

The cost and affordability of sustainable diets

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The food system is facing increasing **environmental and health challenges**:

- Without dedicated measures, **environmental limits** could be exceeded (Springmann et al, Nature 2018);
 - **Poor diets** are responsible for more attributable deaths globally and in most regions than any other behavioural risk factor (GBD, 2018, 2019).
- ⇒ Increasing recognition of **importance and benefits of dietary changes** towards healthy and sustainable diets (EAT-Lancet Commission, 2019).

Not much is known about the **economic dimensions** of such changes, including aspects of diet cost and affordability:

- One **meta-analysis** found healthier dietary patterns more expensive than less healthy ones in HICs (Rao, 2013).
 - **Optimization studies**, also from HICs, showed that healthier and more sustainable diets can in principle be obtained without increases in costs in the countries that were analysed (MacDiarmid et al, 2012; Wilson et al, 2013; Masset et al, 2014; Scarborough et al, 2016).
- ⇒ Results **difficult to generalise**:
- Analyses limited to high-income countries
 - Diets were not comparable across regions
 - No consistent collection and use of price data

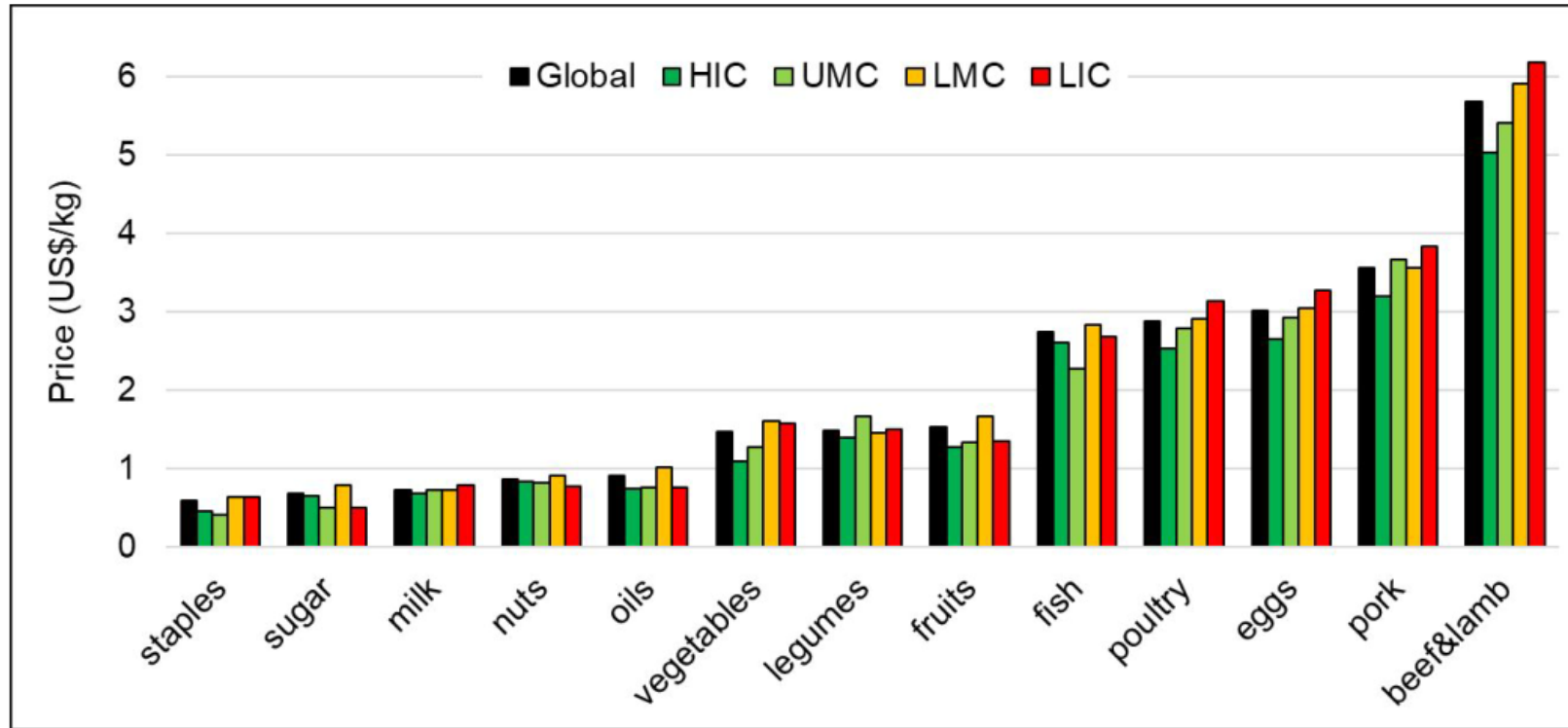
This study:

- Regionally comparable estimates of diet costs for a standardised set of healthy and sustainable diets (in 2030).

