Climate impacts and monetary cost of healthy diets worldwide

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2025 Global Food+ Symposium

May 2, 2025

https://sites.google.com/view/elenammartinez • https://sites.tufts.edu/foodpricesfornutrition
https://worldbank.org/foodpricesfornutrition

Food Prices for Nutrition

WORLD BANK GROUP

Tufts UNIVERSITY | Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy

Motivation and main findings

- New global food security metrics introduced in 2020 measure food access as affordability of the least expensive locally available items for a healthy diet
  -- The frontier of lowest cost options is around $3.50-$4.00 per person, per day

- In this study we ask
  -- What is the monetary cost *and GHG emissions* of the lowest-cost and lowest-emissions diets?
  -- How much higher than that are costs and emissions due to actual choices in each food group?

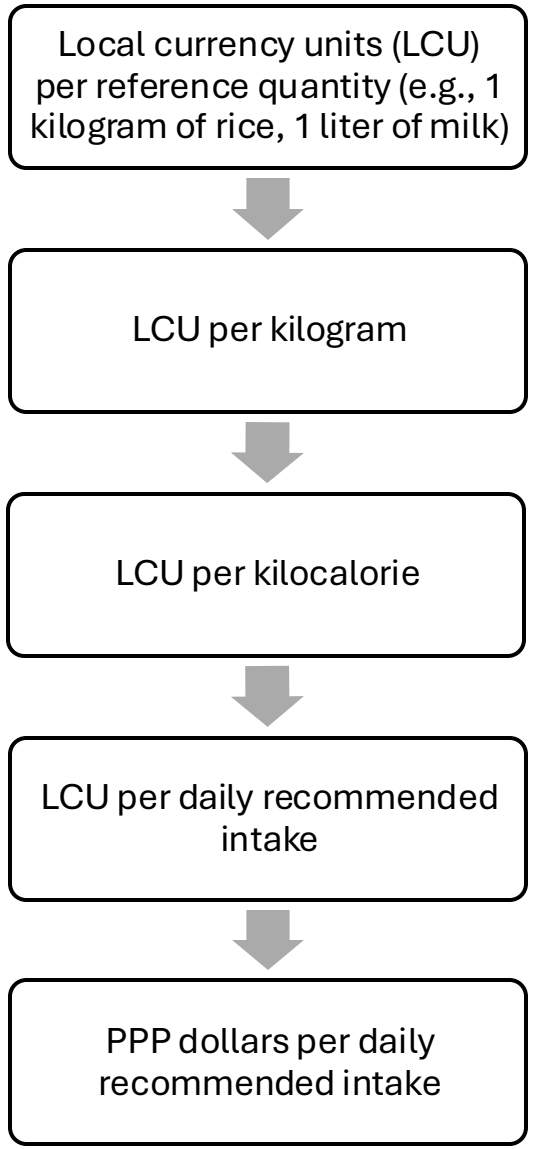
- Our main findings are
  -- Healthy diets that incorporate lowest-GHG emissions items or most commonly consumed items are nearly **twice as expensive** as the lowest-cost items in each country.
  -- The food groups driving higher emissions are **animal-source foods and starchy staples**, so item selection matters most for these food groups.

Data sources

Food item prices and availability

- **Retail food prices**
  2021 PPP dollars
- National average food prices
- 440 food items in 173 countries
- World Bank International Comparison Program, 2021

Conversion to standardized, comparable units:



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Healthy Diet Basket

Definition of the Healthy Diet Basket for cost per day

Food group	**Number of items**	**Dietary energy (kcal/day)**	*Energy shares*
Starchy staples	2	1,160	*50%*
Vegetables	3	110	*5%*
Fruits	2	160	*7%*
Animal-source foods	2	300	*13%*
Legumes, nuts & seeds	1	300	*13%*
Oils and fats	1	300	*13%*
		2,330	

4

Data sources

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Commonly consumed foods

- **Consumption of each food category** relative to total consumption in each country
- FAO's Food Balance Sheets and Supply Utilization Accounts

Greenhouse gas emissions

- **GHG emissions**
  CO2-eq per kcal of food item)
- Global average, based on studies from 78 countries
- 324 food items
- Cradle-to-retail-gate
- Petersson et al. (2021)

How does food choice affect cost and emissions? *

Benchmark frontiers

Diet 1: Lowest monetary cost
Least expensive food items available in each country in each food group (CoHD)

Diet 2: Lowest greenhouse gas emissions
Lowest emissions food items available in each country in each food group

Range of options and actual consumption

Diet 3: Most commonly consumed items in each food group
Using each country's most commonly consumed products in each food group

Diet 4: All available items, weighted by share of actual consumption
Using all of each country's food options, in proportion to use

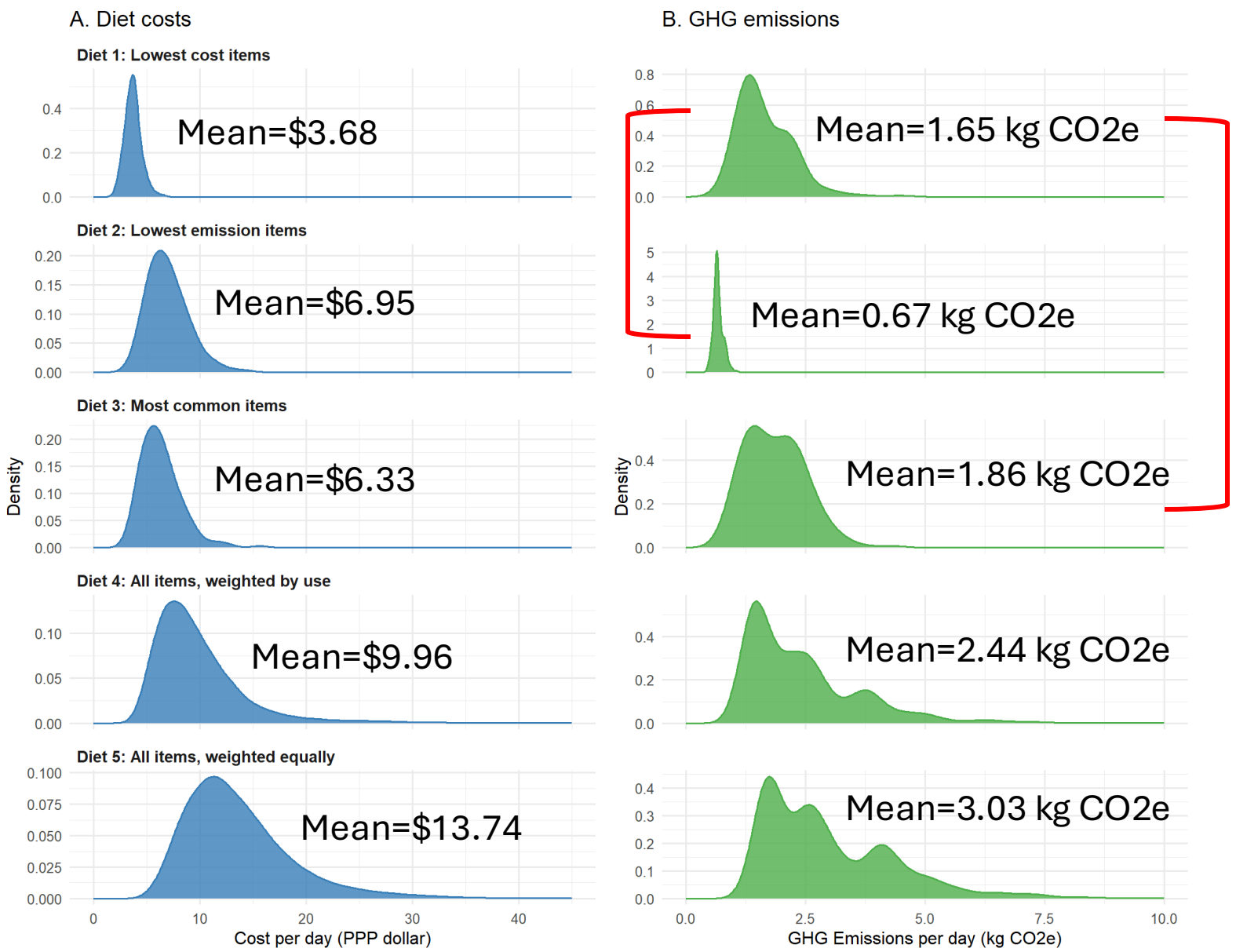
Diet 5: All available items, weighted equally
Using all of each country's food options, to show the entire range of choices

* Note: All diets meet the same nutritional needs, as defined by the global Healthy Diet Basket targets

Distribution of diet costs and GHG emissions across diets, 2021

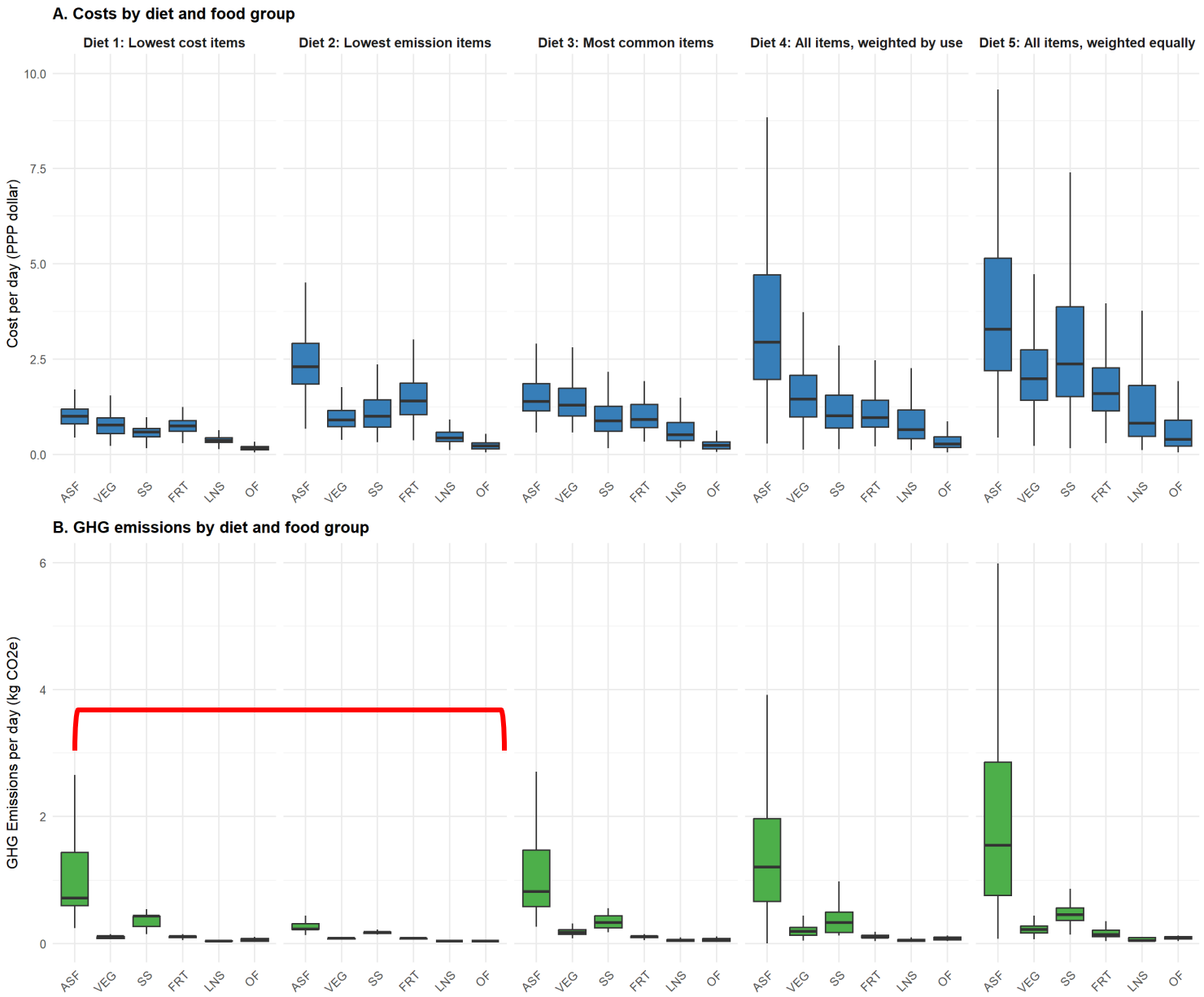
- Selecting lowest GHG emissions items or most commonly consumed items nearly doubles the cost of the least expensive healthy diet
- Average cost of healthy diets across all available items are even more expensive

