Consumer perspective in the SUSFANS toolbox models

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How to link macro models & micro data
macro **availability** vs. micro food **intake**

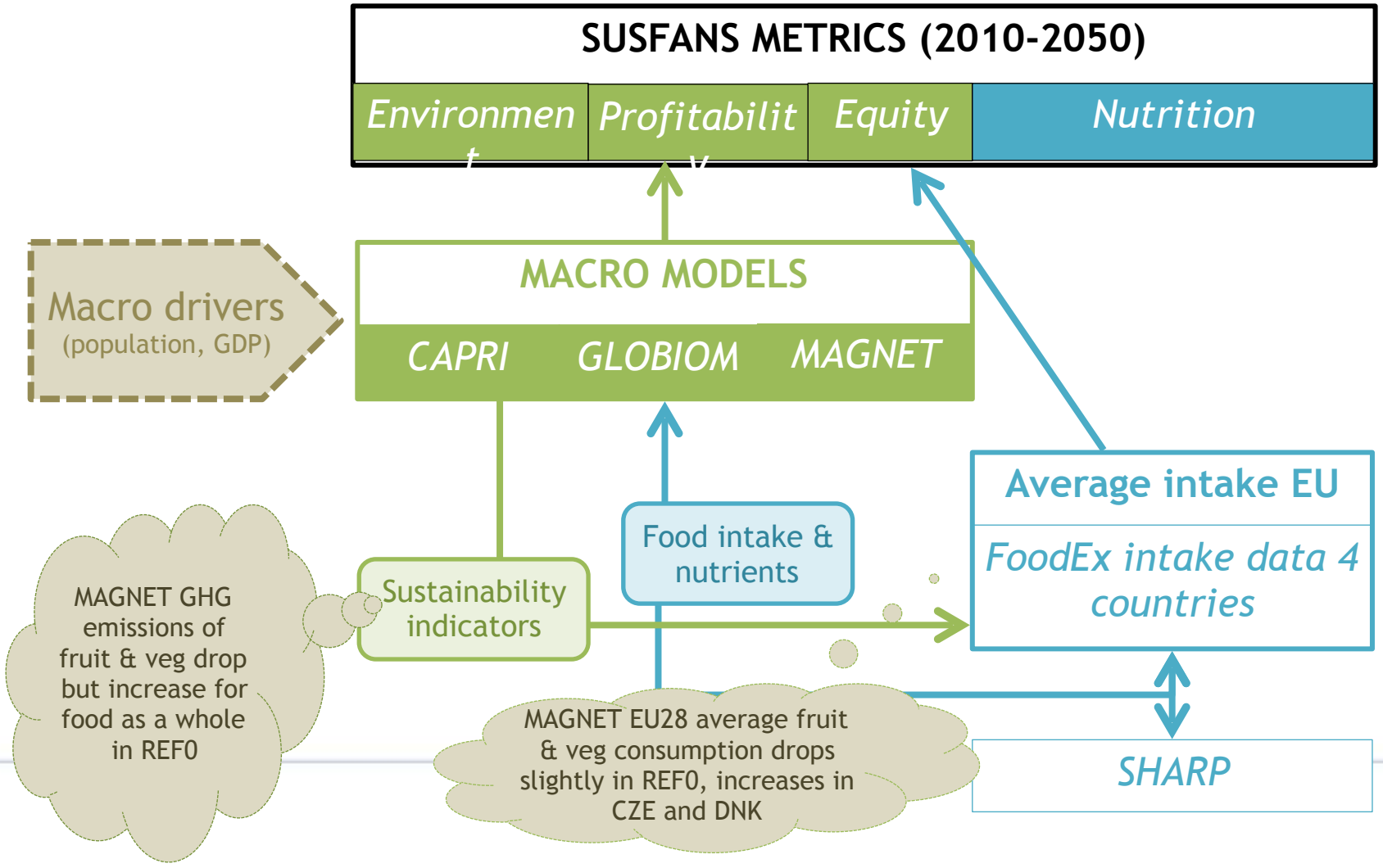
FAO

national food **availability** data, **global** dataset, **225 items** (GEnUS)

FoodEx

individual food **intake** data, for **4 EU** countries, **1063 items** (FoodEx2)

What can we learn from the individual level dietary intake data?