Methods:

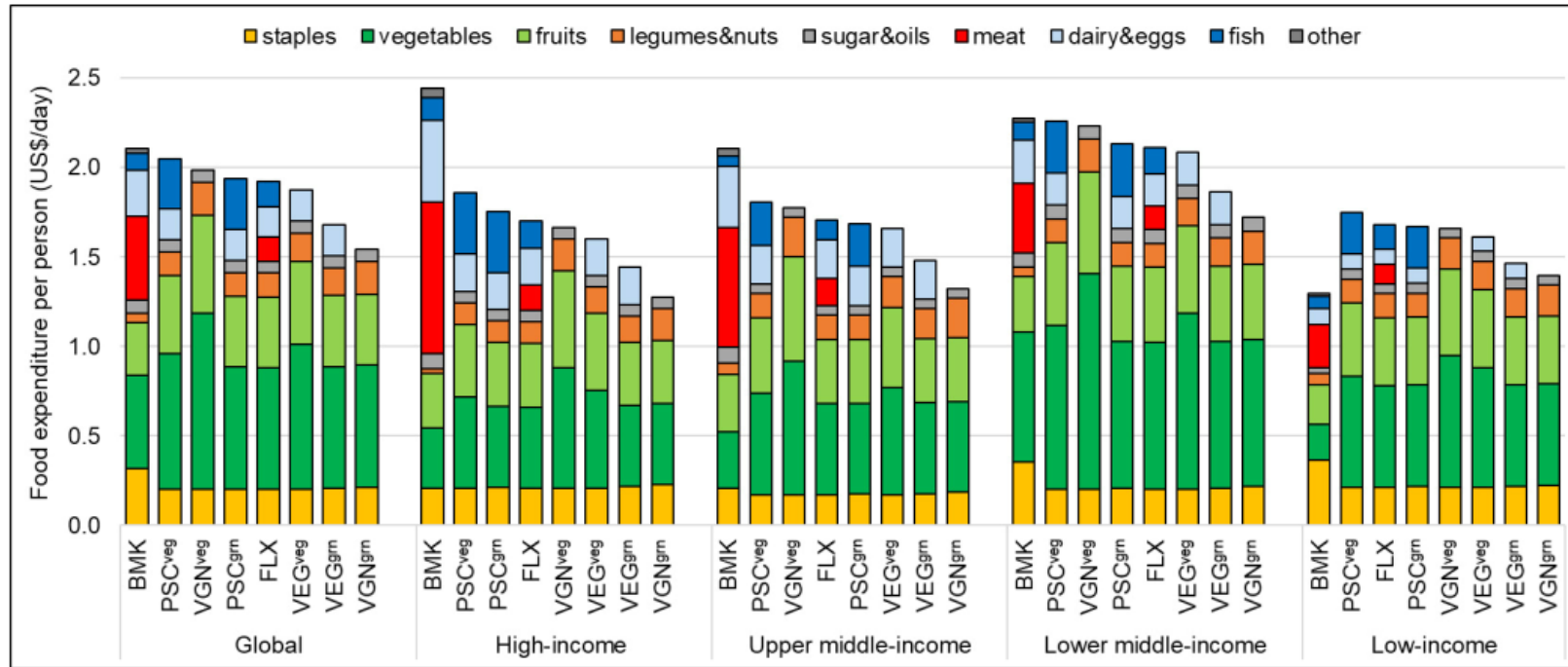
- Adopt **diet scenarios shown to reduce premature mortality and environmental resource demand** (Willett et al, 2019):
 - **Flexitarian, pescatarian, vegetarian, vegan**
 - Calorie and nutritionally balanced (Springmann et al, 2018)
 - Differentiate between **high-veg and high-grain** varieties (relevant for affordability)
- Adopt projections of **commodity prices from agriculture-economic model** (IMPACT; Robinson et al, 2015):
 - Consumer prices **endogenously determined** based on world market prices, consumer and producer support measures, and tariff structure (OECD, GTAP).
 - **No mark-up at processing and retail levels** → indicative of basic cost of diets, no confounding by choice of retailer.