Distribution of diet costs and GHG emissions across diets, 2021



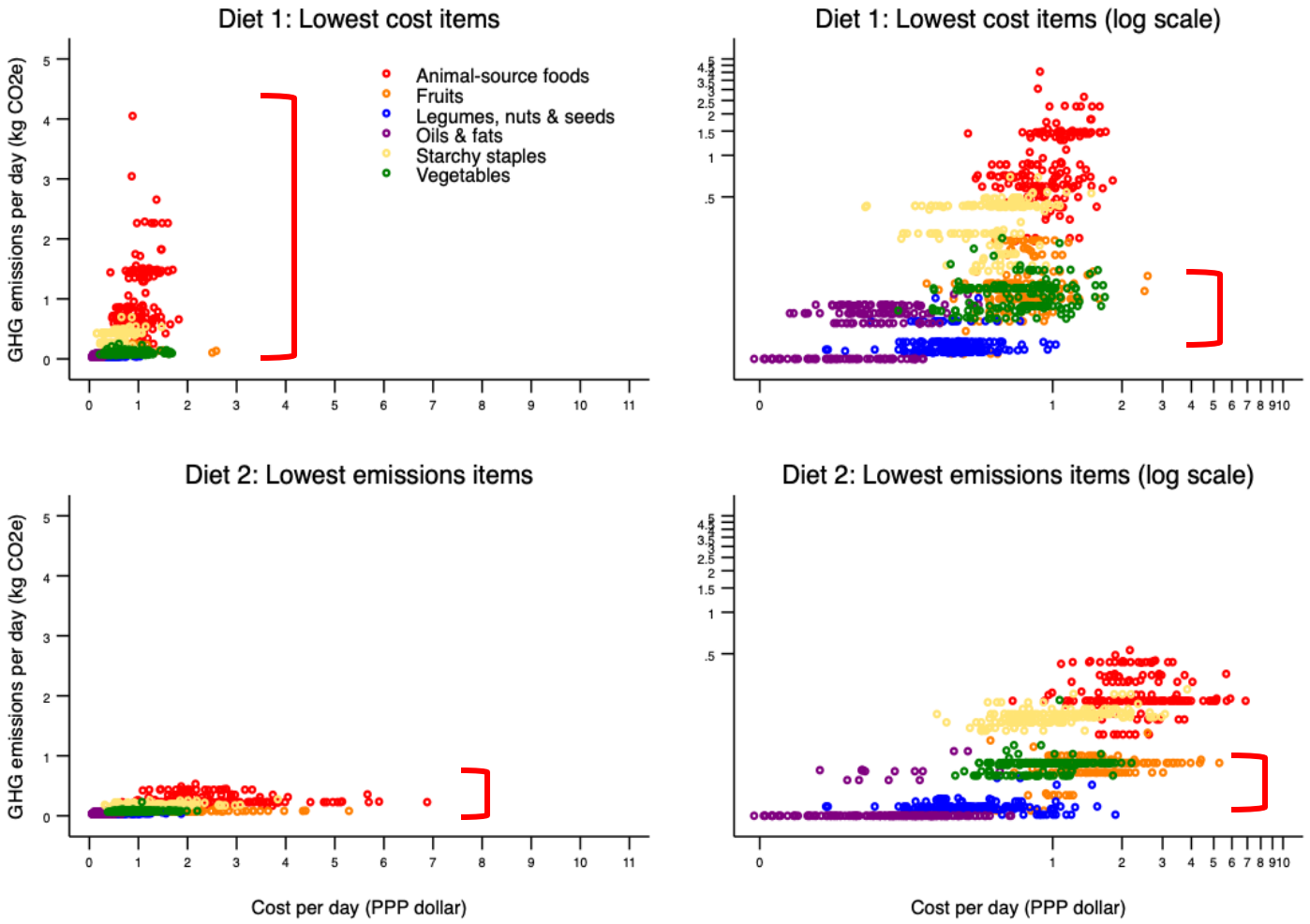
- Selecting lowest GHG emissions items or most commonly consumed items nearly doubles the cost of the least expensive healthy diet
- Average cost of healthy diets across all available items are even more expensive
- Least expensive available diets are not always the lowest-emissions diets
- Emissions of diets with most commonly consumed items are not significantly higher than emissions of least-cost diets

Distribution of the cost and GHG emissions of daily diets by food group and diet, 2021



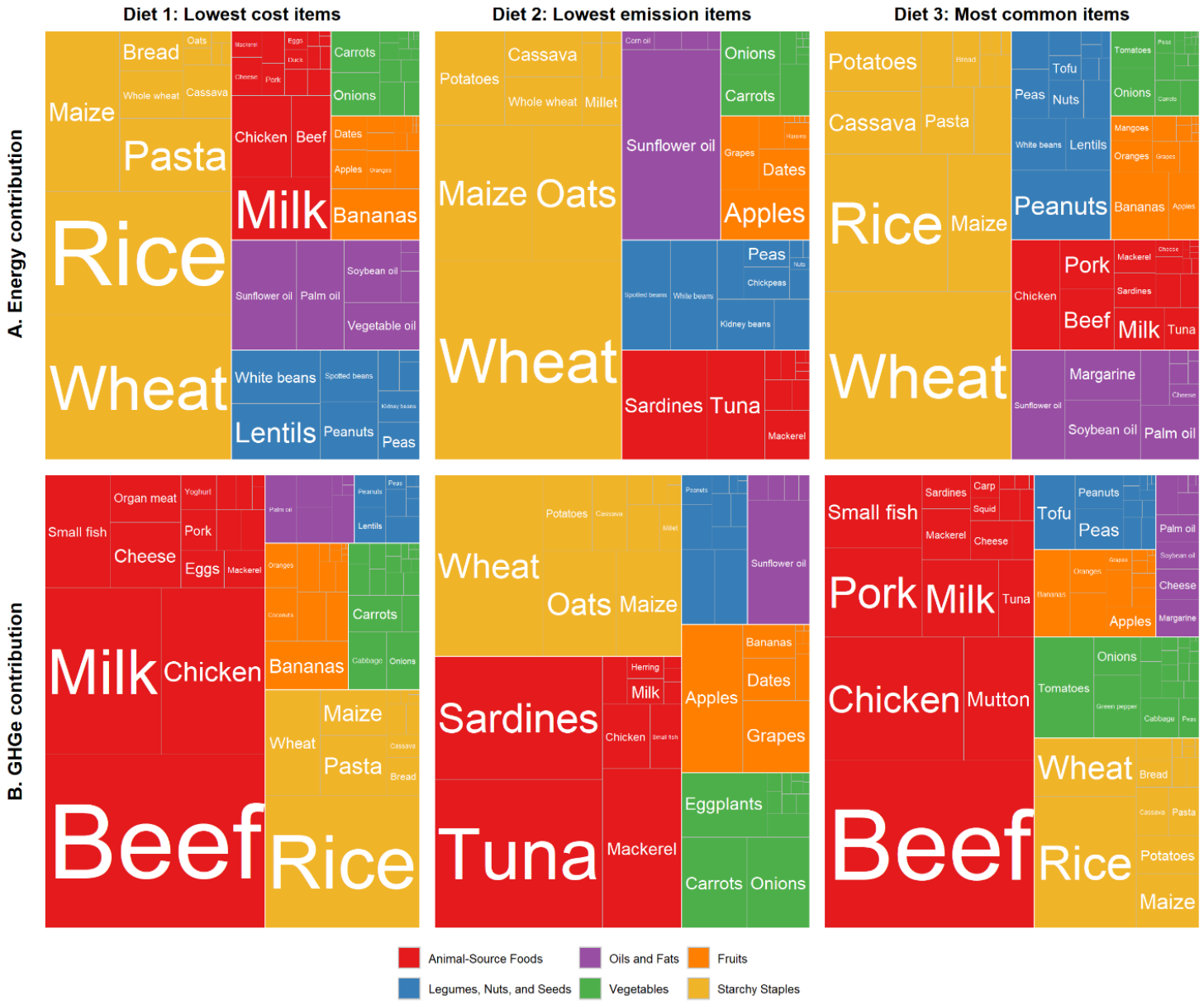
- Animal-source foods (ASFs) have highest and most variation in GHG emissions per day
- Selecting lowest GHG items reduces emissions in all food groups, especially among ASFs and starchy staples
- GHG emissions of fruits, vegetables, legumes/nuts/seeds, and oils are very low, so selecting least-emissions options increases diet cost has only small impact on emissions

Distribution of the cost and GHG emissions of daily diets by food group and diet, 2021



- Animal-source foods: lowest-emissions items have much lower emissions than lower-cost items
- Other food groups: little difference in emissions between lowest-emissions and lowest-cost items, but large difference price

Energy and GHG emissions contribution of food groups in the three least-cost diets, 2021



- Some items are inexpensive, commonly consumed, and low GHG: *wheat, maize, white beans, apples, onions, carrots*
- Some items are inexpensive and commonly consumed but have relatively higher GHG: *rice, pasta, palm oil, chicken, beef, milk*
- Some items are low GHG but are neither least expensive nor commonly consumed: *oats, sardines*

Summary

- Healthy diets that incorporate lowest-GHG emissions items or most commonly consumed items are nearly twice as expensive as the lowest-cost items in each country.
  - Lowest cost items available in each country may not be the most commonly consumed items.
  - Lowest cost and lowest-GHG emissions items are not always the same.
- The food groups driving higher emissions are animal-source foods and starchy staples, so item selection matters most for these food groups.
  - Animal-source foods: High average GHG emissions, wide range of GHG emissions
  - Starchy staples: Larger quantity required to meet daily intake recommendations
  - Selecting lower-emissions items among other food groups may increase price but likely will not significantly lower GHG emissions of diets.

Thank you!

Contact: Elena.Martinez@tufts.edu
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Sustainable Hospital Dining: Implementing Plant-Forward Meals in Boston

As part of its commitment to the Cool Food Pledge–to reduce food-related greenhouse gas emissions by 25% by 2030–Beth Israel Deaconess Medical Center (BIDMC) introduced plant-forward initiatives in its retail food services and launched a new inpatient menu in March 2025. This practicum project evaluated the implementation using customer feedback, chef and staff insights, sales data, and climate impact analysis to assess acceptance and effectiveness. Additional efforts included promoting locally sourced plant-forward meals during Earth Week and advancing sustainability in catering systems by reducing food waste and offering more climate-conscious choices.

Bo Wang, 05/2025

Customer Feedback on Plant-Forward Options

Plant-Forward Interventions: Customer Feedback (n = 52, March 2025)

- **Health benefits, taste & variety, and price** were the top factors for purchasing plant-forward meals.
- Preferred plant-forward foods included grain bowls, soups, and plant-based burgers.
- **58%** of respondents consume plant-forward meals a few times a week or daily.
- Feedback on the **turkey sausage** was positive for nutrition, flavor, texture, and price, with requests for improvements in price, portion size, and promotion.
- The **vegetable root hash** had positive intent to repurchase, but feedback indicated **a need for better flavor, texture, portion size, and more promotion.**
- Additional request: daily availability of hard-boiled eggs.

Portal Intro

BIDMC TODAY

BIDMC Advances Sustainable Dining with the Cool Food Pledge and New Menu Offerings

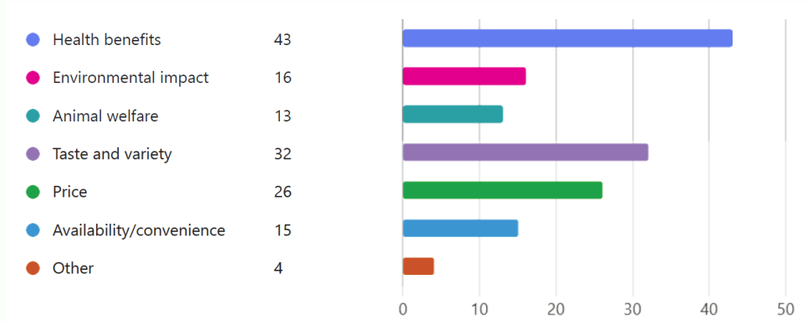
BIDMC has taken a bold step toward sustainability by committing to this global initiative.

Published: 3/10/2025 2:00:00 PM

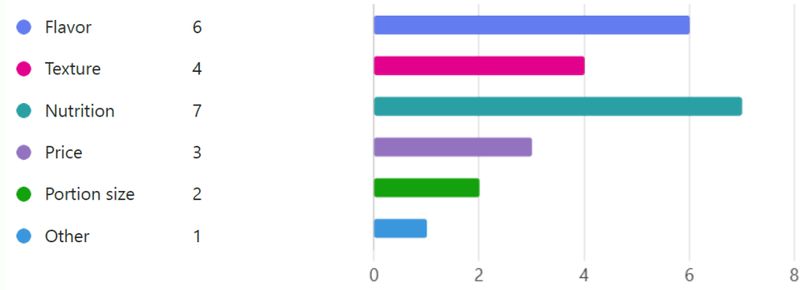
Beth Israel Deaconess Medical Center has taken a bold step toward sustainability by committing to the **Cool Food Pledge**, a global initiative led by the **World Resources Institute** to reduce food-related greenhouse gas emissions while ensuring nutritious, satisfying meals. By participating, BIDMC is aligning its food services with its broader mission of promoting health and sustainability.

Recognizing the significant role food plays in both individual and planetary health, BIDMC is curating menus that encourage sustainable food choices while meeting diner preferences. A key part of this effort includes **new breakfast offerings (featured below)** and a **new patient menu** that was rolled out on March 5th.