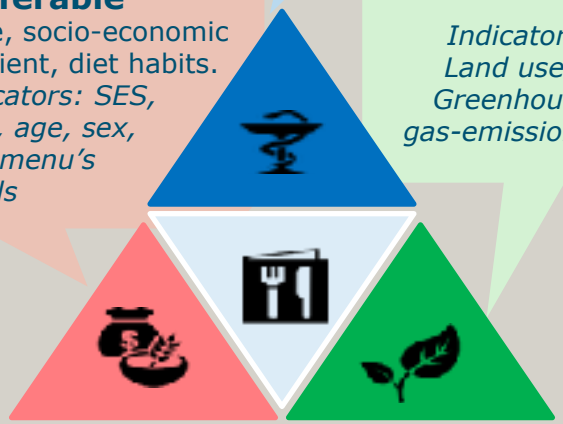
The SHARP diet: Sustainable, Healthy, Affordable, Reliable & Preferable

Healthy
prevent NCDs, obesity, nutrient deficiency.
Indicators: FBDGs & nutrient (in)adequacy

The CONCEPT

Affordable, reliable & preferable
price, socio-economic gradient, diet habits.
Indicators: SES, EDU, age, sex, day-menu's meals

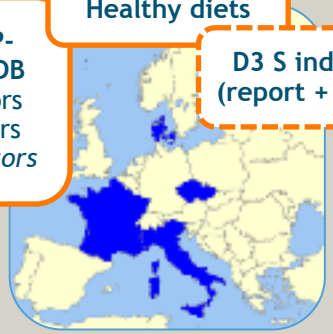
Sustainable
global warming, biodiversity, eutrophication, ...
Indicators: Land use & Greenhouse gas-emissions



D1 SHARP-indicator DB
H-indicators
S-indicators
ARP-indicators

D2 Paper on Healthy diets

D3 S indicator (report + paper)



The DATA

Food intake and food composition data from ca 8000 people in the EU. Linked to agro-production in SUSFANS project

Data sharing and ownership

Description, analysis, modelling

D4 Paper on basic model

D5 Paper on extended model

The MODEL

Future diet for Europe from the consumers perspective

Apply model to 4 EU countries (SUSFANS)

Meeting on model development

Model ownership

Consumer food choices are the entry point for change
Reported intake data, not "per capita" production
Food intake linked to FCDBs and S-db (GHGe, LU)
Description and modelling in progress (DEA, Prefer.)

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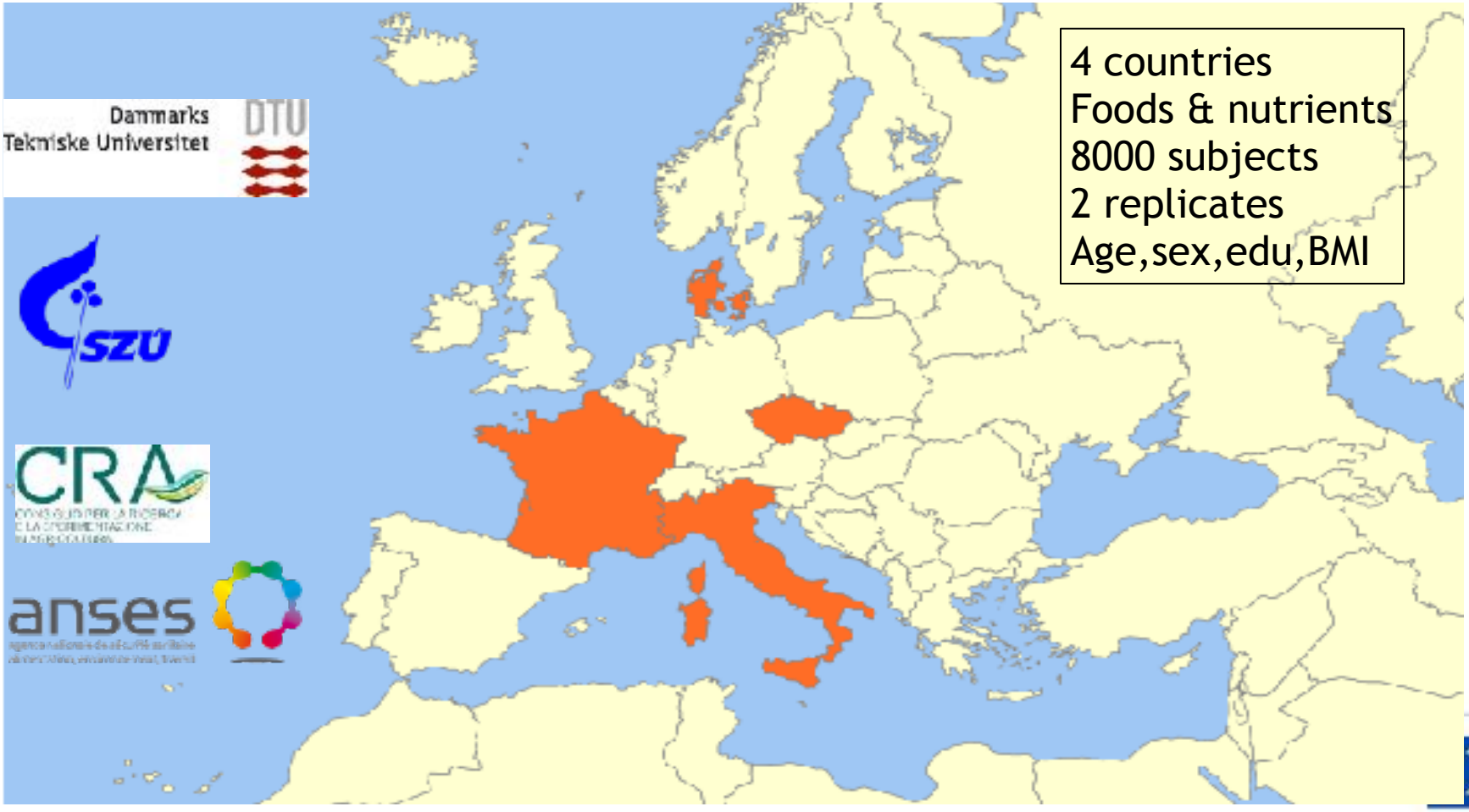
Nutrition databases
4 countries



