# Improving Global Food Demand Projections with Income Inequality

#### Introduction

Income is a key predictor of food demand

Engel & Bennet's Laws:



How can global food system models better represent disparities in diet affordability within countries?

How does income inequality influence global food demand and land use?



starchy staples Luxury goods, meat

Income inequality evolves over time. Potential impacts on food demand & land use are largely unstudied

Projected intranational inequality:



Year

Methods

Data source: Narayan et al., 2023

## The plots below show differences in projected food demand between model runs with & without intranational inequality included:

Results







#### Conclusions

 Future changes in national income distributions substantially effect food demand projections

## Next steps: Model dietary health outcomes; Run tax and subsidy

scenarios

- Income distributions affect the composition of demand more than total demand
- Future inequality projections should be considered in long-term food system scenarios





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#### Key References

Bijl, D. L. et al. A physically-based model of long-term food demand. Glob. Environ. Change 45, 47-62 (2017).

Cirera, X. & Masset, E. Income distribution trends and future food demand. Philos. Trans. R. Soc. B Biol. Sci. 365, 2821–2834 (2010).

Narayan, K. B., O'Neill, B. C., Waldhoff, S. T. & Tebaldi, C. Non-parametric projections of national income distribution consistent with the Shared Socioeconomic Pathways. Environ. Res. Lett. 18, 044013 (2023).

Henry, R. C. et al. Global and regional health and food security under strict conservation scenarios. Nat. Sustain. 5, 303–310 (2022).