Graph1: Factors that influence customers' decision on plant-forward meals



Graph2: Main reasons selected by customers who like the plant-forward meals



Source: Customer questionare feedback

Chef & Retail Operations Insights

Chief Team Insights

- Mixed **perceptions** on plant-based options, with **turkey sausage** receiving positive feedback, but **vegetable root hash** facing skepticism due to the lack of traditional breakfast proteins.
- While adding new items was **logistically easy**, **customer acceptance** remained a challenge.
- The **Cool Food Pledge** is seen as an environmental initiative, but **staff education** is necessary.
- **Ingredient sourcing** is improving, though challenges remain in variety and cost. **Profit margins** are stable, but **pre-developed recipes** and **corporate support** such as cost subsidies, staff training could streamline processes.
- **Chefs should be involved early** in recipe planning and testing. **Sampling and customer surveys** recommended before menu rollouts.
- **Taste and familiarity** are key drivers; **price and marketing** influence choices; health benefits alone aren't always persuasive
- Shifting away from **red meat** presents challenges, but **jackfruit** and **tofu** show promise as alternatives.
- Open to more plant-based meals if they meet criteria for **flavor**, **affordability**, and **ease of preparation**.

Retail & Catering Operations Insights

- Customer feedback on **plant-based meals** is generally **positive** or **neutral. Turkey sausage** was particularly **well-received**, surpassing the previous pork-based option in popularity, while **vegetable root hash** had limited engagement. Its **flavor** may have contributed to its lower popularity.
- Factors such as customer **dietary preferences** (e.g., **health-conscious** individuals and **vegetarians**) support plant-based meal choices, while **protein-focused diets** and **unfamiliarity** with dishes may discourage others.
- **Pricing** for plant-based meals is on par with meat options, though further **discounts** could hurt **profit margins**.
- Successful dishes, like **eggplant parm**, highlight the potential of plant-based options when they are **consistent** and **well-promoted**.
- Suggestions for improvement include increasing **sampling opportunities**, enhancing **flavor profiles**, and providing clearer **nutritional information** to attract **protein-focused customers**.

Actionable Takeaways from Interviews:

To successfully integrate plant-based meals, prioritize **flavor and familiarity**—focus on dishes like turkey sausage, lentil shepherd's pie, and falafel gyro that mimic traditional flavors while avoiding bland or unfamiliar textures. **Sampling and engagement** are critical; offer free tastings, highlight top dishes as "Chef's Recommendations," and pilot **customizable stations** (e.g., falafel bars). Optimize the menu by **featuring** plant-based options **consistently**, balancing **variety** with meat dishes, and promptly adjusting based on feedback. Internally, **standardize recipes**, **train staff** on plant-based prep, and **clarify sustainability goals** like the Cool Food Pledge. Monitor sales data to confirm **cost efficiency—plant-based ingredients** often lower costs, but **pricing** should remain competitive. **Expand successful dishes** (e.g., eggplant parm, jackfruit tacos) while introducing **seasonal specialties** to sustain interest. A **phased rollout**—starting with high-flavor dishes, then scaling based on feedback—will ensure long-term adoption.

Source: Interview of BIDMC chef team and Retail & Catering Operations, April 2025

New Patient Menu Launch: Highlights & Opportunities

Launch Success &Top Dishes

- **Rollout Success:** Pre-launch testing with nursing staff, cafeteria teams, and patient advisory groups helped refine dishes ahead of rollout. A smooth implementation followed, driven by early previews that built excitement and strong initial reception. Quick adaptations, such as adjusting spice levels and clarifying menu labels, addressed early feedback.
- **Top Plant-Based Dishes:** Lentil Shepherd's Pie emerged as a comforting favorite, Falafel Gyro was praised for its bold Mediterranean flavors and texture contrast, and Smoky Bean Chili gained popularity after adding spice warnings.

Key Patient & Staff Feedback

- **Positive:** "More flavorful than expected" (challenged hospital food stereotypes). Increased variety reduced menu fatigue for long-stay patients.
- **Critiques:** Occasional requests for milder versions of spicy dishes (e.g., chili). Desire for more "build-your-own" options (e.g., quesadillas, salad toppings).

Opportunities for Improvement

- **Consistency:** Standardize recipes across campuses to ensure uniform quality.
- **Expansion:** Add seasonal/specialty items (e.g., summer grain bowls) to maintain interest.
- **Customization:** Pilot "create-your-own" stations (e.g., falafel bar with toppings).
- **Staff Training:** Reinforce plant-based prep techniques to maintain dish integrity.
- **Marketing:** Highlight "Chef's Recommendations" and verbally share sustainability benefits with interested patients.
- **Cost-Effective Innovation:** Explore affordable ways to introduce more customizable options based on patient requests.
- **Monitoring:** Track repeat orders to assess long-term popularity.

Source: Interview of Patient Service Operations , April 2025

Sales Performance and Climate Impact Analysis

Sales & Margins Impact

- **Turkey sausage outsold pork sausage**, reflecting strong customer interest. While pork sausage had a slightly higher per-portion profit margin, the significantly higher sales volume of turkey sausage made it the **more profitable** option overall–generating nearly **$2,000 more in annual profit**. This performance underscores turkey sausage as **both a healthier and economically sound** choice to prioritize in future menu planning.
- **Vegetable Root Hash** and Corned Beef Hash show similar sales, although subject to short-term variations and the potential for **flavor improvements**. Both are priced the same, but **Vegetable Root Hash** has a **26% higher profit margin** (80% vs. 54%), resulting in nearly **$6,000 more** in annual profit. This makes Vegetable Root Hash the more profitable and **economically viable option** to prioritize, especially with the potential for **enhanced flavor appeal**.

Climate Impact

- **Replacing pork sausage with turkey sausage** yields a per-portion emissions savings of 0.0006 metric tons of CO_2 equivalent ($MTCO_2e$), resulting in an annual reduction of approximately **10.53 $MTCO_2e$.**
- **Similarly, substituting corned beef hash with vegetable root hash** saves 0.0494 $MTCO_2e$ per portion, translating to an estimated annual reduction of 353.57 $MTCO_2e$.
- Together, these changes contribute to a **3.64%** decrease in total annual foot-related emissions, demonstrating the **cumulative** power of small, consistent dietary shifts in institutional settings.

Product	Sale Price	Profit Margin	Weekly Sales (March 10)	Weekly Sales (March 17)	Weekly Sales (March 24)	Yearly revenue estimate	Yearly profit estimate
Turkey Sausage	$0.99	$0.66	259 portions	171 portions	230 portions	$11,325.6	$7,550.4
Pork Sausage	$0.99	$0.72	150 portions	0 portions	0 portions	$7,722.0	$5,616.0
Vegetable Root Hash	$1.99	$1.60	/	48 portions (March 18 & 20)	/	$17,474.9	$13,068.5
Corned Beef Hash	$1.99	$1.08	/	59 portions (March 17, 19 & 21)	/	$13,607.3	$7,377.4

Source: Retail & Catering sales data; BIDMC sustainability calculation. No significant shift toward other meat alternatives was observed during the intervention period.

Additional Sustainability Initiatives

- Earth Week: Locally sourced plant-forward meals in the cafeterias
- Catering system improvements (food waste reduction, climate-conscious choices)

Food Waste:

- Large Minimum Orders: The system requires minimum quantities (e.g., 10 guests), which can lead to over-ordering and food waste
- Pre-Set Menus: Fixed menus (e.g., Continental Breakfast, Healthy Start) may not align with individual preferences, resulting in uneaten items.
- Inflexible Portions: Lack of adjustable portion sizes makes it difficult for users to tailor orders to actual needs.
- Unwanted Add-Ons: Mandatory items like desserts or chips may not always be desired, leading to waste. These could be offered as optional add-ons instead.

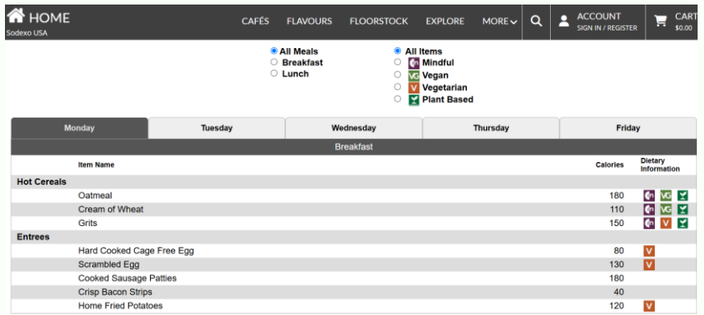
Red Meat Tendency:

- Limited Promotion of Alternatives: Plant-based or sustainable protein options (e.g., tofu, legumes) are not prominently featured or encouraged.
- Add Guidance: The system does not provide information or nudges to help users make eco-friendly or health-conscious protein choices

Ordering Process:

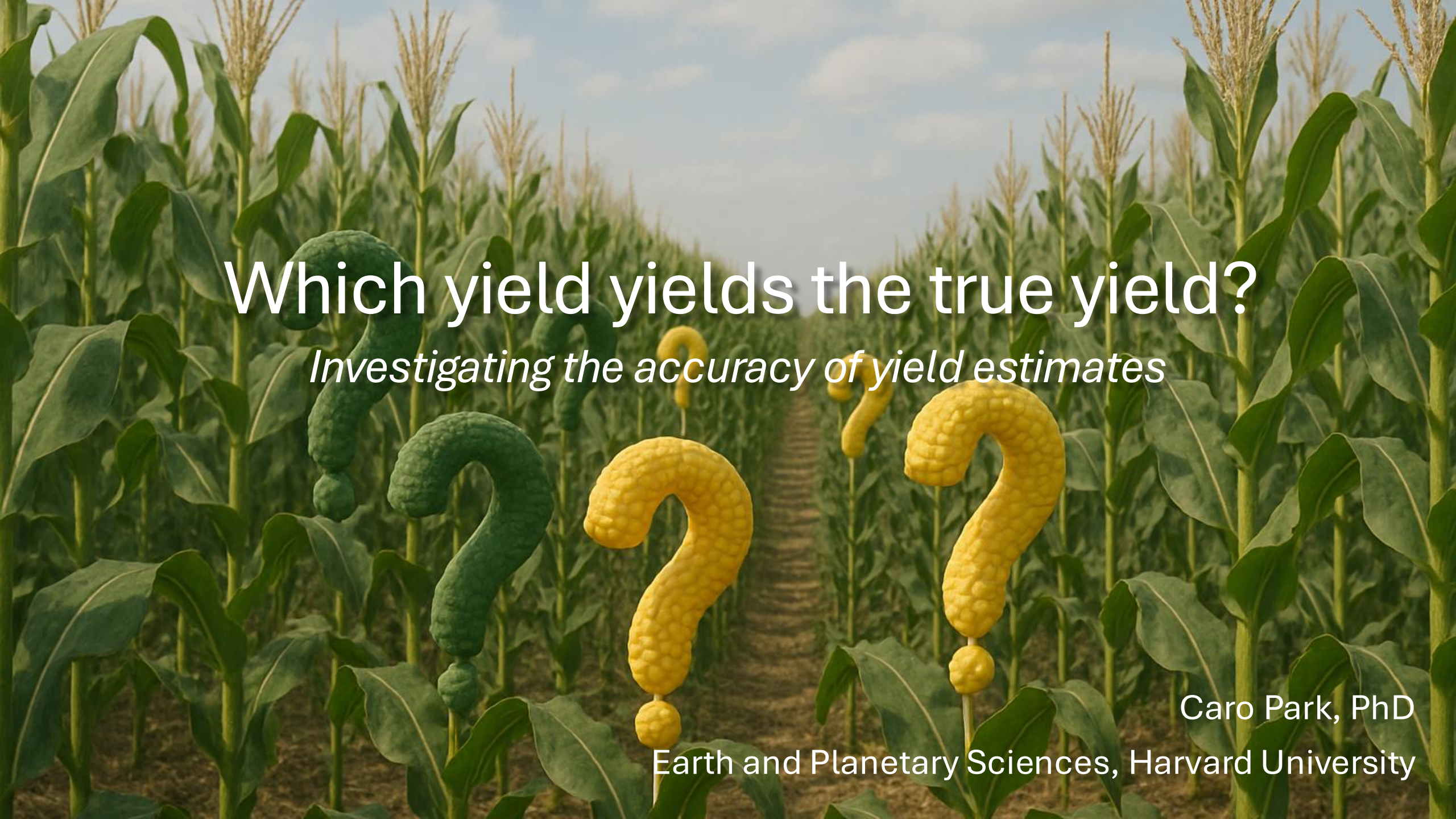
- Straightforward but Limited: The process (login → select menu item → customize → add to cart → payment) is user-friendly but lacks features to promote sustainability or mindful ordering.
- Add Sustainability Filter: Users cannot easily filter or identify eco-friendly options.
- Add Real-Time Updates: The system does not provide real-time inventory updates or recommended quantities, which could help prevent over-ordering.

Poster Design



Source: bidmc.catertrax.com

Thanks!



Which yield yields the true yield?