Data structure

- Countries: DK, CZ, IT, FR
- Demographic groups: age, sex, BMI, EDU
- Individuals: almost 8,0000
- Replicates: 2 per individual (from larger db)

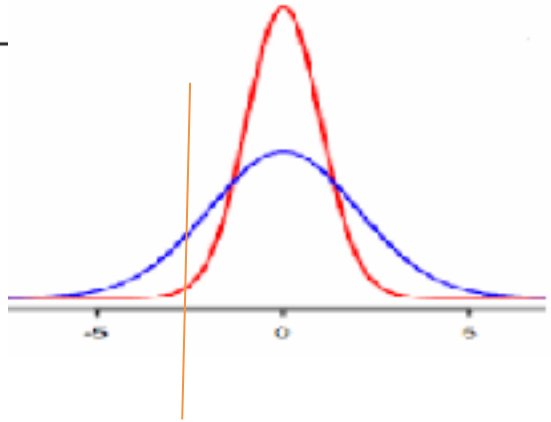
Technical details

- Sampling days: non-consecutive days from 3-7-day records and independent 24hRs.
- Calculated variables: Energy, macro & micronutr, GHGe & LU.

dherence to FBDGs

Table 2 Adherence to food-based dietary guidelines in four European countries.

	Cut off	Range in %adherence
Foods to increase		
Fruit	> 200 g/d	20% (CZ) - 40% (IT)
Vegetables	≥ 200 g/d	10% (CZ) - 53 %(IT)
Legumes	≥ 19 g/d	10% (DK/CZ) - 19% (FR/IT)
Nuts and seeds	≥ 15 g/d	1% (IT/FR) 7% (DK/CZ)
Dairy products	≥ 300 g/d	8% (IT) - 41% (DK)
Fish	≥ 21 g/d	17% (CZ) - 43% (IT/FR)
Foods to decrease		
Red and processed meat	≤ 71 g/d	39% (DK) - 51% (IT)
Cheese	≤ 21 g/d	28% (IT) 83% (CZ)
Sweet beverages	≤ 71 mL/d	10% (DK) 76% (IT)
Alcohol	≤ 10 g/d	58% (DK) - 87% (CZ/IT/FR)



Note: based on the mean of two days, standardised for a 2,000 kcal diet

(Dis)qualifying nutrients

Table 3 Nutrient intakes and prevalence of inadequate intakes in four European countries.

