D4N 2025

Delivering for Nutrition in South Asia

Towards Impact at Scale

Linking production diversity, commercialization, and diet quality: a multi-level food systems analysis from South Asia

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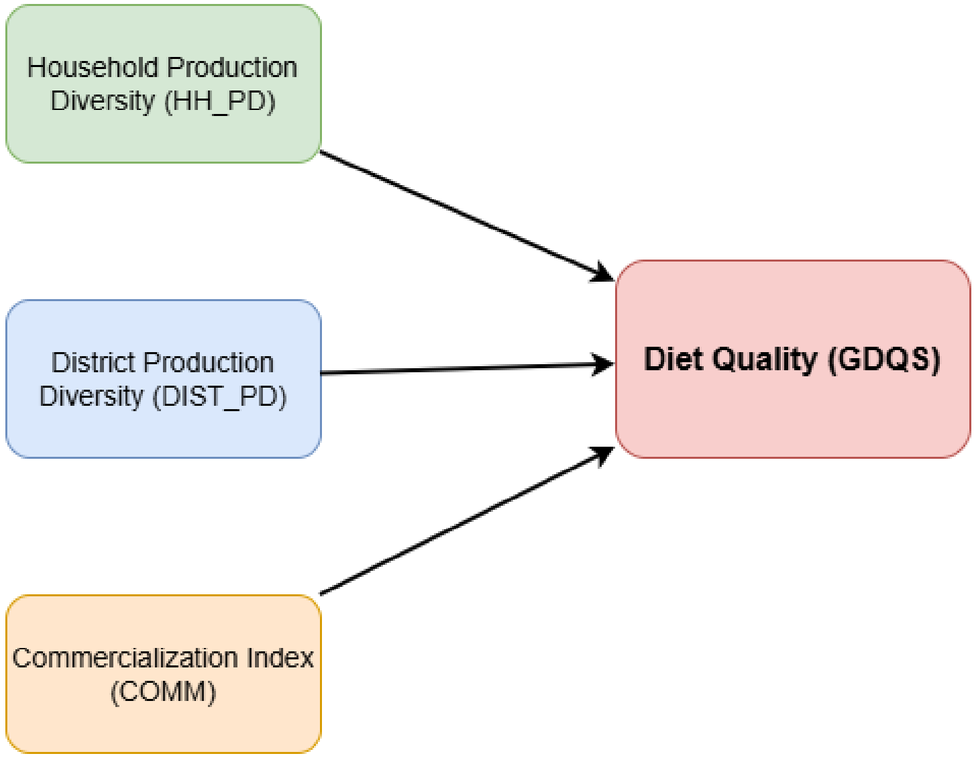
Background

- **Problem statement:** Malnutrition persists despite agricultural production growth in South Asia.
- **Knowledge gap:** Unclear how farm-level diversity, district-level diversity, and commercialization interact to shape diets.
- **Objective:** Examine how production diversity at multiple levels and market orientation influence household diet quality (GDQS).
- **Rationale:** Inform multi-level, nutrition-sensitive food system strategies.