Results: Food prices



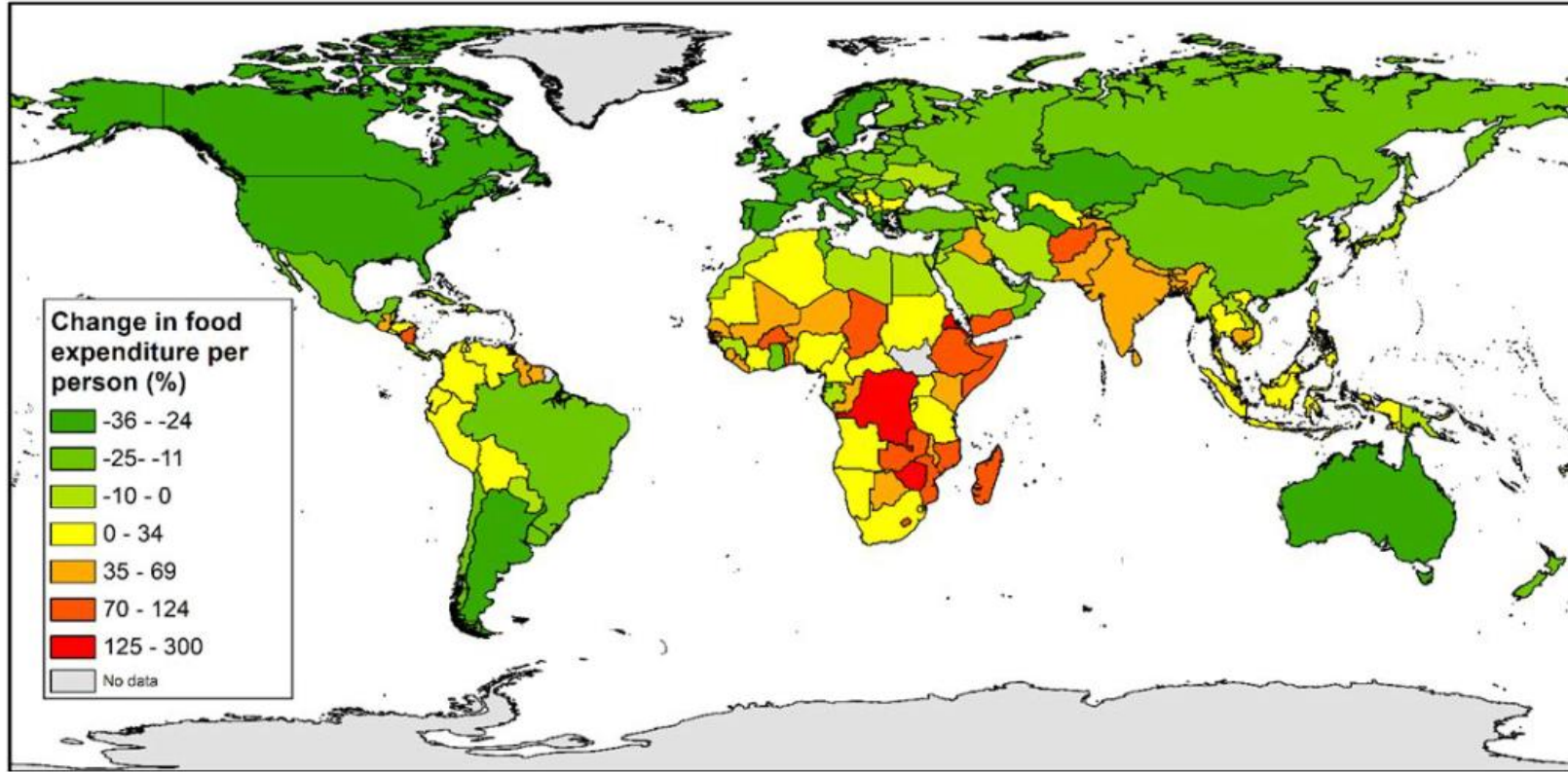
- Animal products, except milk, generally more expensive than plant-based products (up to factor 10 difference);
- For many commodities, higher prices in LICs than in HICs (44% for veg, 20% for meat)