	DRV/MRV	Range in %inadequacy
Qualifying nutrients		
Dietary fibre	25 g/d	81% (DK) - 96% (CZ)
Vitamin D	15 µg/d	97% (DK) - 99% (CZ/FR/IT)
Potassium	3500 mg/d	69% (DK) - 96% (CZ)
Magnesium	M:350; F: 300 mg/d	54% (DK) - 77% (CZ/FR)
Vitamin E	M:13; F: 11 mg/d	53% (IT/CZ) - 95% (DK)
Folate	250 µgDFE/d	23% (IT) - 76% (CZ)
Disqualifying nutrients		
Saturated Fatty Acids	< 10 E%	82% (IT) - 91% (FR)
Added Sugar	< 10 E%	21% (CZ) - 32% (DK)
Sodium	< 2400 mg/d	13% (IT) 98% (CZ)

GHGE and LU in 4 EU countries

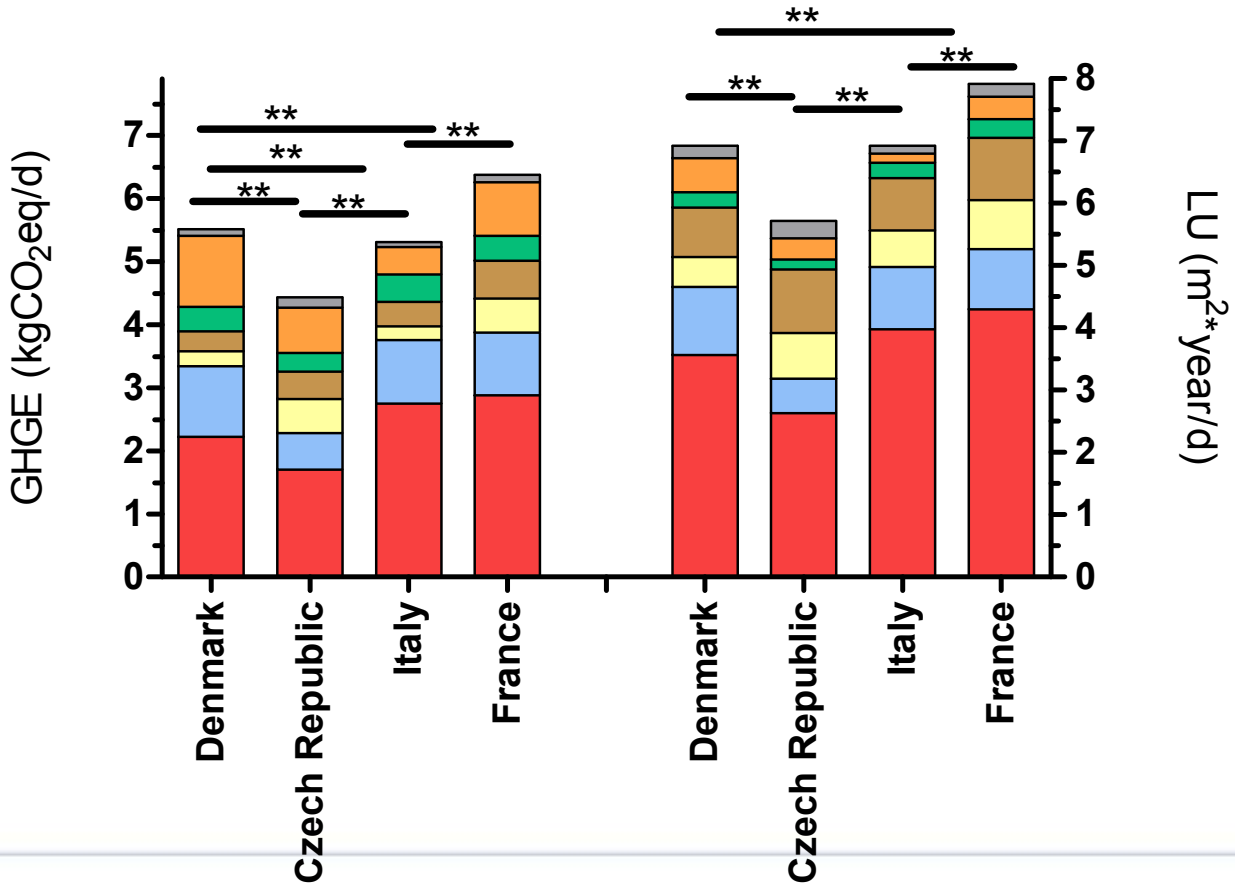


Figure 1 Total greenhouse gas emissions (GHGE, in kg CO2-equivalents/day) and land use (LU, in m^2*yr/day) calculated for a 2,000 kcal diet associated with dietary patterns of four European countries.

