Reducing health and climate impacts of the global food system

Koen van Greevenbroek Steven J. Davis Ken Caldeira

Department of Earth System Science, Stanford University

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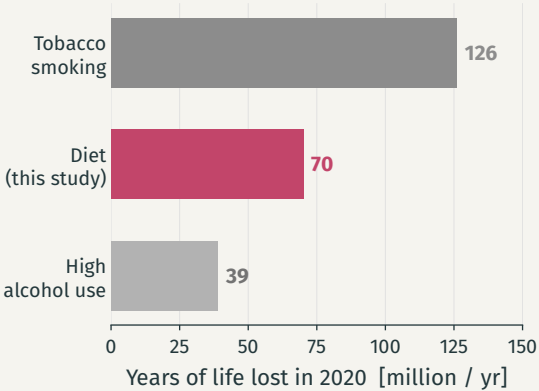
The food system at the intersection between climate & health

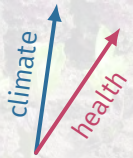
- **Climate.** Food is responsible for roughly **a third** of global greenhouse-gas emissions.
- **Health.** Dietary risks cost tens of millions of **years of life** every year.

So could interventions in the food system tackle both problems at once?



The appealing story: one fix for both

“Reduce global red meat consumption to improve health *and* protect the climate.”



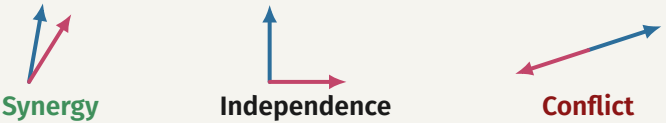
Two goals, pulling in the same direction.

Background: “Edible garden at Pixie Hollow” by Myrna Litt, Wikimedia Commons, CC BY 2.0.

Research question; scope of emission and health burden

Research question

What is the relationship between **climate** and **dietary health** in the global food system? Generally aligned, in conflict, or somewhere in between?



Climate

Net food-system greenhouse-gas emissions (CO_2+CH_4+N_2O, incl. land use and reforestation).

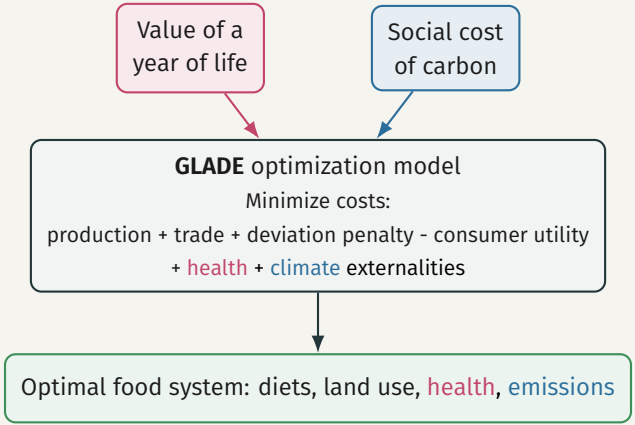
Dietary health

Years of life lost to six food-group dietary risk factors (red meat, whole grains, legumes, fruit, veg, nuts).

The answer: co-optimizing for climate and health

Existing food system studies evaluate health burden *after* optimization.

Here, we co-optimize for health and climate endogenously.



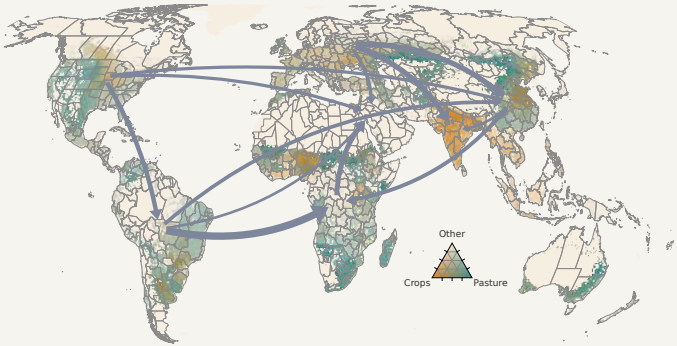
GLADE: A NEW, SPATIALLY EXPLICIT FOOD-SYSTEM MODEL

GLADE — Global Land, Agriculture, Diet & Emissions

- 48 crops, 7 animal products
- 750 regions, land at ~9 km
- MILP over land use, production, trade & diet
- Production costs, health *and* emissions priced in the objective

Fully open data and source code:

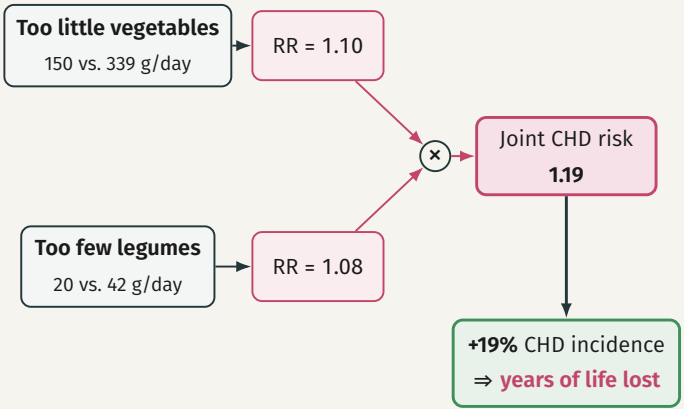
try the model out in your next study!