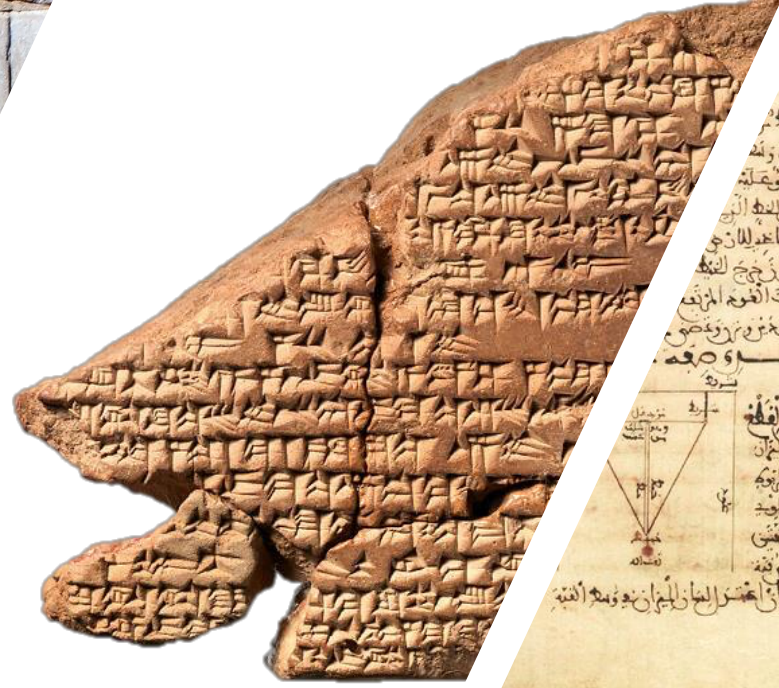
Investigating the accuracy of yield estimates

Caro Park, PhD

Earth and Planetary Sciences, Harvard University

In 2023, an estimated 28.9 percent of the global population – **2.33 billion people** – were moderately or severely food insecure.

FAO, IFAD, UNICEF, WFP and WHO (2024)



How weather determines yields is one of the oldest scientific questions...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ΕΡΓΑ ΚΑΙ
ΕΡΑΙ.

HESIODI AS-
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PIO FRANEKEREN-
SI FRISIO.

How weather determines yields is one of the oldest scientific questions…

… and the answer varies depending on which data you use.

Census yields
(Food and Agriculture Organization)

How weather determines yields is one of the oldest scientific questions…

… and the answer varies depending on which data you use.

Census yields
(Food and Agriculture Organization)

vs.

Remote-sensed yields
(Contiguous Solar Induced Fluorescence)

How weather determines yields is one of the oldest scientific questions…

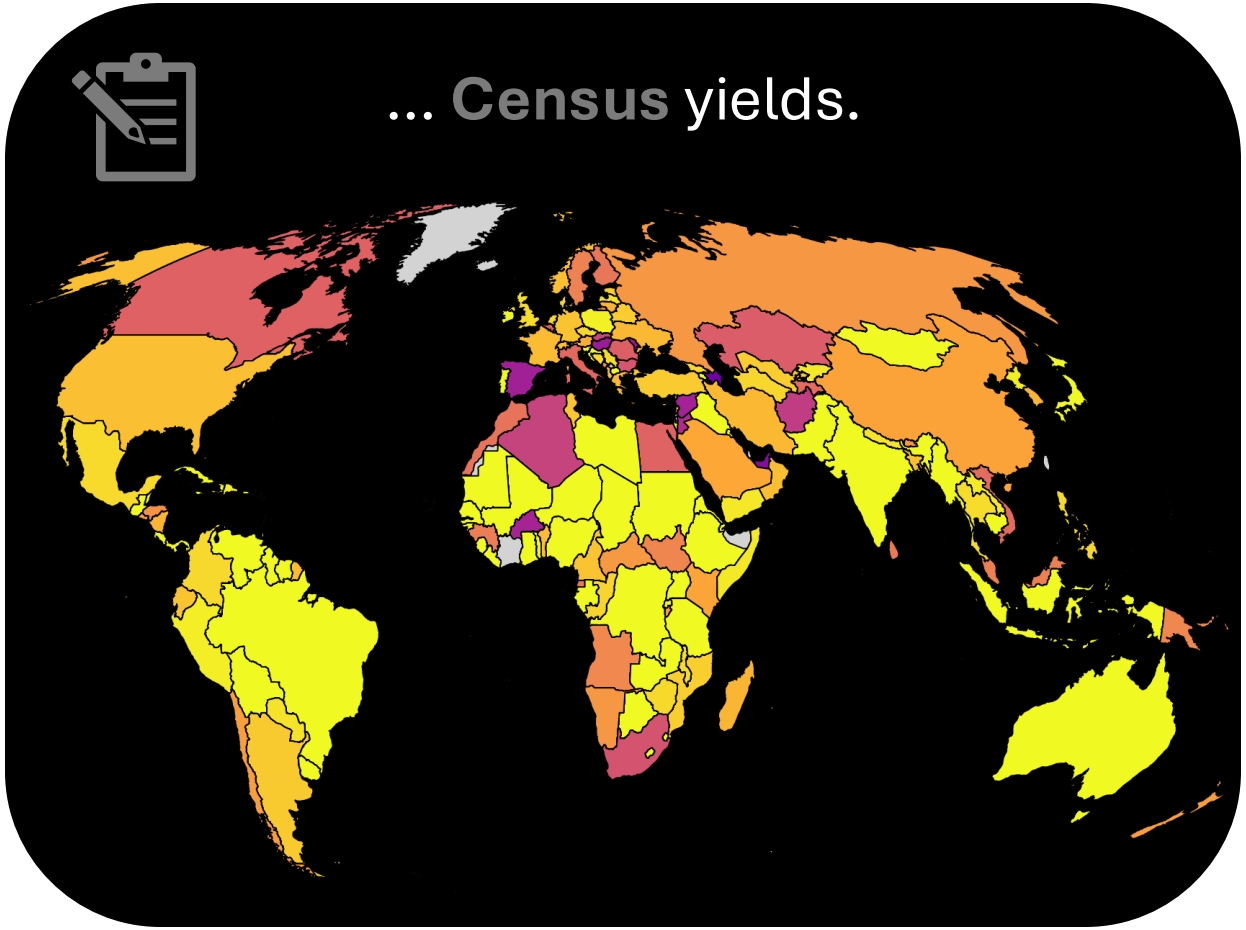
… and the answer varies depending on which data you use.

Year-to-year yield variability explained by weather, when using…

… **Census** yields.

$$log(C_{ij})' = c + \alpha_1 T'_{ij} + \alpha_2 T'^2_{ij} + \beta_1 SM'_{ij} + \beta_2 SM'^2_{ij} + \epsilon_{ij}$$

Year-to-year yield variability explained by weather, when using…



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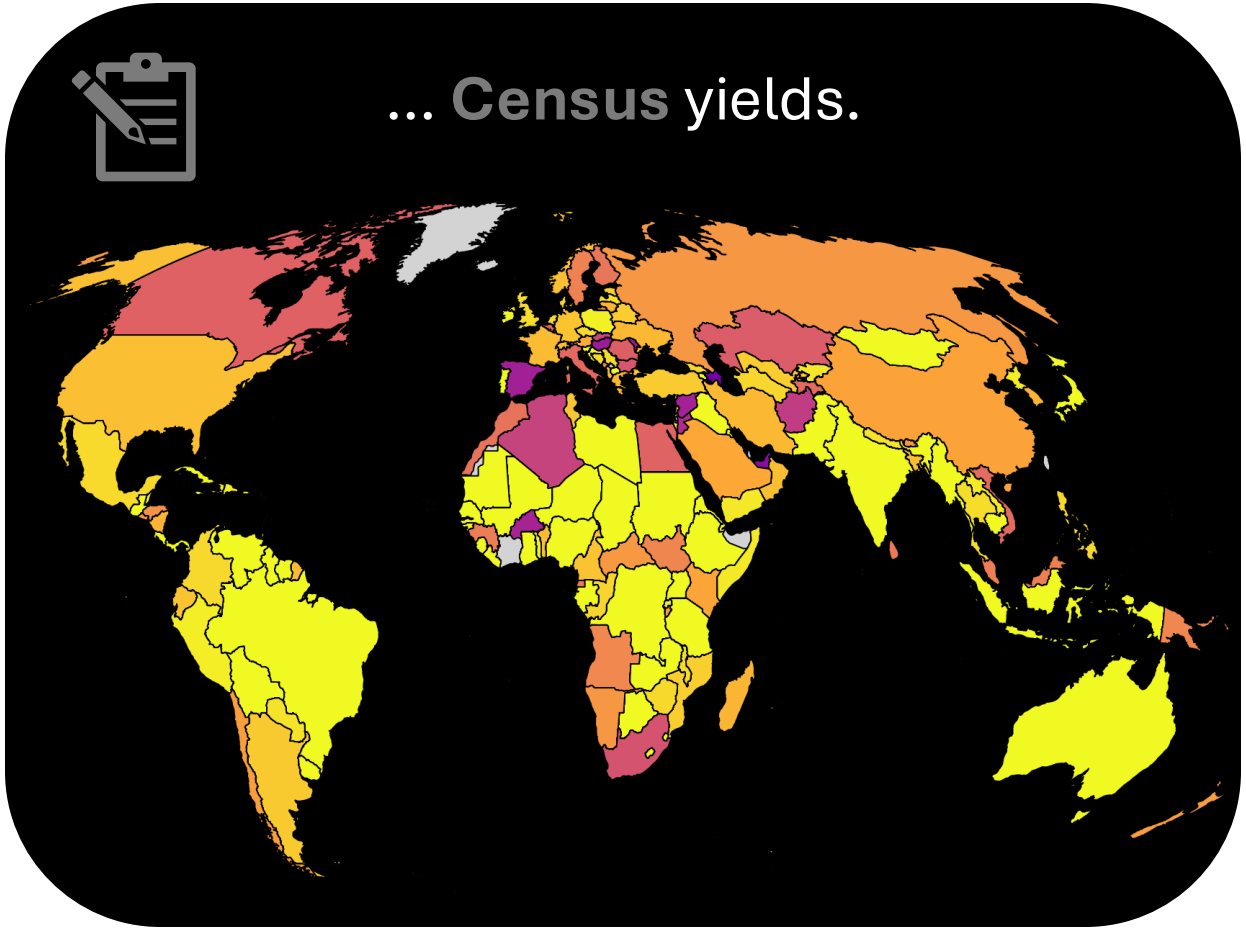
Adj. R2

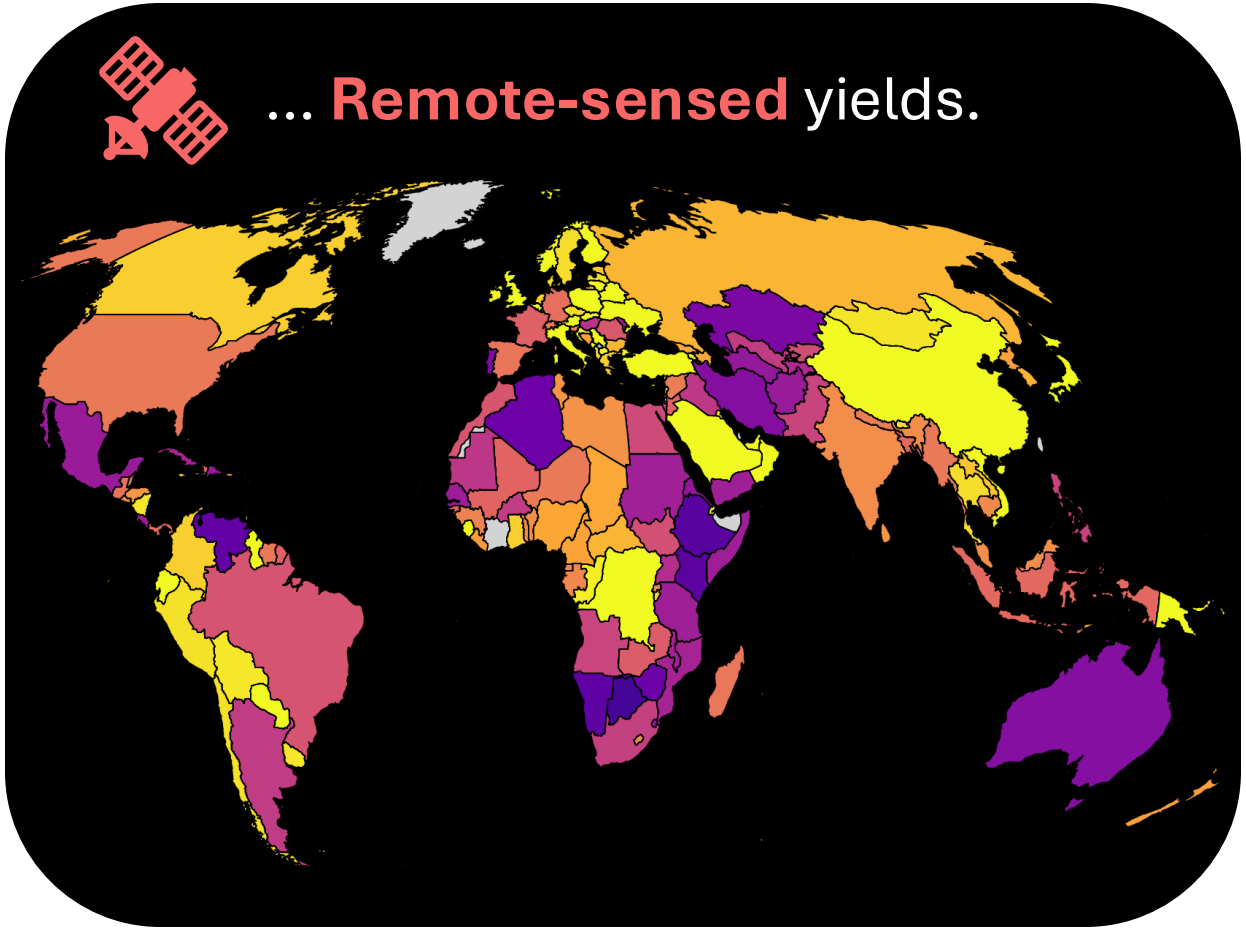
0.00 0.25 0.50 0.75 1.00

Not explained by weather

Perfectly explained by weather

Year-to-year yield variability explained by weather, when using...