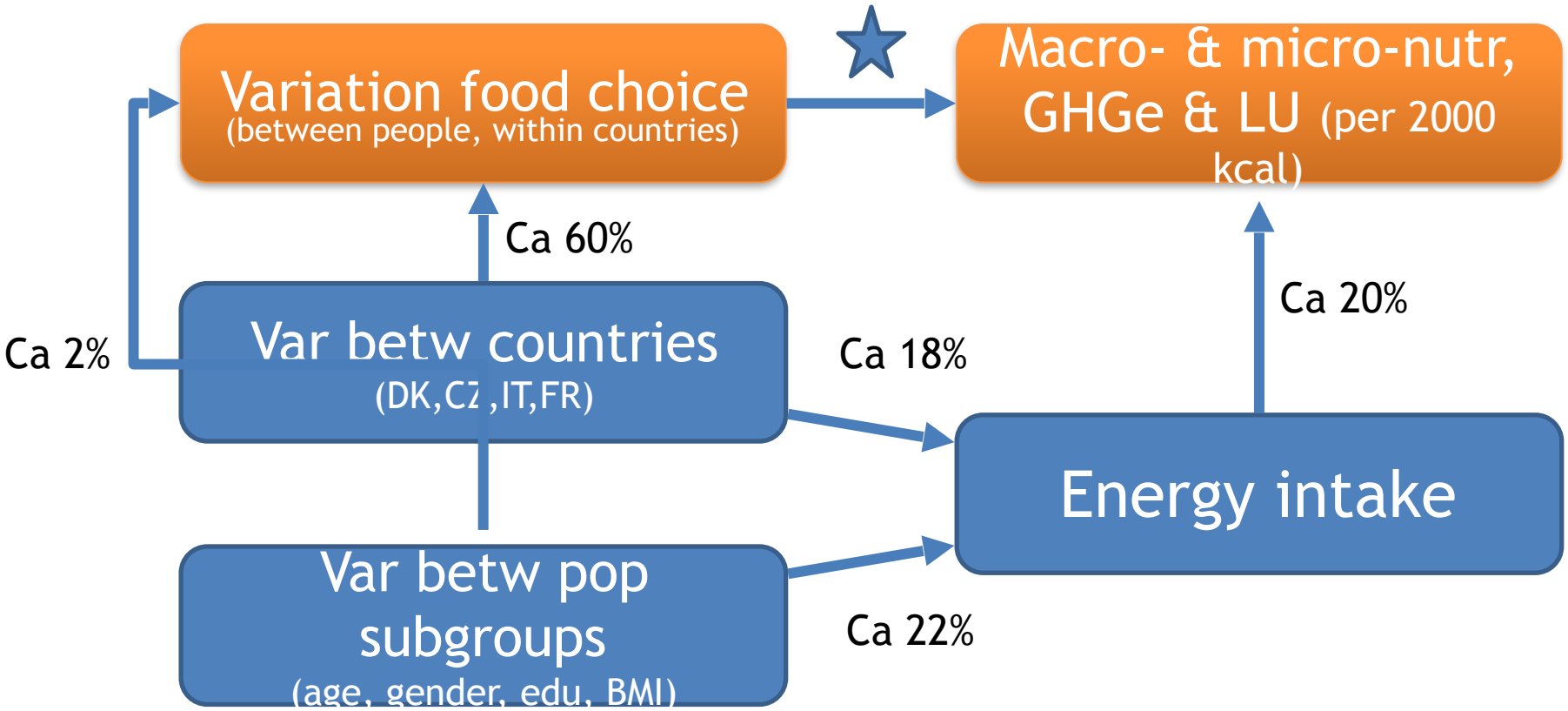
Note: based on the mean of two days standardised for a 2,000 kcal diet

Sources of variability (prelim)

Nutrients and GHGe/LU per 2000 kcal:

- Large variation
  - between countries (food choice)
  - between subjects large (food choice)
- Small variation between subgroups
  - age, sex, edu, BMI
  - largely explained by amount of food (energy intake, food choice much less important).