How is health burden calculated?

Certain food group intakes, relative to their *minimum-risk* level, raise the risk of chronic diseases. Rooted in the Global Burden of Disease (GBD) studies.

Example for one region, two food groups, one disease:



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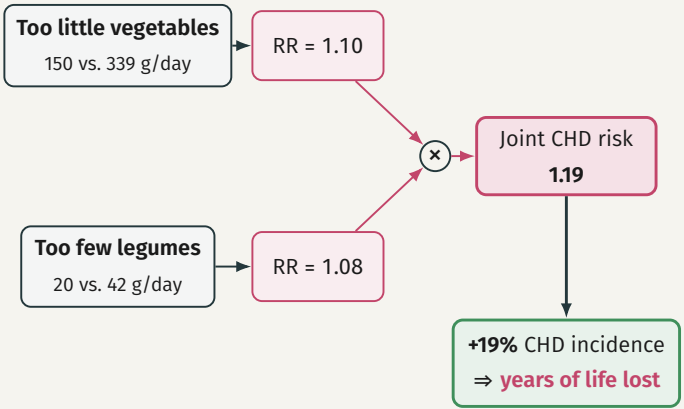
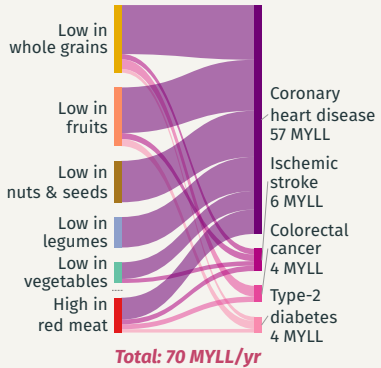
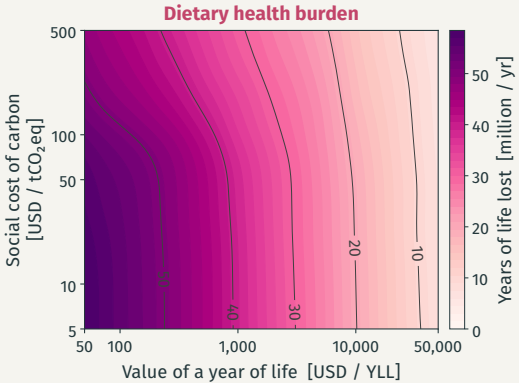


Global 2020 dietary health burden:



Result: each price drives its own outcome



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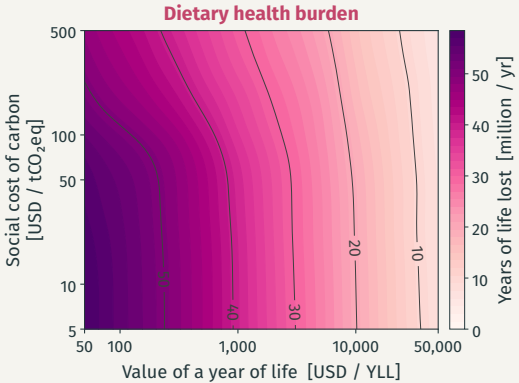

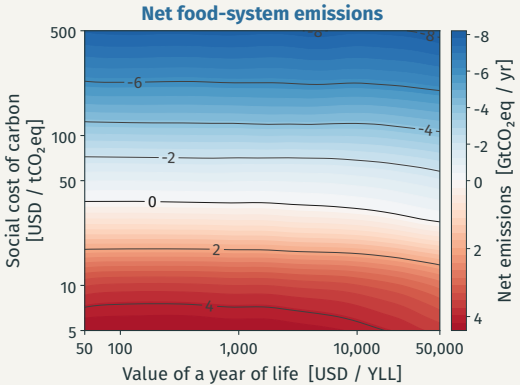

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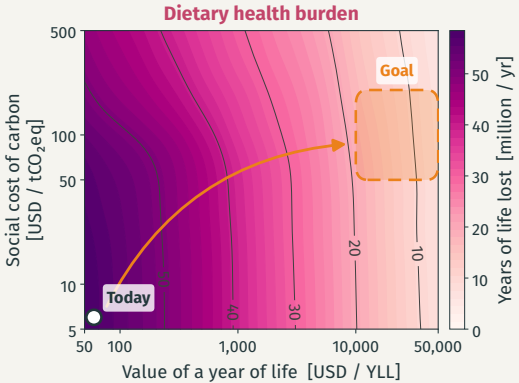