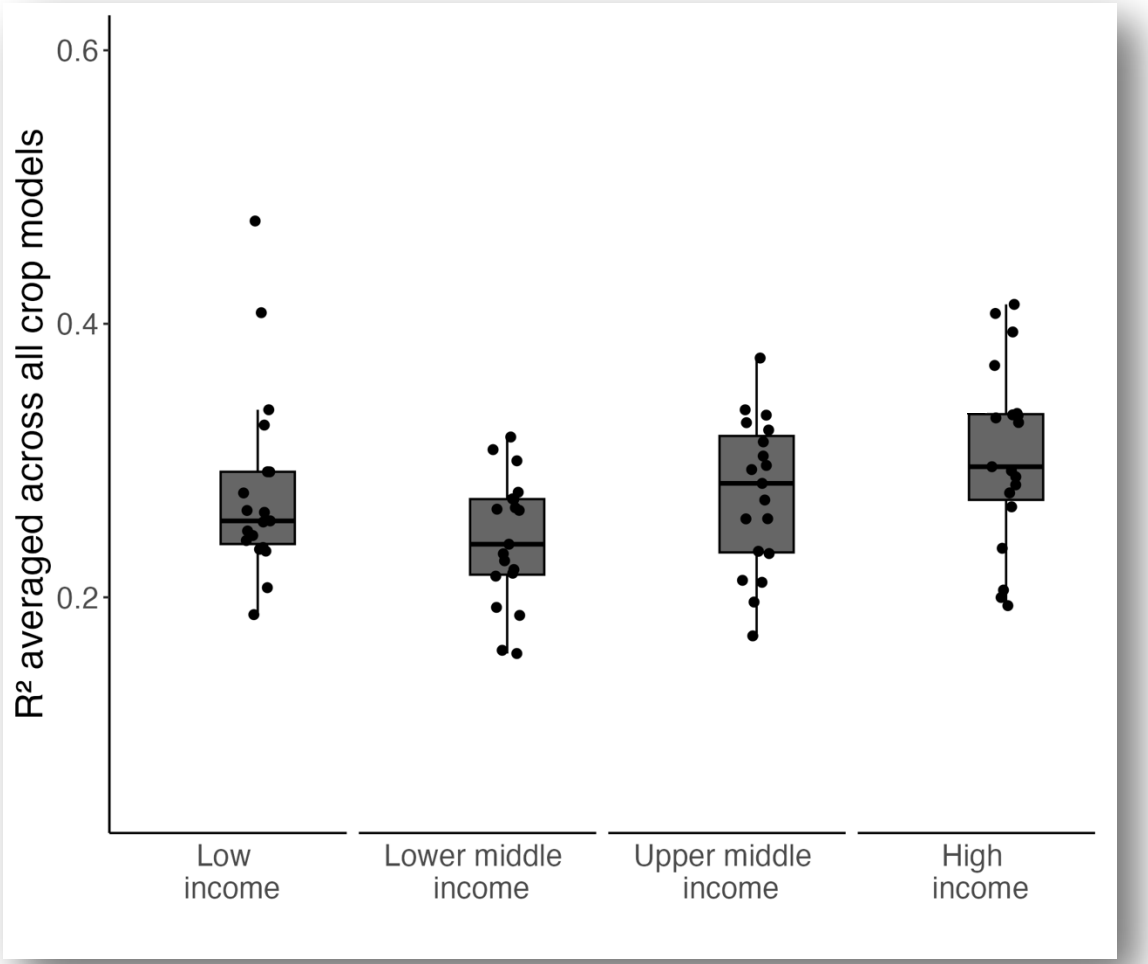
Adj. R2

0.00 0.25 0.50 0.75 1.00

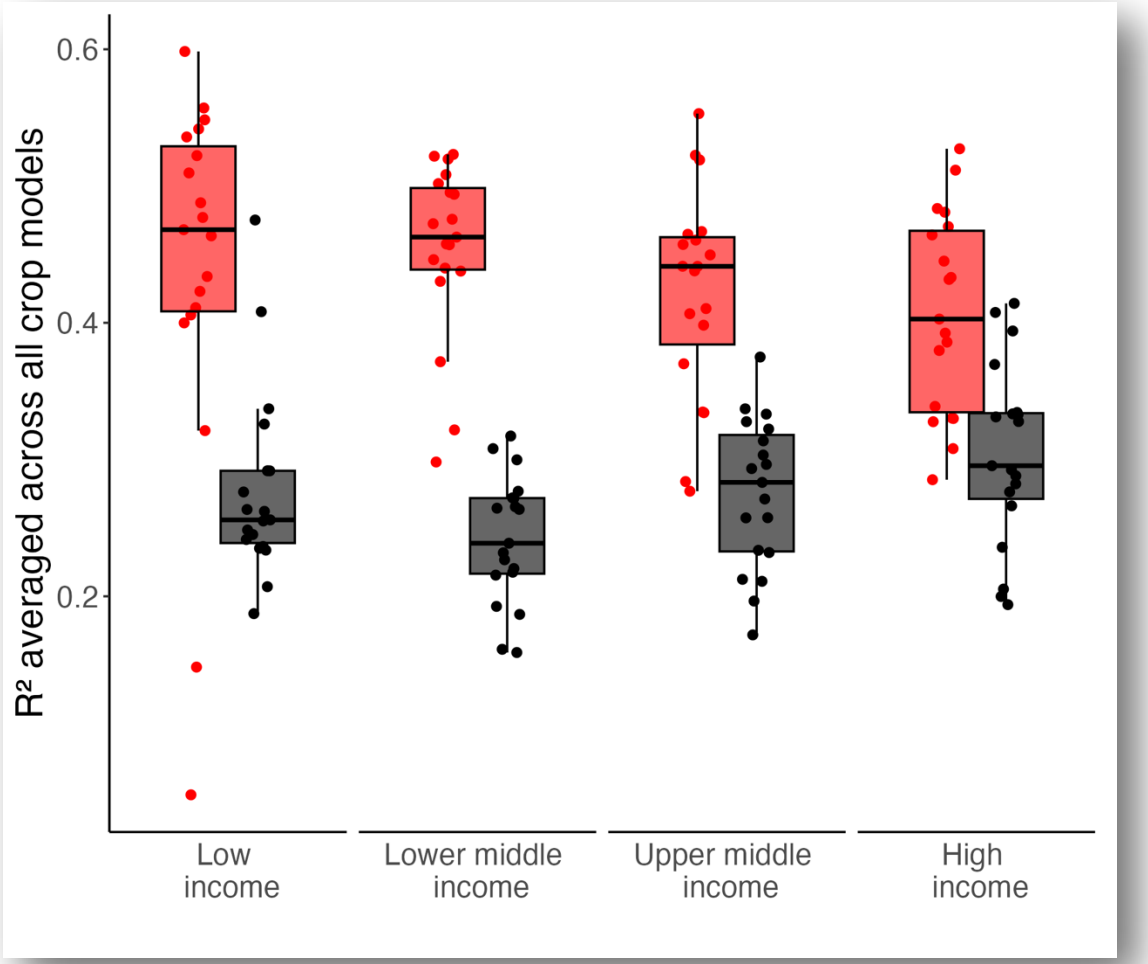
Not explained by weather

Perfectly explained by weather

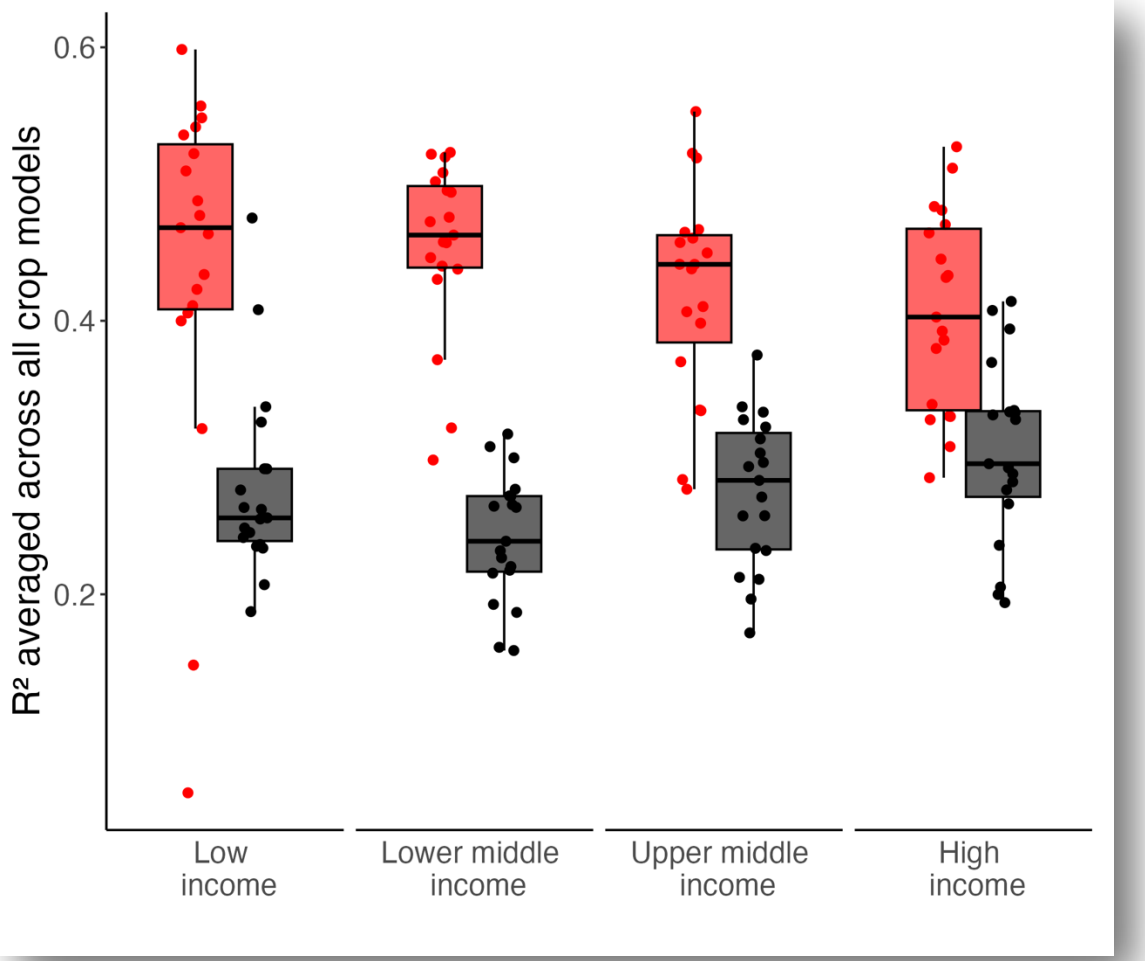
Census yield variability attributable to weather remains constant across class.

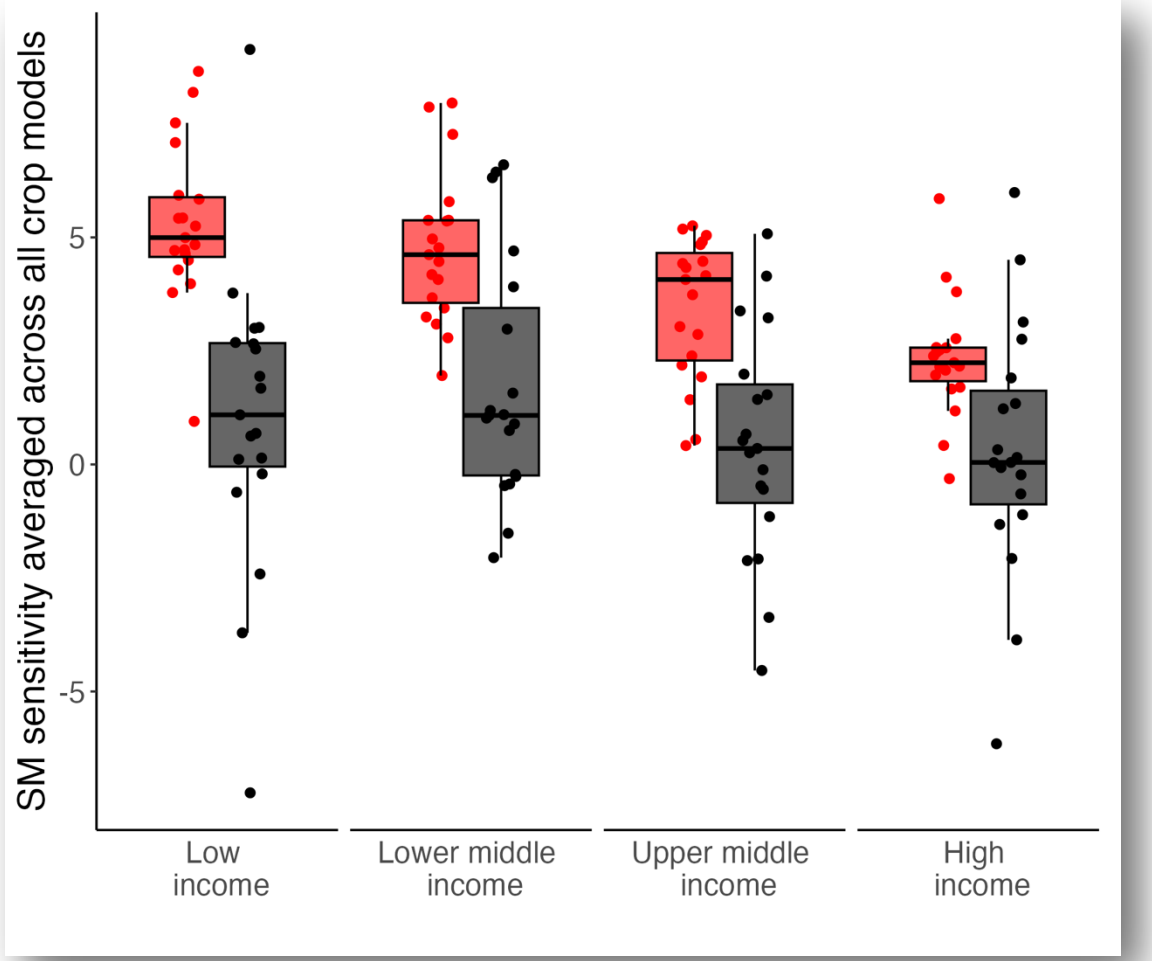


Remote-sensed (but not **census**) yield variability attributable to weather follows an income gradient.



