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The impacts of nutrient- and health-optimal diets on the food system in Switzerland

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Background

- Current dietary choices are sub-optimal from a health, nutrition, and environmental perspective.

  62% of Swiss respondents do not comply with dietary guidelines (Schuh et al 2018)

- Unhealthy consumption is the main risk factor for non-communicable diseases.

  Over 2.3 million Swiss are affected, 80% of healthcare costs (FOPH 2025)

- Food consumption habits are interlinked in the food system with agricultural production, trade, and environmental sustainability.

  3rd highest GHG emissions per calorie supplied, and external costs of food production & consumption for environment and health is about 20.3 billion CHF/year (Lucas et al 2023)

Background and aim

- Previous research:
  - Analyzed impacts of dietary recommendations, e.g. EAT-Lancet or developed by government, on health, economic, environmental, and social indicators (Rockström et al 2025; Stylianou et al 2021)
  - Used individual, household, agricultural sector and economy-wide models (Rieger et al 2023; Springmann et al 2018)

- Lack of research: Identifying nutrient- and health-optimal diets within the food system's settings, which can restrict food supply and show trade-offs of these diets

- **Aim:** To understand possible impacts of nutrient- and health-optimal diets on the food system using the ex-ante food system model

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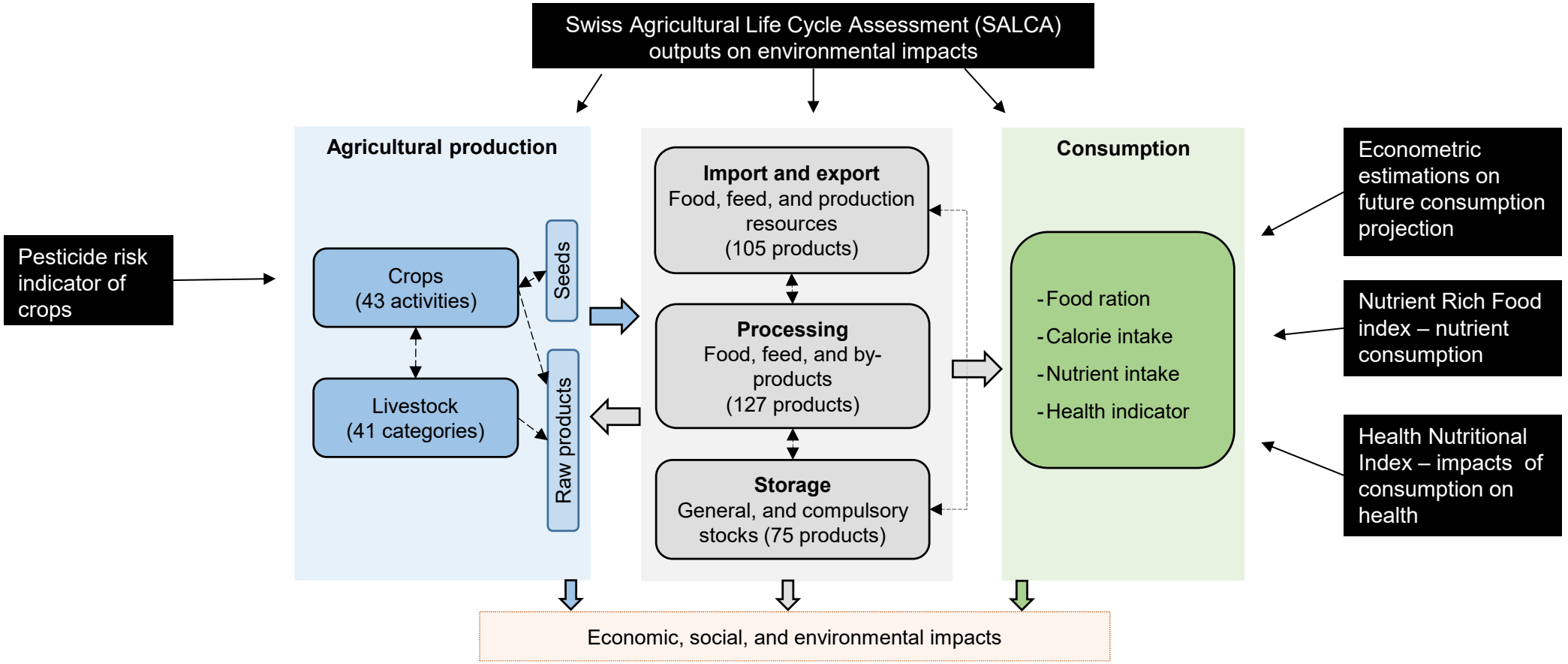
Method: Swiss Sustainable Food System (SWISSfoodSys) model



