure 4: Environmental effects per serving of food produced

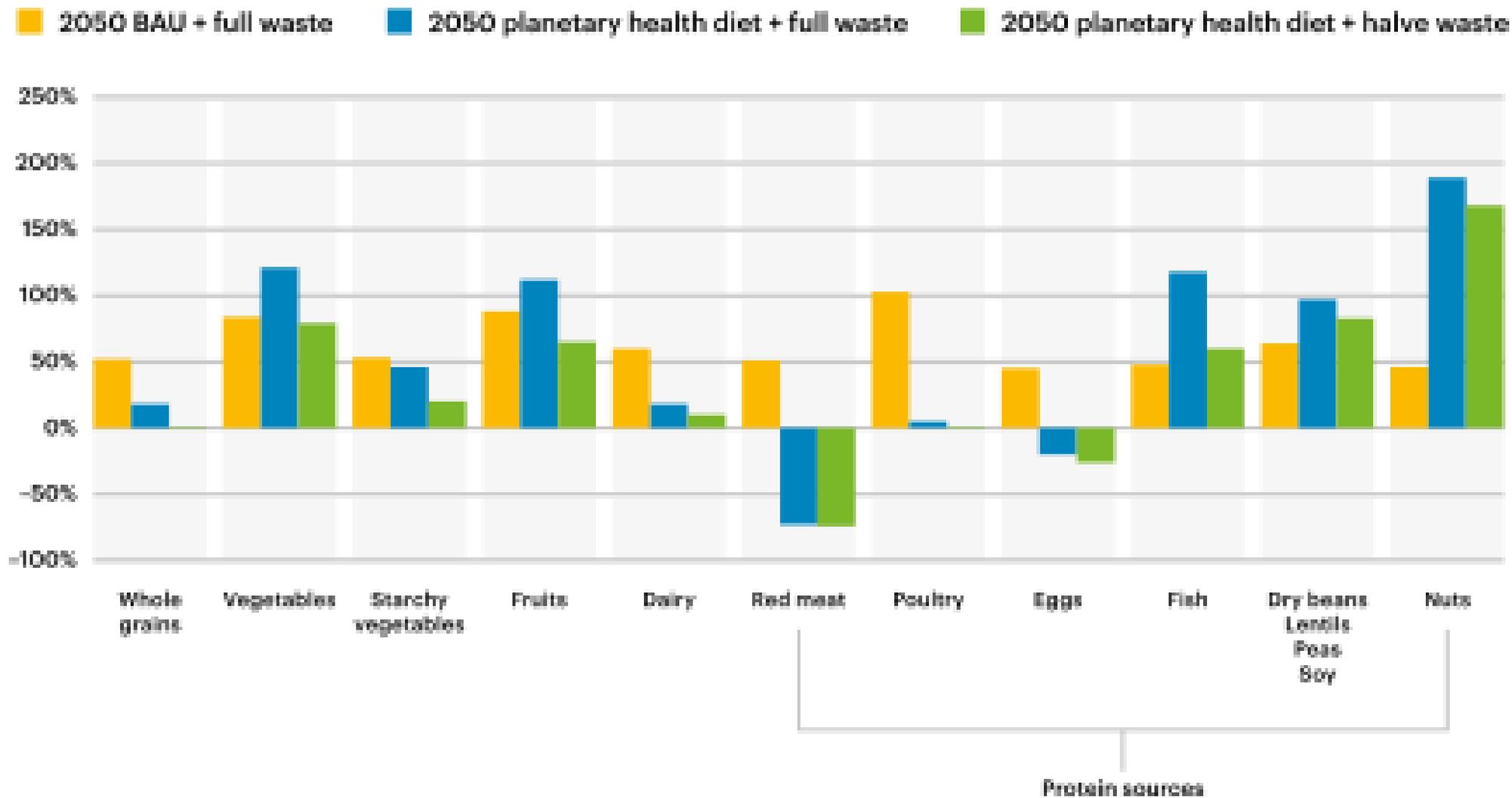
Bars are mean (SD). 5,216 Some results are missing for fish due to lack of data for some impact categories (eg, land use stemming from plant-based feeds in aquaculture).

This was, however, accounted for in the global food systems modeling framework used in Section 3. CO<sub>2</sub> =carbon dioxide.

			 GHG emissions	 Cropland use	 Water use	 Nitrogen application	 Phosphorus application	 Biodiversity loss
<b>Food production boundary</b>			5.0 (4.7-5.4)	13 (11.0-15.0)	2.5 (1.0-4.0)	90 (85.0-140.0)	8 (8.0-16.0)	10 (1-80)
<b>Baseline in 2010</b>			5.2	12.6	1.8	131.8	17.9	100-1000
Production (2050)	Waste (2050)	Diet (2050)						
BAU	Full waste	BAU	9.8	21.1	3.0	199.5	27.5	1,043
BAU	Full waste	Dietary shift	5.0	21.1	3.0	191.4	25.5	1,270
BAU	Halve waste	BAU	9.2	18.2	2.6	171.0	23.2	684
BAU	Halve waste	Dietary shift	4.5	18.1	2.6	162.6	21.2	885
PROD	Full waste	BAU	8.9	14.8	2.2	187.3	25.5	206
PROD	Full waste	Dietary shift	4.5	14.8	2.2	179.5	24.1	351
PROD	Halve waste	BAU	8.3	12.7	1.9	160.1	21.5	50
PROD	Halve waste	Dietary shift	4.1	12.7	1.9	151.7	20.0	102
PROD+	Full waste	BAU	8.7	13.1	2.2	147.8	18.5	37
PROD+	Full waste	Dietary shift	4.4	12.8	2.1	140.8	15.4	34
PROD+	Halve waste	BAU	8.1	11.3	1.9	128.2	14.2	21
PROD+	Halve waste	Dietary shift	4.0	11.0	1.9	121.3	13.1	19

**Table 5**

Various scenarios demonstrating the environmental impacts of implementing the action outlined in Table 4. The colors illustrate whether environmental impacts transgress food production boundaries: green - below lower range value; light green - below or equal to boundary but above lower range value; yellow - above boundary but below upper range value; red - above upper range value. BAU indicates business as usual scenario.



**Table 6**

Predicted change in food production from 2010 to 2050 (percent from 2010 scenario) for the business as usual (BAU) with full waste, the planetary health diet with full waste, and the planetary health diet with halve waste scenarios.



# Acknowledgements

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