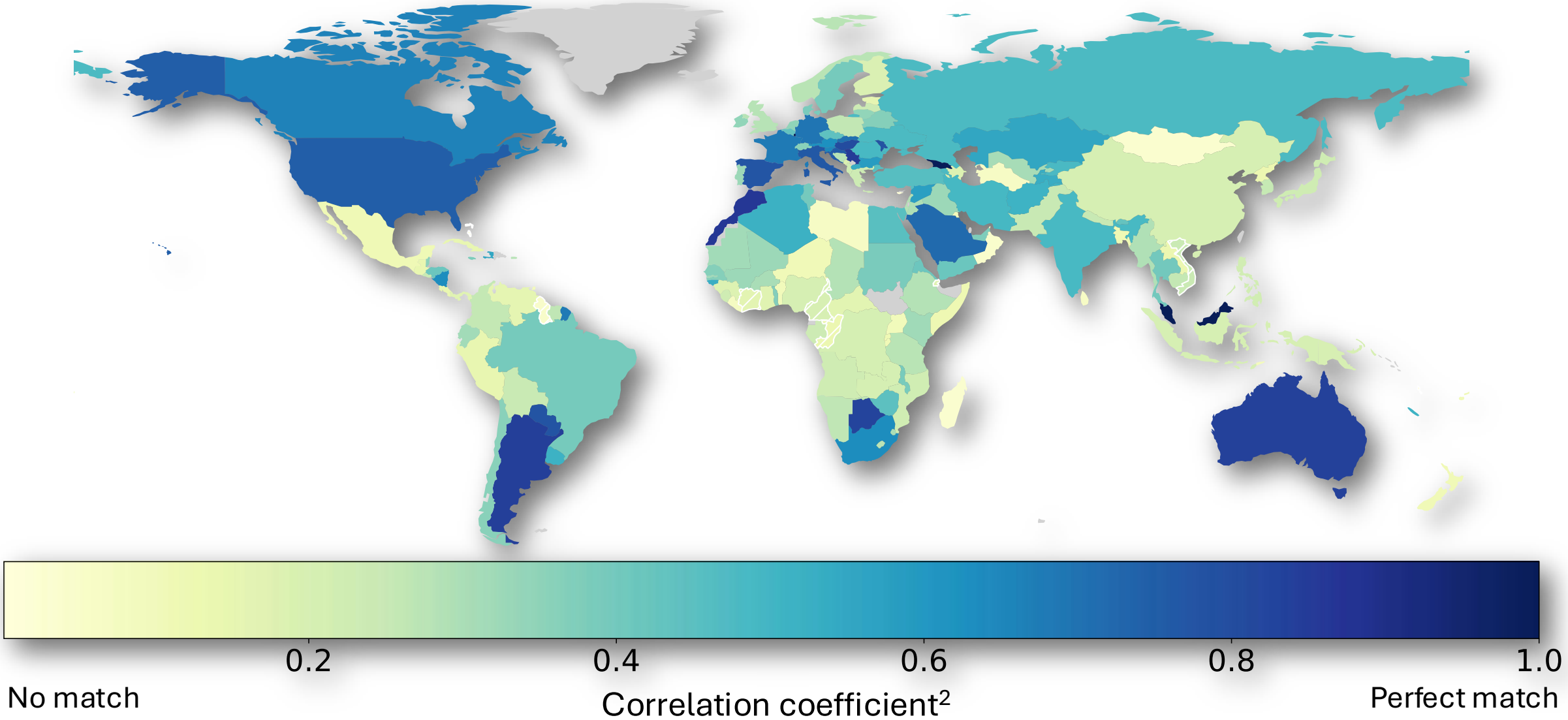
Depending on which yield you use, you will get **two very different stories** about how climate change will impact future food security.





What explains the discrepancy between the **census** yields and the **remote sensed** yields?

In wealthier countries, census and remote-sensed yields match better.



Global All-crop Bayesian Mixed Model (beta distribution)

	Correlation coefficient[2]	
Predictors	*Estimates*	*CI (95%)*
Intercept (Class: High income)	0.18***	0.16 – 0.21
Class: Low income	0.76***	0.61 – 0.93
Class: Lower middle income	0.77***	0.65 – 0.92
Class: Upper middle income	0.81***	0.68 – 0.96
Time offset: lag	0.66***	0.58 – 0.75
Time offset: lead	0.68***	0.60 – 0.77
FAO flagged percentage	0.91***	0.85 – 0.96
Total harvested area	1.09***	1.04 – 1.15
Average harvested area	1.06***	1.00 – 1.13
Cropland fraction	1.11***	1.03 – 1.18
Average CSIF	0.92***	0.86 – 0.98

Random Effects

σ^2	1.00
$\tau_{00\ country}$	0.06
$\tau_{00\ crop}$	0.03
ICC	0.08
$N_{\ crop}$	19
$N_{\ country}$	160
Observations	1568
Marginal R^2 / Conditional R^2	0.092 / 0.153

** p<0.05 ** p<0.01 *** p<0.001*

Higher income, fewer data flags, and larger cropland area are all associated with a higher correlation between **census** yields and the **remote sensed** yields.

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Observations	1568
Marginal R^2 / Conditional R^2	0.092 / 0.153

*$p<0.05$ **$p<0.01$ ***$p<0.001$

So… which yield yields the true yield?

So… which yield yields the true yield?

Peter Huybers

Michael Foley

Weston Anderson
Kyle Davis
Steffen Ehrmann
Rafaela Flach
Andy Hultgren
Carsten Meyer
Caro Park
Jonathan Proctor
Deepak Ray
Liangzhi You

THE METHANE CHALLENGE FROM LIVESTOCK IN THE GLOBAL SOUTH

Robert Paarlberg

Sustainability Science, Harvard Kennedy School

Salata Institute for Climate and Sustainability

GLOBAL FOOD+

May 2, 2025

Percent of Methane Emissions from Cattle Coming from Global South

In Dairy Production:

71 Percent

- In Beef Production:

76 Percent

Methane Emissions in Global South, *Per Unit of Output*, Compared to USA

India

- Emissions from dairy **ten times** as high as in USA

Brazil

- Emissions from beef **three times** as high as in USA

FEED ADDITIVE SOLUTIONS?

RED SEAWEED

BOVAER

CONFINED CATTLE FEEDING: COSTS AND BENEFITS *PER UNIT OF OUTPUT*

BENEFITS:

- Lower methane emissions
- Reduced forest loss from pasture expansion
  - Lower CO_2 emissions
  - More habitat and biodiversity protection
- Higher producer income

COSTS:

- Reduced animal welfare?

Megan Elias

Story Map

Cattle Slaughterhouses and Deforestation in Brazil

Edson Severnini (Boston College and NBER)
(with Daniel Da Mata and Mario Dotta – FGV São Paulo)

May 2, 2025

Motivation

- Limited state capacity is ubiquitous in the developing world
  - e.g., affect law enforcement and provision of public goods
- Policies that outsource state functions to market players under incentive compatibility constraints may partially address that limitation
- We study this issue in the context of cattle ranching and slaughterhouse operations in Brazil
  - Brazil is a major player in beef markets, accounting for roughly 20% of all world beef exports (OECD/FAO, 2022)
  - slaughterhouse openings may stimulate cattle ranching, which may lead to deforestation and other land-use changes
  - instead of targeting ranchers, strained federal prosecutors decided to go after slaughterhouses, outsourcing monitoring and enforcement to key nodes of the supply chain
  - limited capacity to enforce environmental laws led to extrajudicial agreements between prosecutors and slaughterhouses

This paper

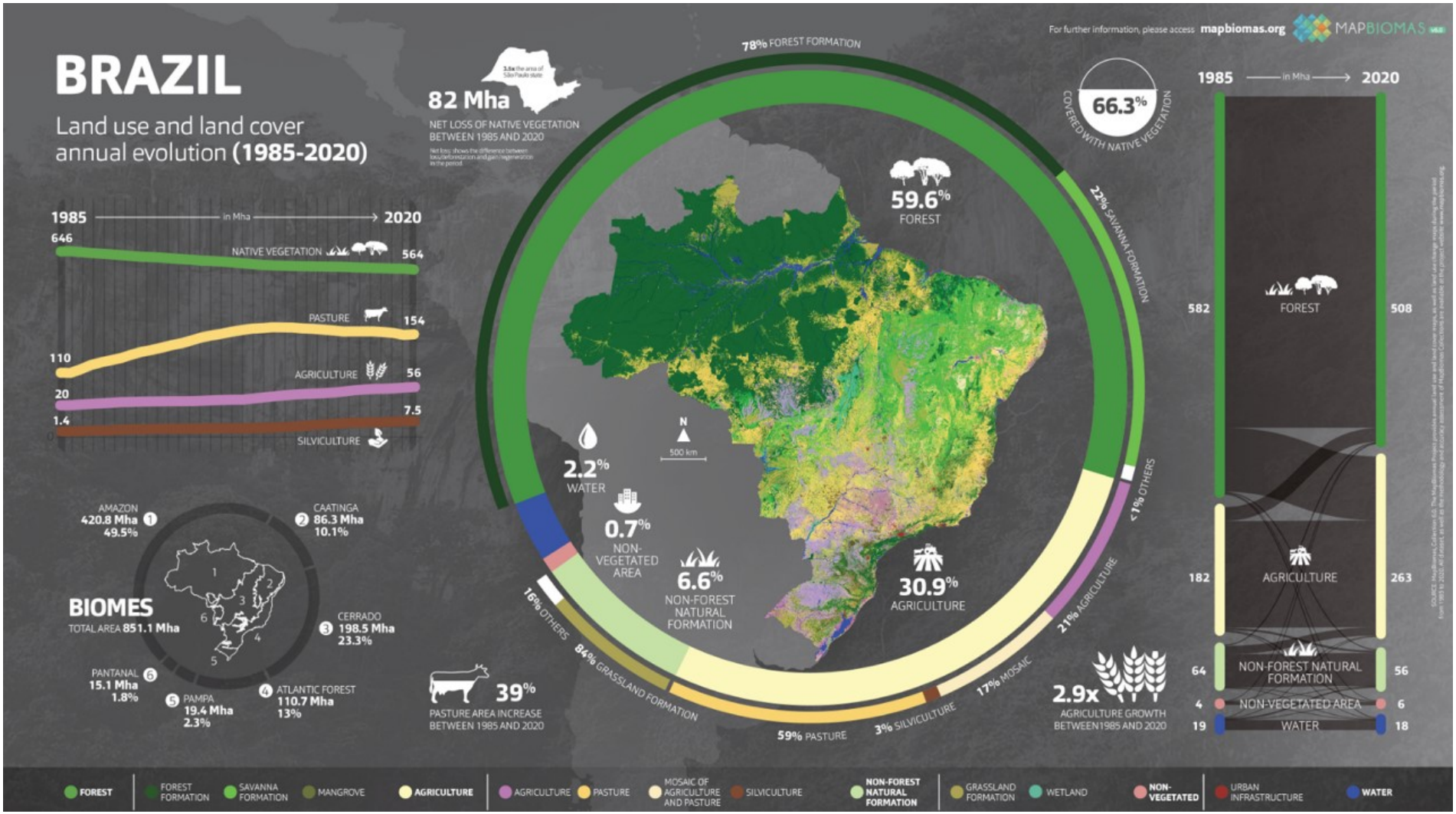
We use comprehensive Brazilian data and a staggered DiD approach (Callaway and Sant'Anna, 2021) to examine:

1. impacts of opening new slaughterhouses on cattle ranching and environmental outcomes from 1992-2019
2. effects of extrajudicial agreements (known as *TAC*) to avoid deforestation