Methods: Dietary assumptions

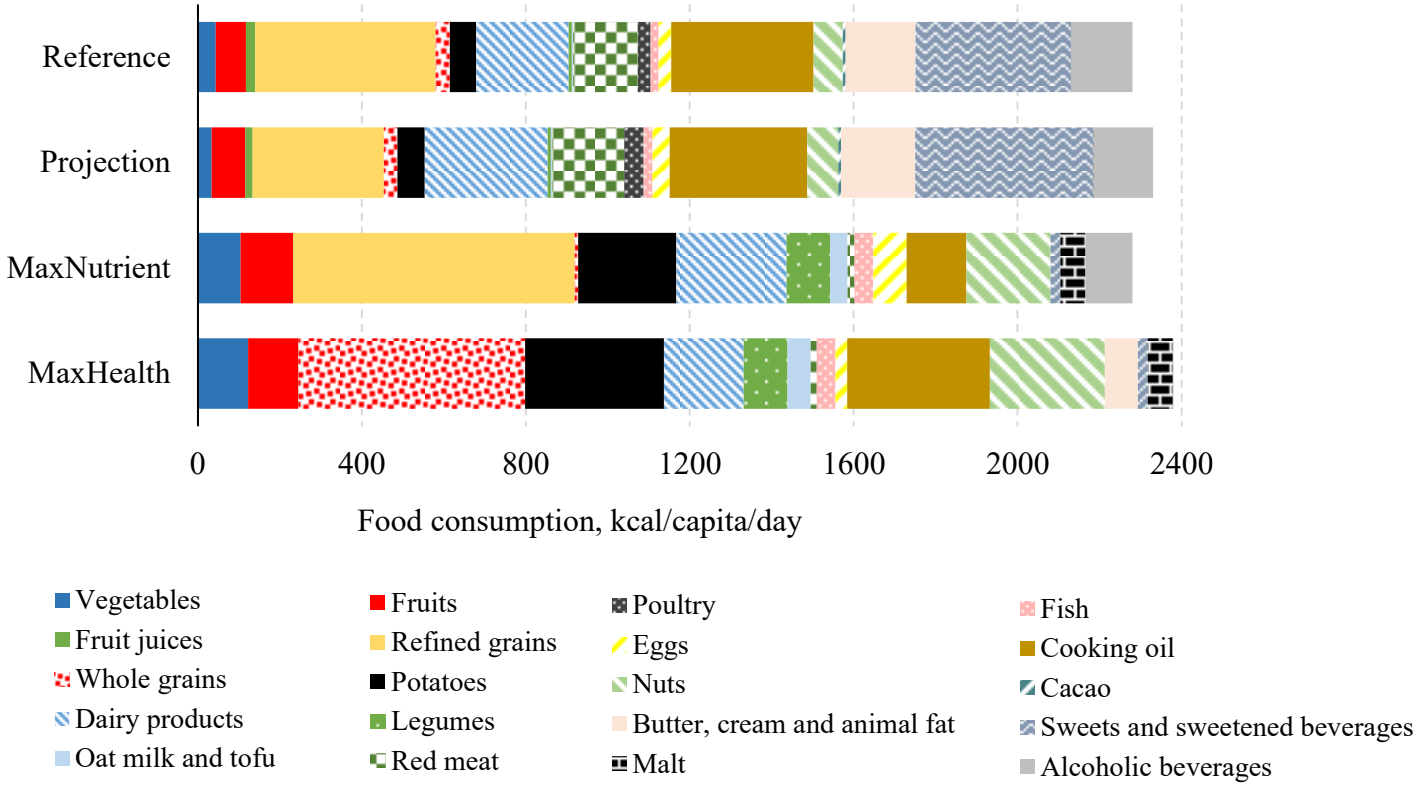
Consumption variables	Description
Food portions	Upper and lower boundary of portions of food groups
Lower boundary of calorie intake Upper boundary of calorie intake	2,280 kcal/capita/day 2,380 kcal/capita/day
µDALYs	Micro-disability adjusted life years, which includes 15 dietary risk factors
Health Nutritional Index (HENI)	Positive values show the minutes of healthy life gained from healthy food consumption and negative values show the minutes of healthy life lost from unhealthy food consumption
Nutrient Rich Food index (NRF10.3)	Ten qualifying nutrients: protein, fiber, vitamins A, C and E, potassium, calcium, magnesium, iron, and iodine. Three disqualifying nutrients: sugar, saturated fats, and sodium