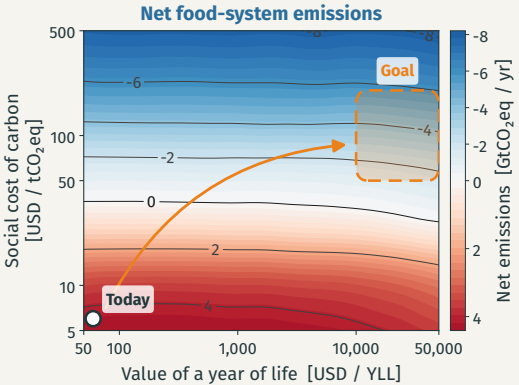

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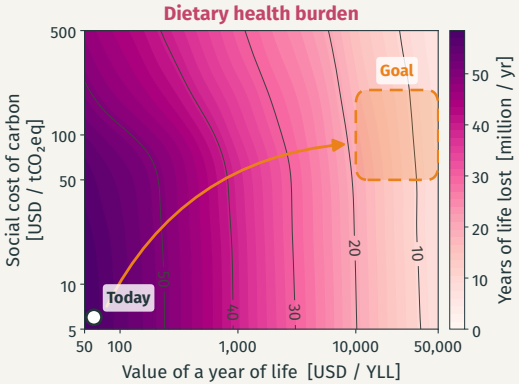
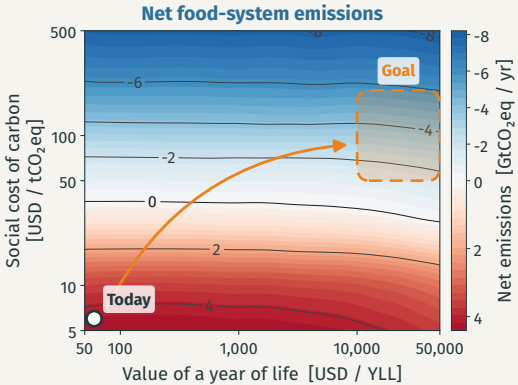




Limited synergies: carbon pricing doesn't reduce health burden much, and pricing health burden doesn't reduce emissions much.

Result: climate and health are largely separable

Research question

Climate vs. dietary health: synergy, independence, or conflict?

Synergy

Independence

Conflict

Result: climate and health are largely separable

Research question

Climate vs. dietary health: synergy, independence, or conflict?

Synergy

Independence

Conflict

Independence: the two goals are largely **separable**.

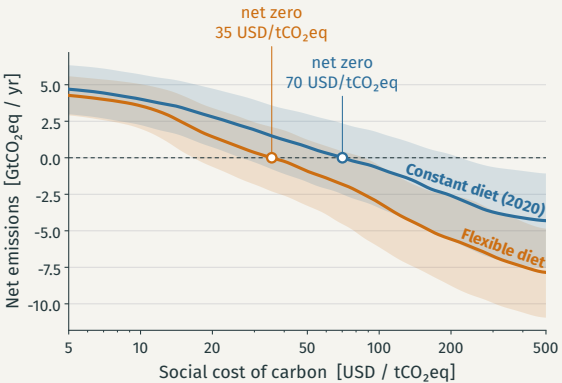
Pricing carbon only **mildly** improves health.

Pricing health **barely** improves climate.

Stronger result: reducing emissions *without* dietary change

Emissions can go **net-negative**

→ **Even with 2020 diets held fixed**.



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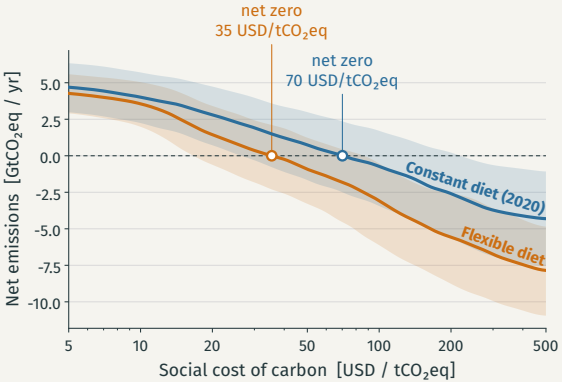

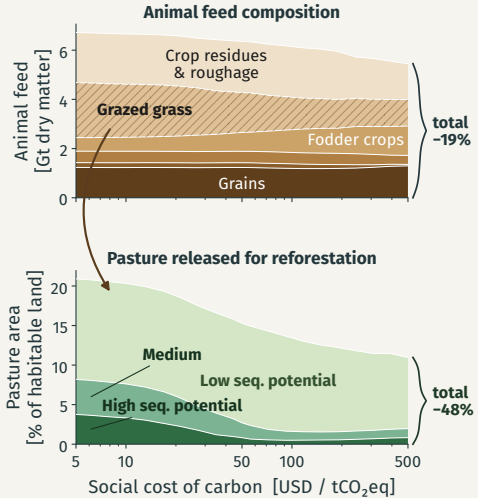

Conclusion

- Climate and dietary health in the food system are **largely separable**.
- No silver bullet: solving one problem does not solve the other.
- No conflict either. **Large, low-cost** gains are available on *both* fronts.

Take-away

Pursue dietary-health and food-system climate policy as **parallel** objectives, each with its own instrument.

Thank you!

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koenvg@stanford.edu

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