Preliminary results
(analyses in progress)



Realistic replacements to be analysed further, followed by modelling

Variation in diets

Observed variation in nutrient intake, GHGE and LU was mainly accounted for by the **country** where you come from, and to a lesser extent by **individual-level demographics**, like age, gender, educational level, and overweight status.

Variation is mainly due to

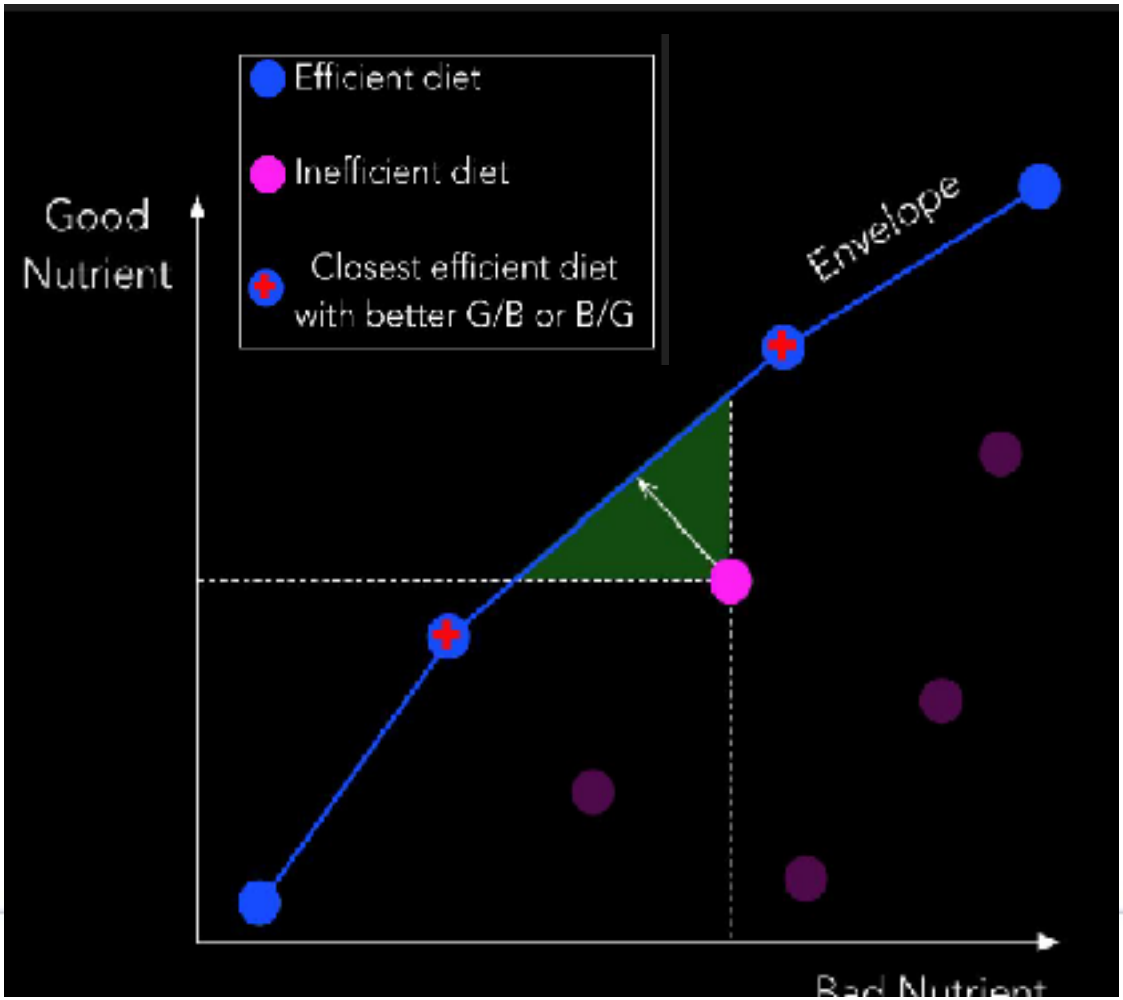
- Differences in food choices
- Consumption quantities

Scope of the SHARP model

To derive *likely and realistic dietary changes* that improve the environmental and nutritional quality of the diets.