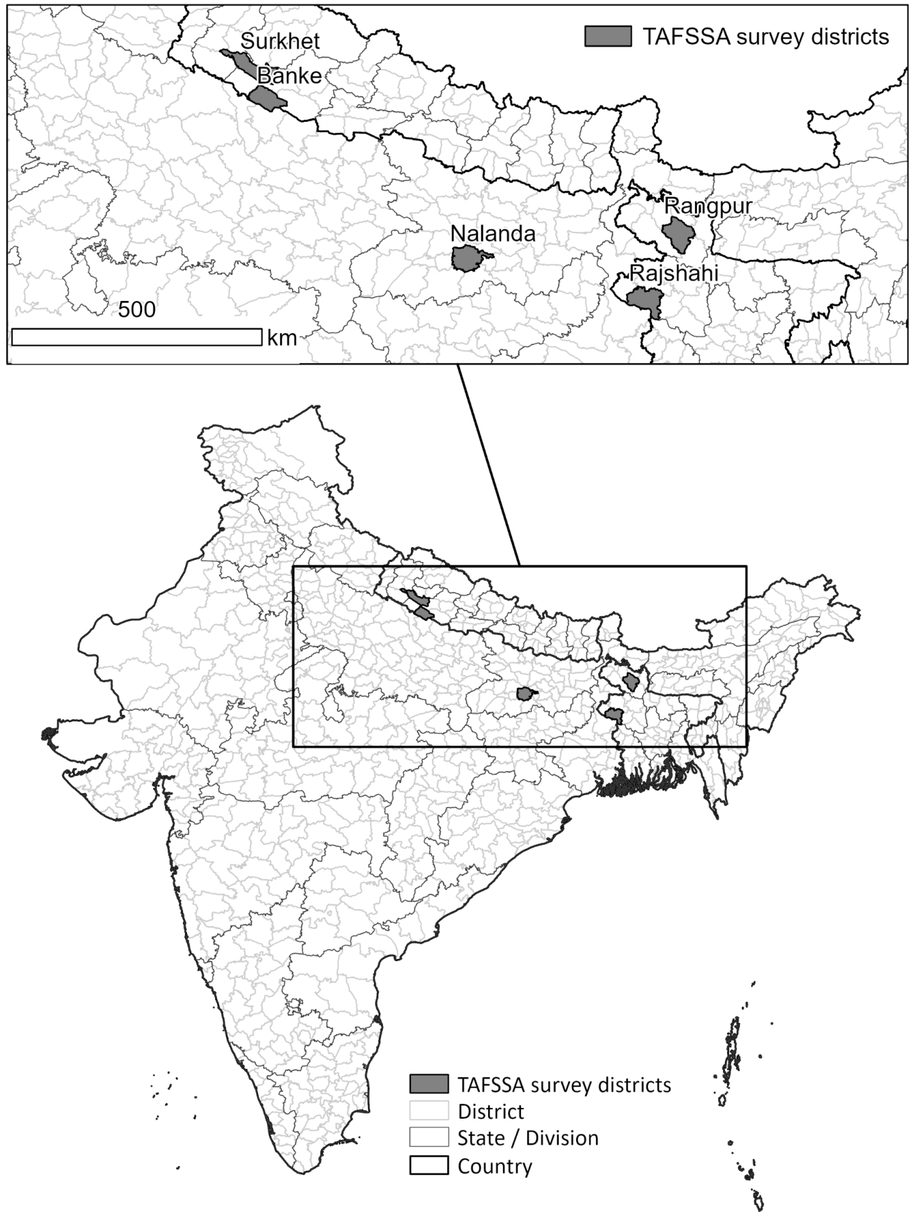
Data and Methods

Data sources:

- Household survey (n=2,708, 2023)[1]
- District-level production data (2015–2021, 5 districts)[2]

Variables:

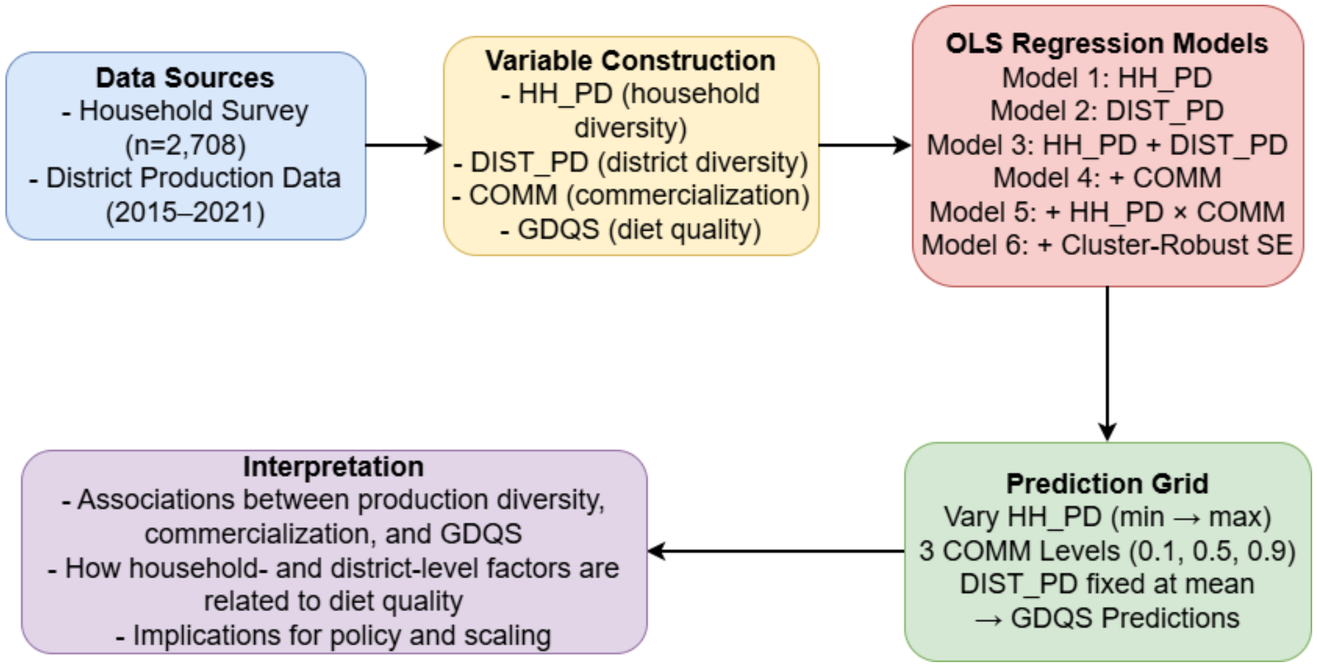
- Diet quality (GDQS)
- Household production diversity (HH_PD)
- District production diversity (DIST_PD)
- Commercialization index (COMM)



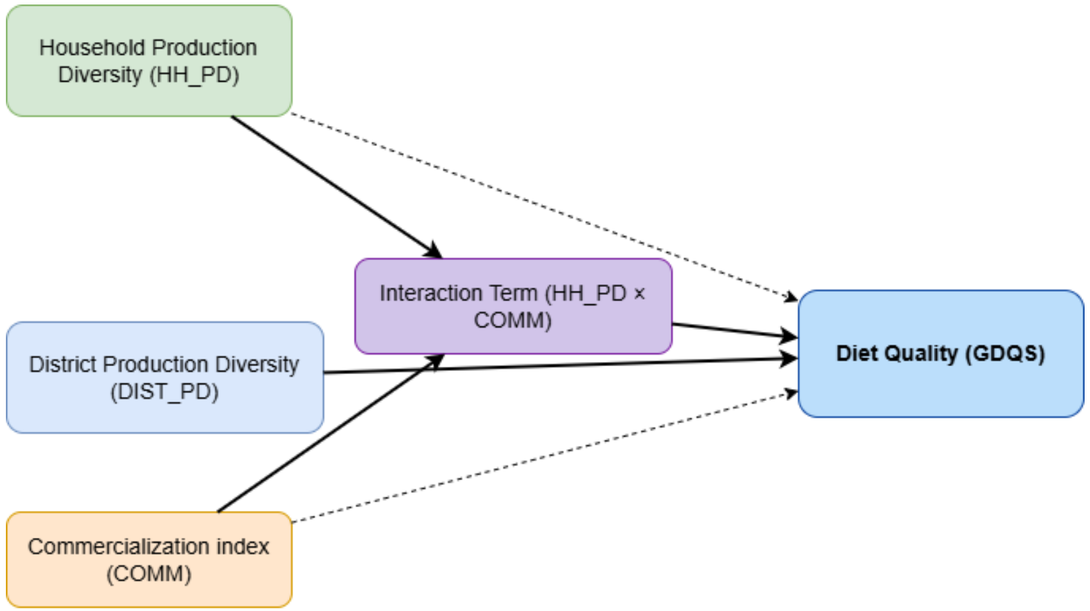
1
Agricultural production and use in Banke, Surkhet, Nalanda, Rangpur and Rajshahi
Open-access agrifood system data TAFSSA