Results: Food expenditure



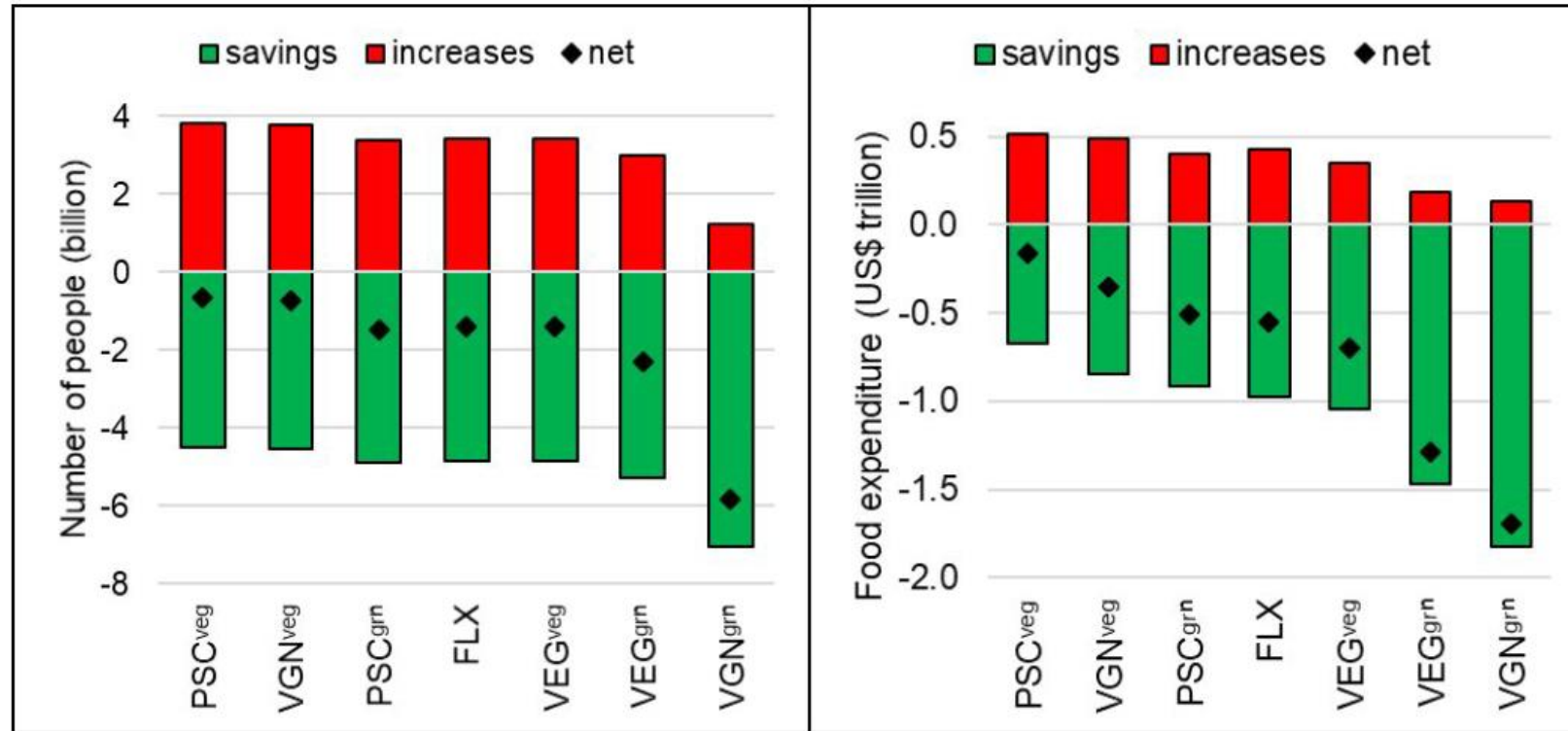
- HICs consume 3-6 times more meat and milk per person → 90% higher food expenditure;
- For sustainable diets, increased exp on plant-based foods often compensated by savings from less animal products → reductions of 1% (PSC_{veg}, LMCs) to 48% (VGN_{grn}, HICs);
- Increased exp of 8-35% in LICs as diets diversify.