Preview of results:

- Opening new plants do lead to land-use changes
  - ↑ cattle heads and pasture areas
  - ↑ deforestation
  - ↑ pasture degradation
- TAC agreements do avoid deforestation
  - – deforestation
  - ↓ pasture degradation
  - ↑ productivity

Background

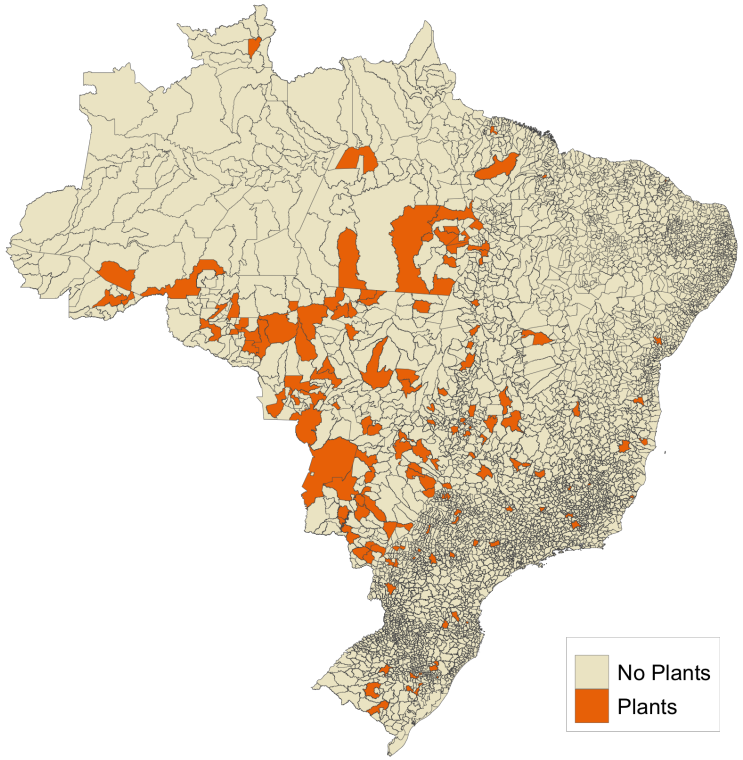


MapBiomas (2020)

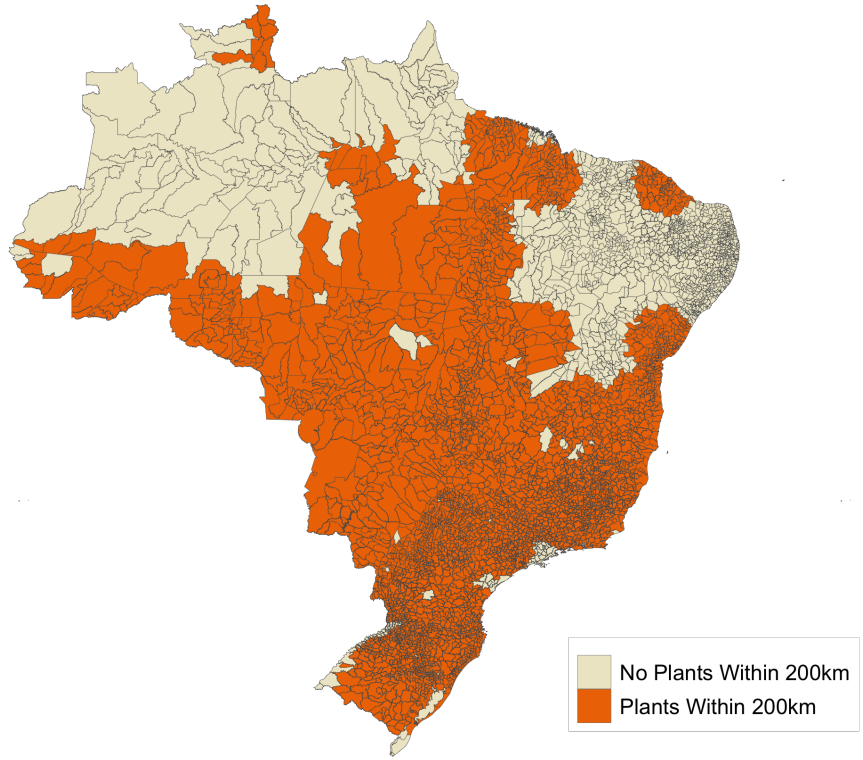
What a slaughterhouse looks like

SOURCE: Globo Rural (2021)

Municipalities with Slaughterhouse Plants (1992-2019)



Municipalities w/ Plants



Municipalities w/ Plants within 200km

Slaughterhouses linked to deforestation

Slaughterhouses linked to land degradation

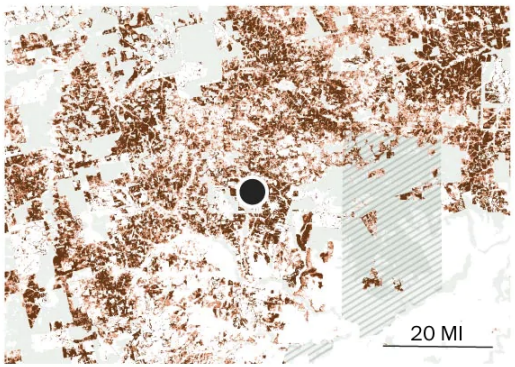
The Washington Post
Democracy Dies in Darkness

Level of damage in pasture areas around JBS meatpacking plants

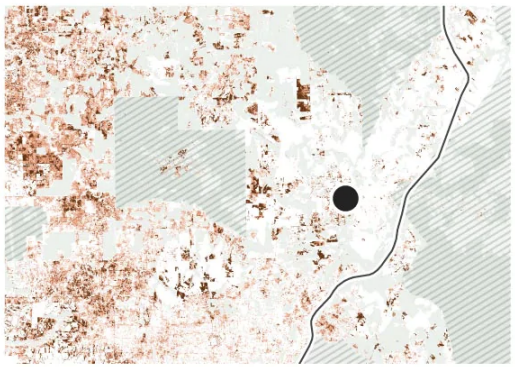
Moderate Severe

Meatpacking plants Indigenous territory

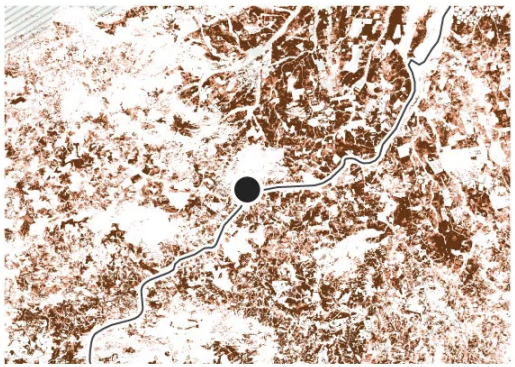
1 **Confresa,** Mato Grosso



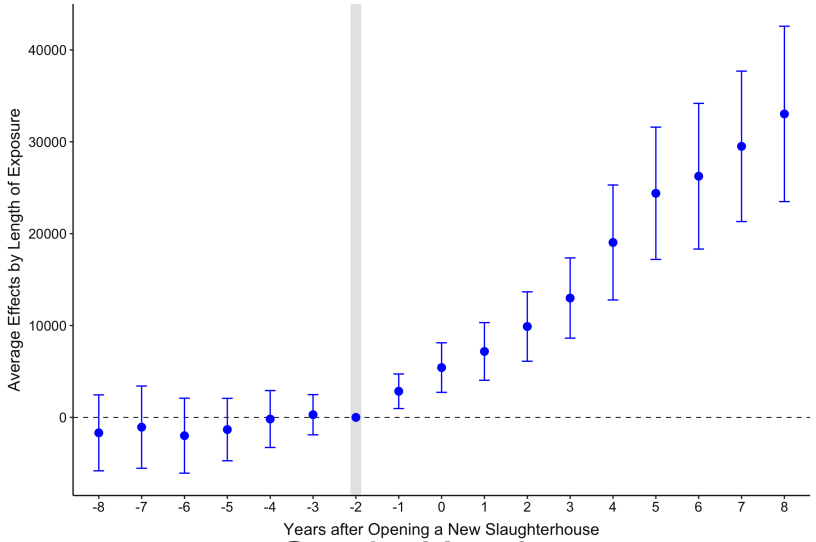
2 **Vilhena,** Rondônia



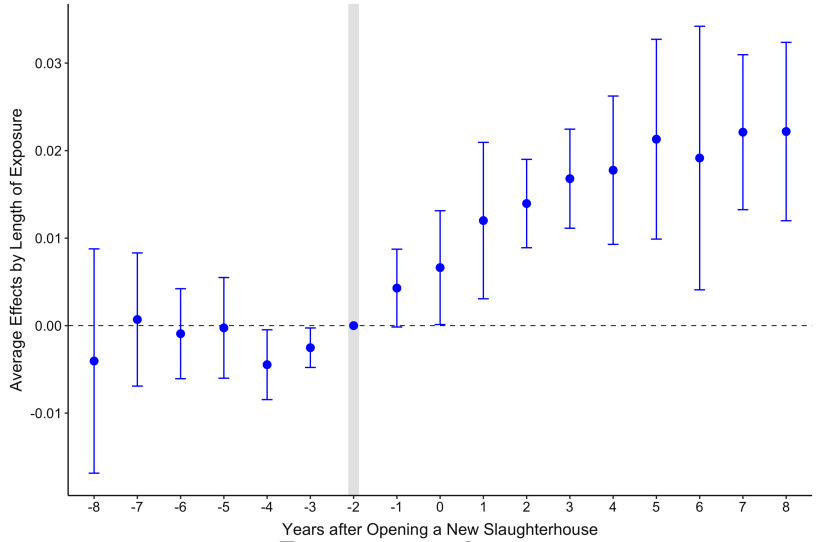
3 **Barra do Garças,** Mato Grosso



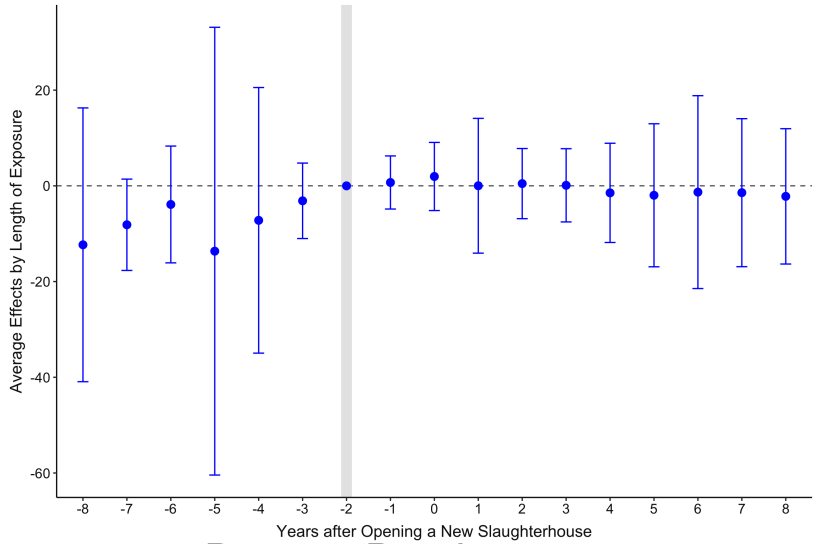
Results: Production Response to Slaughterhouse Openings