- *Likely changes*: The SHARP-analyses advances current agriculture-based models by using individual-level food intake data, providing a *higher level of resolution*, relevant to food choice of consumer subgroups.
- *Realistic changes*: time horizon for realistic changes *estimated at 5-10 year. Regular updates of data needed* because of altered dietary patterns, new and reformulated food products, and changing LCA of environmental sustainability.

DEA-model for qualifying and disqualifying nutr/S-indicators



Scope model: advice for 5-10 yr time window, realistic for cons.

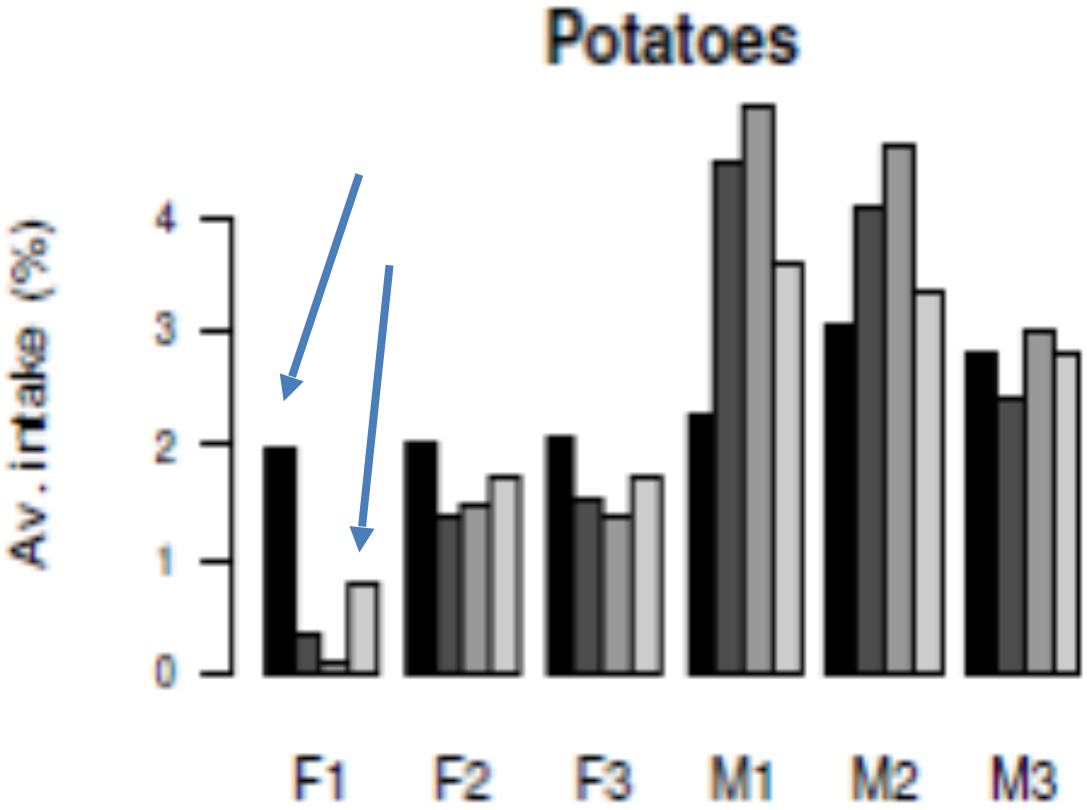
LP often comes with diets "out of realistic range".

DEA → searches in dataset for "better" diets based on nutrients, GHGe, LU; makes lin combinations

Account for "culture" by doing this within subgroups, national or EU-level.

Next step: apply to meal level

DEA – proof of principle



Example for ‘potatoes’ in population subgroups (NQ-plus dataset, NL)

Changes largely similar to FBDGs. They can differ by subgroup (gender, age)

Next Q: What is a realistic H&S meal for consumers?.

→ Application to country-data and meals

Related activities in SUSFANS

- Provide data-input to the macro-models, to advance the estimation of dietary quality (more nutrients, detailed food groups)

- Advance modelling of changeability beyond subgriups analyses, focusing on the P (Preferability) in the SHARP-model (dymanics of change, based on long-term intake data at the individual level).

To take-away from all of this...

- Diets are not in line with the nutrient requirements or FBDGs.
- Diversity of diets related to food choice and amount.
- Some nutrients likely become inadequate after radical change of food system (all others being equal).
- DEA model works and can be applied to day menus, extendable to meals
- Country data enrich the macro-models