Results: Regional distribution for FLX diets



- Greatest reductions for Mongolia (-49%), USA (-40%), Israel (-39%), Denmark (-37%), and Greece (-35%);
- Greatest increases for Congo (219%), Eritrea (218%), Yemen (95%), Ethiopia (91%), and Chad (88%).

Results: Increases vs decreases



- Savings for 89-119 countries (4.5-7 billion people) vs increases in 38-68 countries (1.2-3.8 billion people);
- Net savings of USD 160-1,700 billion, most for VGN_{grn};
- 2-4 times diff between GRN and VEG variants.

Results: Sensitivity analysis

Region	Diet	Main scenario	ΔPrice		ΔWaste		ΔCalories	ΔYear	
			low	high	full waste	quarter waste	BAU	2010	2050
Global	BMK	2.10	2.03	2.19	2.36	1.85	2.10	1.55	2.47
	PSC _{veg}	2.05	2.03	2.08	2.41	1.69	2.19	1.72	2.36
	VGN _{veg}	1.99	1.96	2.02	2.31	1.67	2.12	1.64	2.30
	PSC _{grn}	1.94	1.91	1.96	2.27	1.60	2.07	1.62	2.22
	FLX	1.92	1.89	1.96	2.21	1.63	2.06	1.59	2.19
	VEG _{veg}	1.87	1.85	1.90	2.15	1.60	2.01	1.57	2.15
	VEG _{grn}	1.68	1.66	1.70	1.92	1.44	1.81	1.41	1.92
	VGN _{grn}	1.54	1.53	1.56	1.78	1.31	1.68	1.31	1.79
High-income	BMK	2.44	2.39	2.49	2.77	2.12	2.44	2.01	2.57
	PSC _{veg}	1.86	1.85	1.87	2.28	1.43	2.03	1.62	1.99
	PSC _{grn}	1.76	1.75	1.76	2.16	1.35	1.93	1.54	1.88
	FLX	1.70	1.69	1.72	2.03	1.38	1.88	1.48	1.80
	VGN _{veg}	1.66	1.65	1.67	2.00	1.32	1.84	1.45	1.79
	VEG	1.60	1.59	1.61	1.89	1.31	1.77	1.40	1.70
	VEG _{grn}	1.44	1.43	1.45	1.70	1.19	1.61	1.26	1.53
	VGN _{grn}	1.28	1.27	1.28	1.52	1.03	1.45	1.12	1.37
Low-income	BMK	1.30	1.24	1.37	1.42	1.17	1.30	0.92	1.71
	PSC _{veg}	1.75	1.73	1.77	2.02	1.48	1.81	1.48	1.97
	FLX	1.68	1.66	1.70	1.90	1.45	1.74	1.42	1.87
	PSC _{grn}	1.67	1.65	1.69	1.92	1.41	1.73	1.42	1.87
	VGN _{veg}	1.66	1.64	1.68	1.88	1.44	1.72	1.41	1.88
	VEG _{veg}	1.62	1.60	1.63	1.82	1.41	1.67	1.37	1.81
	VEG _{grn}	1.46	1.45	1.48	1.64	1.29	1.52	1.25	1.62
	VGN _{grn}	1.40	1.39	1.41	1.57	1.22	1.46	1.21	1.54

Take-aways:

- Dietary changes to a set of established dietary patterns that are both healthier and more sustainable could result in reductions in food expenditure in most high-income and middle-income countries, but in increased expenditure in low-income countries.
 - High-grain vegan diets were most affordable, high-veg pescatarian diets least affordable.
- trade-offs between affordability and amounts of fruits&veg and animal products; not necessarily trade-offs between affordability and health/environmental impacts.

Implications:

- In HICs and MICs, policies incentivising dietary changes to healthy and sustainable diets can be financially progressive (also for low-income households) if changes are achieved;
- In LICs, development-focused policies are needed to make healthy and sustainable diets more affordable:
 - Income growth would increase spending power;
 - Greater Ag efficiency would reduce prices;
 - Development aid would help too and could be financed from savings in HICs and MICs.
- Reductions in food loss and waste and balancing energy intake important as well (but not as important as dietary change).

Caveats:

- No market feedbacks (small-country assumption);
- No processed goods or mark-ups at retail;
- Externalities not included in market prices.

Thank you

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