Cattle Heads



Pasture Area



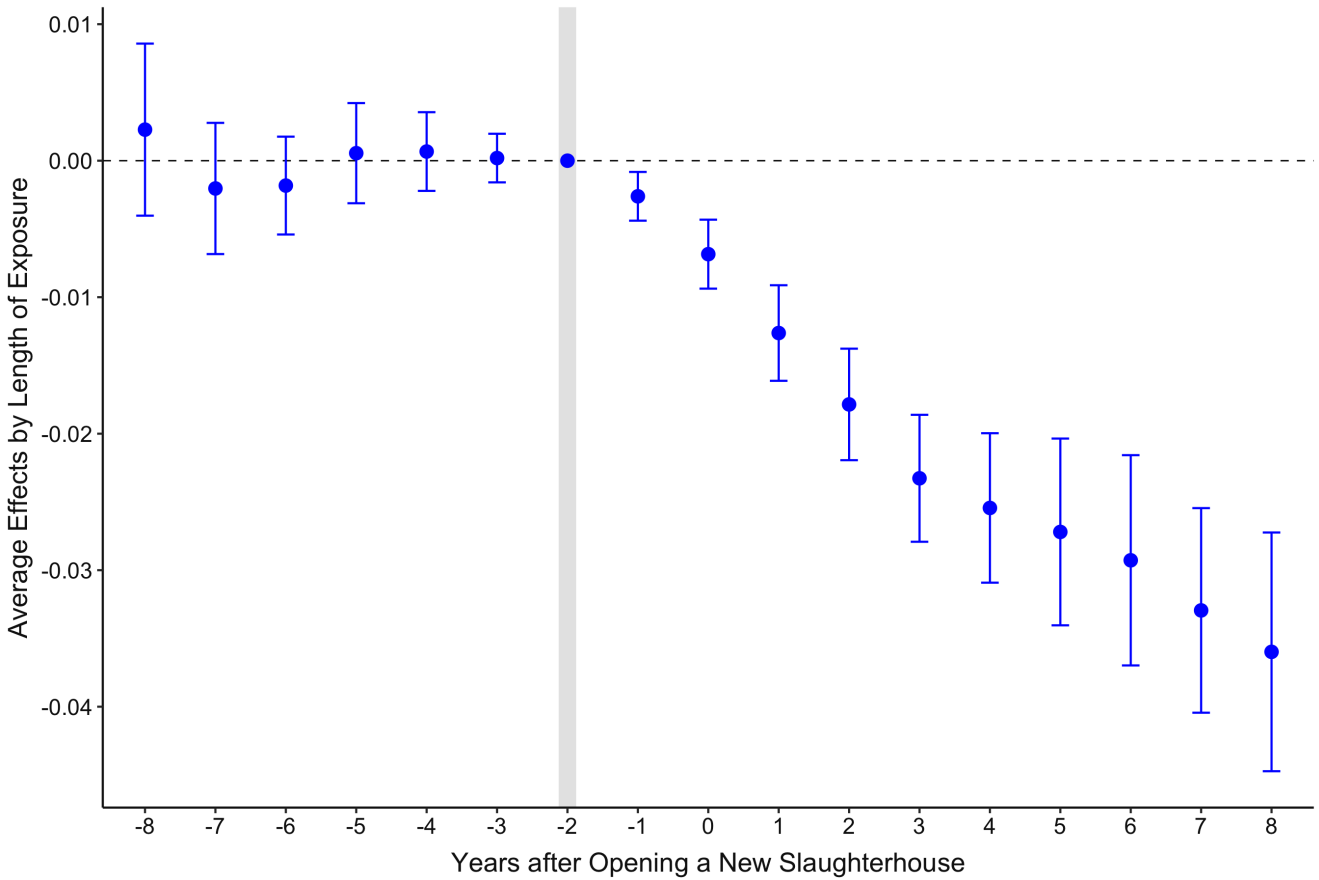
Bovine Productivity

Example of Extensive Pasture Area

Figure: Extensive Pasture Areas with Cattle

By Valdir Pacheco

Deforestation Response to Slaughterhouse Openings

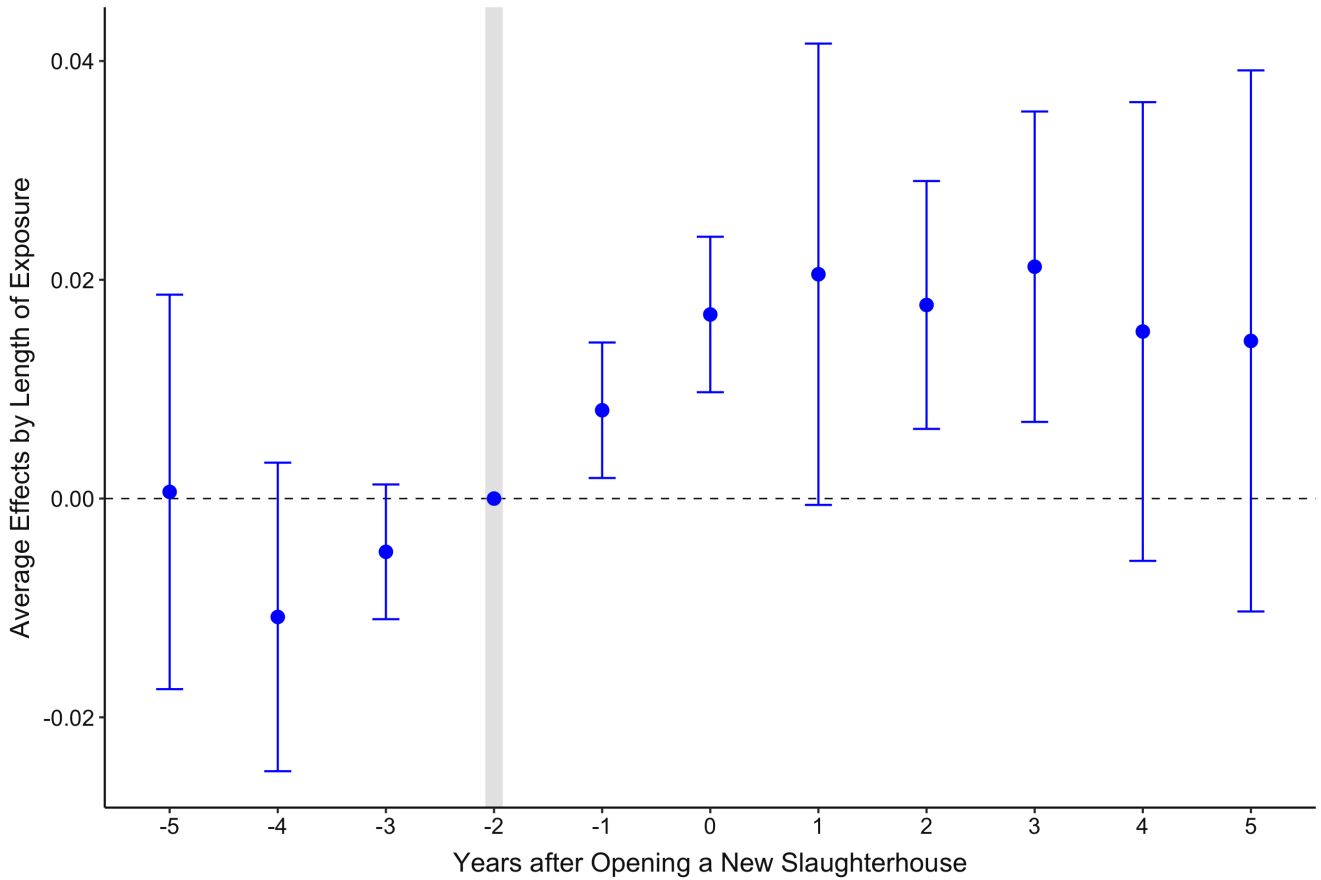


Natural Forest Areas

Example of Cattle Activity and Forest Areas

SOURCE: https://www.kcrw.com/news/shows/all-things-considered/npr-story/746192595

Land Degradation Response to Slaughterhouse Openings



Degraded Pastureland

Example of Degraded Pastureland

Figure: Degraded Pasture Area with Cattle

SOURCE: Compre Rural

Thus far – summary

- Opening new plants lead to land-use changes
  - ↑ cattle heads and pasture areas
  - ↑ deforestation
  - ↑ pasture degradation

We move to our next question: does *TAC* effectively outsource state capacity to market players and decouples deforestation from industrial activity?

Background on *TAC* (Termo de Ajustamento de Conduta)

- *TAC*: certification-like, legally-enforceable commitment
  - it is an agreement between public prosecutors and slaughterhouses
- In 2009, Brazil's government prosecuted slaughterhouses in the Amazon region for buying cattle of unknown origins (Barreto et al., 2017)
- Greenpeace also launched a global campaign to raise awareness that Brazilian slaughterhouses were associated with illegal deforestation
- To avoid legal measures, slaughterhouses signed *TACs* and agreed on buying cattle only from farms that:
  - did not deforest after 2009
  - were not located in Protected Areas
  - were registered on CAR (environmental registry for rural properties)

International consumers care about beef origin

REUTERS® World Business Markets Sustainability Legal Breakingviews Technology Investigations

European supermarkets stop selling Brazil beef over deforestation links

By **Jake Spring** and **Anthony Deutsch**

December 15, 2021 11:29 PM GMT · Updated 2 years ago

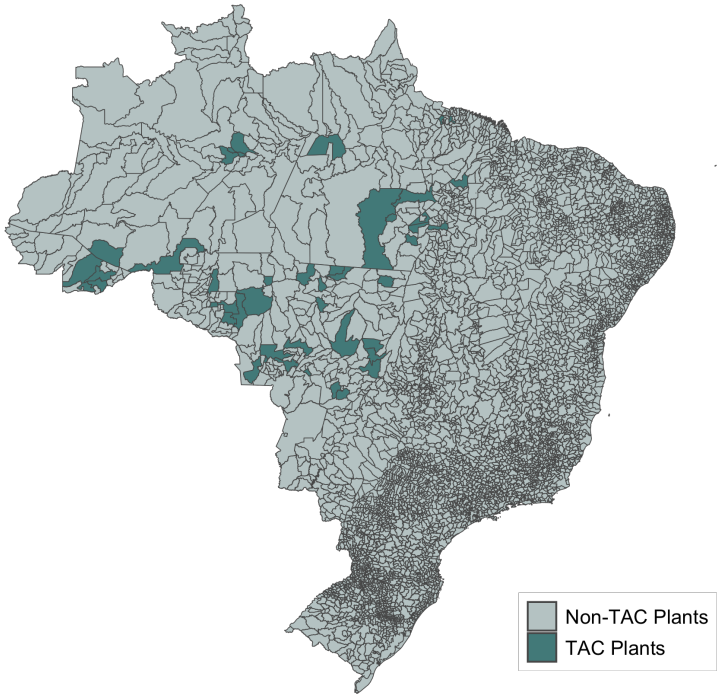
Brazilian consumers care about beef origin

58% dos brasileiros querem saber se carne está relacionada com o desmatamento da amazônia

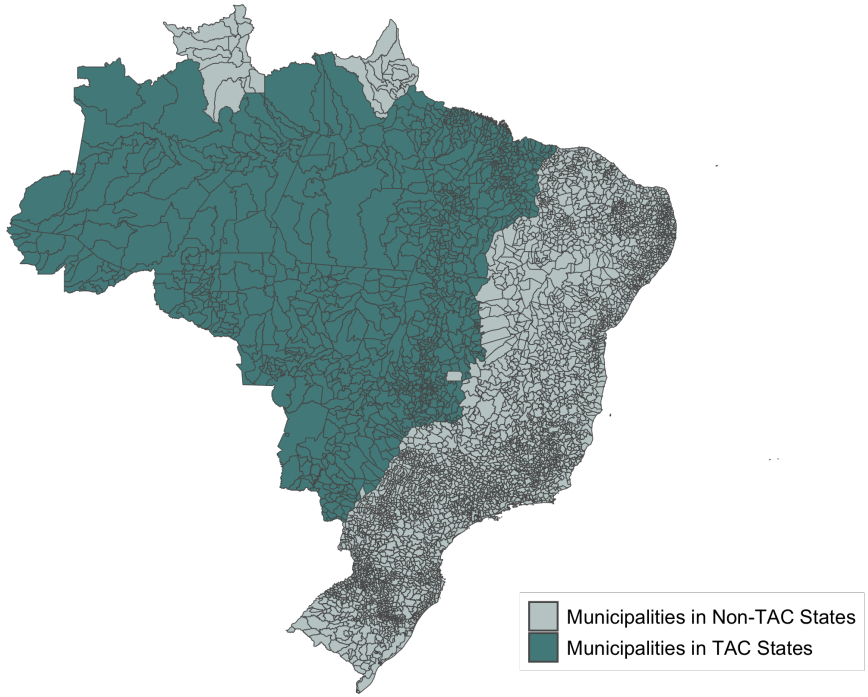
Pesquisa, realizada pelo Reclame AQUI, foi encomendada pelo Radar Verde trazer mais transparência para a cadeia da carne

JULIANA TINOCO · 30 de julho de 2022 · 1 anos atrás

Municipalities with Slaughterhouses with TACs



Municipalities with at least one
TAC-signatory Slaughterhouse Plant



Municipalities in States with at least
one TAC-signatory Slaughterhouse Plant

Opening Effects on TAC and Non-TAC Areas

Table: Effects on Natural Forest Areas, Pasture Degradation, and Bovine Productivity

	Dependent Variable					
	Natural Forest Area		Degraded Pastureland		Bovine Productivity	
	TAC	Non-TAC	TAC	Non-TAC	TAC	Non-TAC
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
1 {Slaughterhouse}	0.0019	-0.0131***	-0.0161***	0.0144	0.8085***	4.3709
	(0.0074)	(0.0025)	(0.0053)	(0.0113)	(0.1996)	(6.7407)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Weather Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Socioeconomic Covariates	Yes	Yes	Yes	Yes	Yes	Yes

Notes. This table presents the overall summary of ATT's based on time/group/length of exposure aggregation according to Callaway and Sant'Anna (2021) for the following dependent variables: "Natural Forest Area / Municipality Area", "Severely Degraded Pastureland / Municipality Area", and "Bovine Productivity" (cattle counts divided pasture area). All columns take covariates into account. Control group is "not-yet-treated" and anticipation period equals 1. Statistical significance is given by *p<0.1; **p<0.05; ***p<0.01. We use data from 2009 to 2019.

Concluding Remarks

- Opening new plants has production and environmental impacts
  - **extensive** production increases
  - more forest area becomes pasture
  - pasture quality worsens
- However, under *TAC* enforcement, new openings lead to
  - improvement on pasture quality
  - no further deforestation
  - increased productivity
- Policy implications
  - Limited state capacity may be partially addressed with IC market players
    - ⋆ slow judiciary can align players' behavior w/ incentive compatibility constraints
  - For this particular setting, this affects licensing for slaughterhouses/ranchers
  - This may have numerous applications in developing nations
    - ⋆ developed nations already use this: online platforms may be liable for crimes committed through them

THANK YOU!

Questions? Comments?

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