Method: Scenarios

Scenarios	Description
Reference	Current average quantity of food consumption.
Projection	Projected future consumption of food products based on the estimated projection using historical observation of food consumption.
MaxNutrient	Optimization of nutrient consumption (nutrient density) level of the population using the Nutrient Rich Food Index 10.3 (NRF10.3).
MaxHealth	Optimization of health of the population from diets using the Health Nutritional Index (HENI).

Results: Consumption

- ↑ Consumption of vegetables, fruits, grains, potatoes, nuts
- Carbohydrates, fish, meat alternatives, nuts, oils > Swiss Dietary Recommendation



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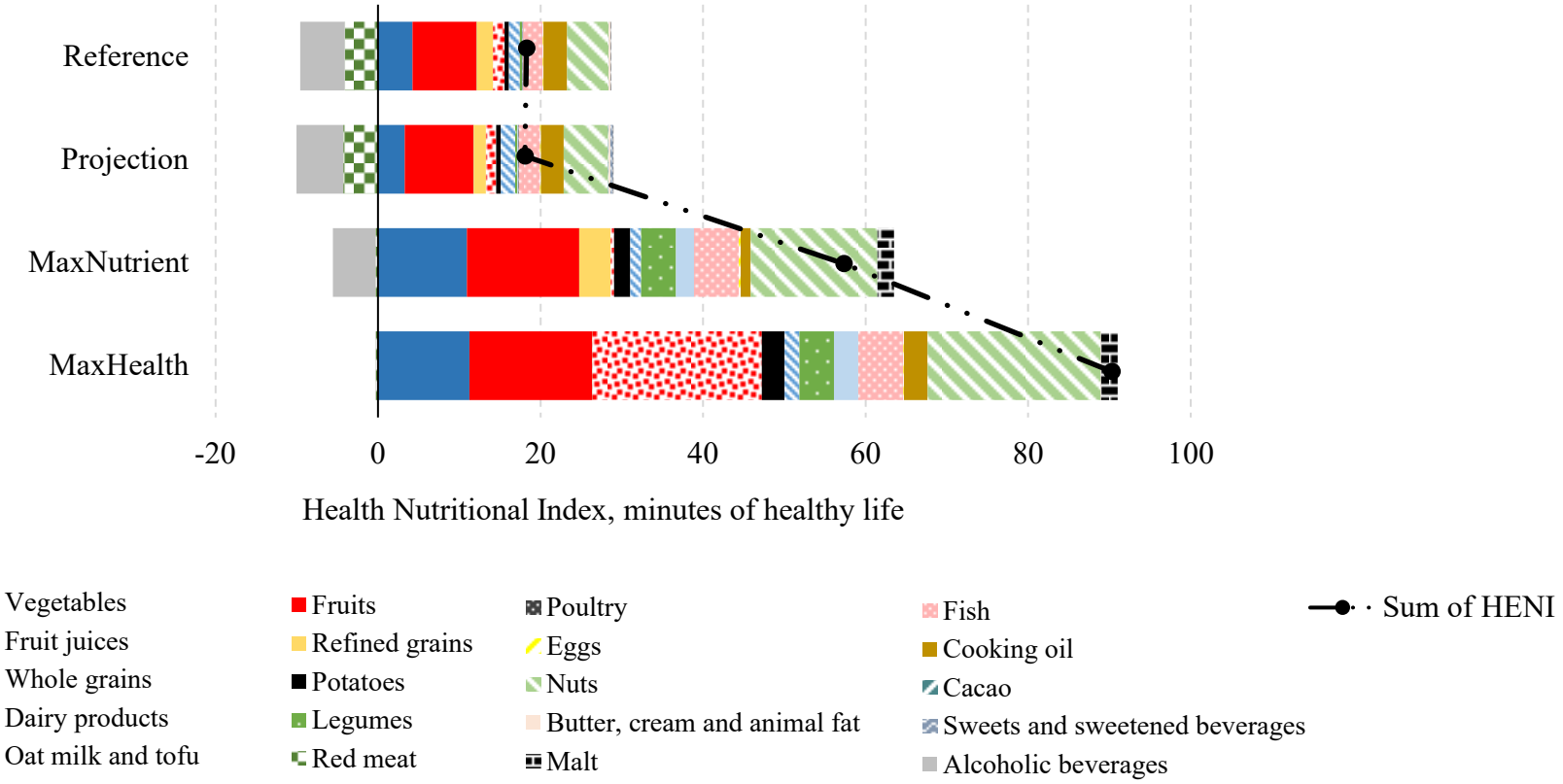
Results: Health impact

- High health benefits from whole-grains, nuts, fruits, vegetables, ↓ alcohol, sweets, red meat
- Optimizing nutrient intake and optimizing health impact result in different health levels



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Results: Nutrients, health, agriculture and trade

- ↑ Nutrient intake, health impacts → crops for consumption → domestic output, still ↑ import
- ↓ Demand for animal-based foods → livestock number, feed crops, export

Indicators	Projection, change from reference	MaxNutrient, change from reference	MaxHealth, change from reference
Nutrient adequacy	2%	57%	50%
Health impact	–1%	203%	374%
Crop area (main changes)	0%	↑ Oat 654%, Potato 132%, Legume 4000%, Vegetables 103%, Fruits 94% ↓ Maize silage –86%, Sugar beet –94%	↑ Oat 1309%, Potato 32%, Legume 4000%, Vegetables 221%, Fruits 145% ↓ Maize silage –90%, Sugar beet –94%, Feed wheat –68%
Livestock unit number	–4%	–47%	–42%
Domestic food output	9%	4%	11%
Food export	–1%	–20%	–17%
Food import	–2%	16%	2%

Results: Environmental impacts

Environmental indicators	Projection, change from reference	MaxNutrient, change from reference	MaxHealth, change from reference
Greenhouse gas emissions			
Domestic agricultural production	−0.1%	−36%	−30%
Import	18%	8%	−10%
Export	0.3%	–6%	−0.4%
Processing	6%	–8%	−9%
Food cooking	–5%	82%	82%
Total	12%	−7%	−18%
Water use			
Domestic agricultural production	−1%	−34%	−20%
Import	12%	56%	15%
Export	1%	−14%	−9%
Processing	16%	51%	76%
Food cooking	−3%	83%	98%
Total	12%	58%	20%
Pesticide risk from crop production			
Surface water	0.2%	45%	127%
Groundwater	1%	−2%	22%
Semi-natural habitat	1%	3%	30%
Nitrogen emissions of domestic agricultural production	−0.5%	−23%	−23%

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Conclusions

- Future projected consumption (using past dietary patterns) does not change much
- Nutrient-optimal and health-optimal diets ↑ nutrient intake and health, but have different impact levels
- ↑ Plant-based food consumption by 55% and 78%, ↓ animal-based food consumption by 35% and 43%
- ↑ Area of crops for human consumption, ↓ livestock number
- ↑ Import dependency with diets to improve the nutrint adequacy and health
- Environmental trade-offs: ↓ GHG and N emissions, ↑ Water use and pesticide risks

Source

Djanibekov U, von Ow A, Reguant-Closa A, Loginova D, Furrer C, Douziech M, Mann S, Nemecek T (2026). The impacts of nutrient- and health-optimal diets on the food system in Switzerland. *Food Policy* 138, 103014.














Thank you!

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