2
Landscape level agrobiodiversity data and production diversity
https://cgspace.cgiar.org/items/1c87956a-e7b0-4d5c-a33c-3c1d0939d2a5
https://southasia.ifpri.info/files/2024/12/9.-Mustafa-Kamal_Rapidfire-1.pdf

Data and Methods cont.



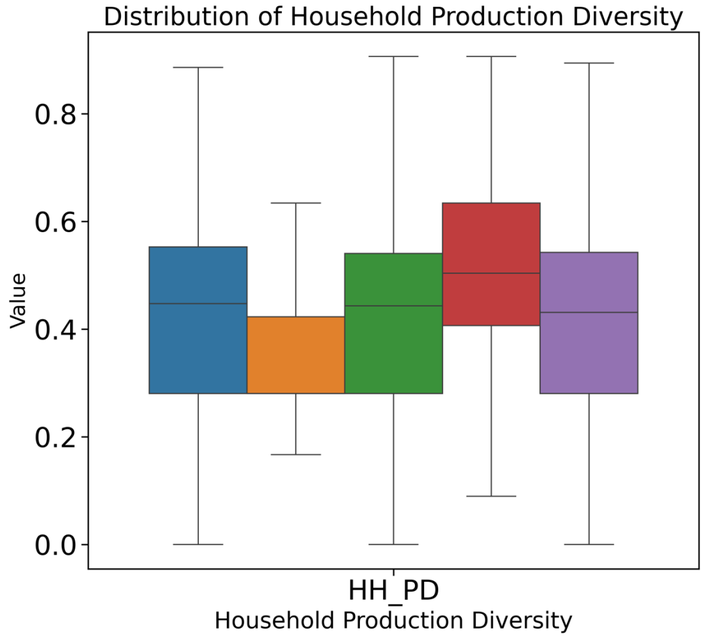
Modeling framework flowchart

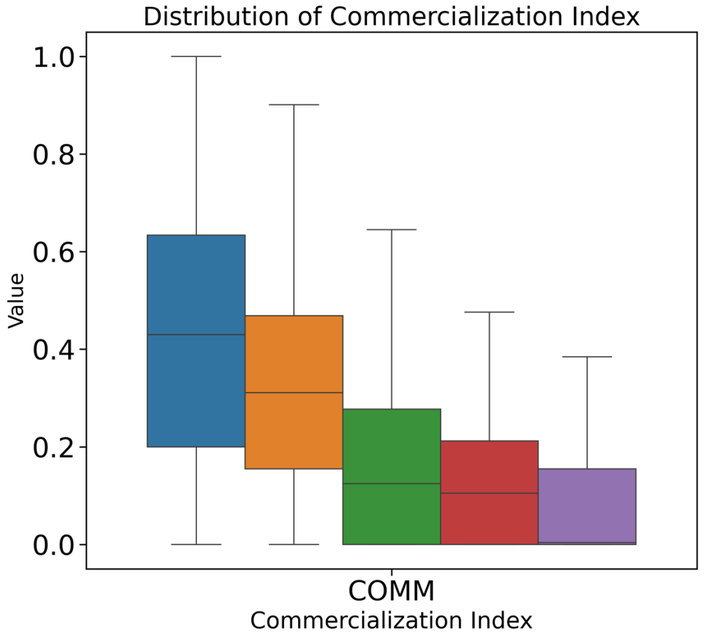


Interaction effect pathway

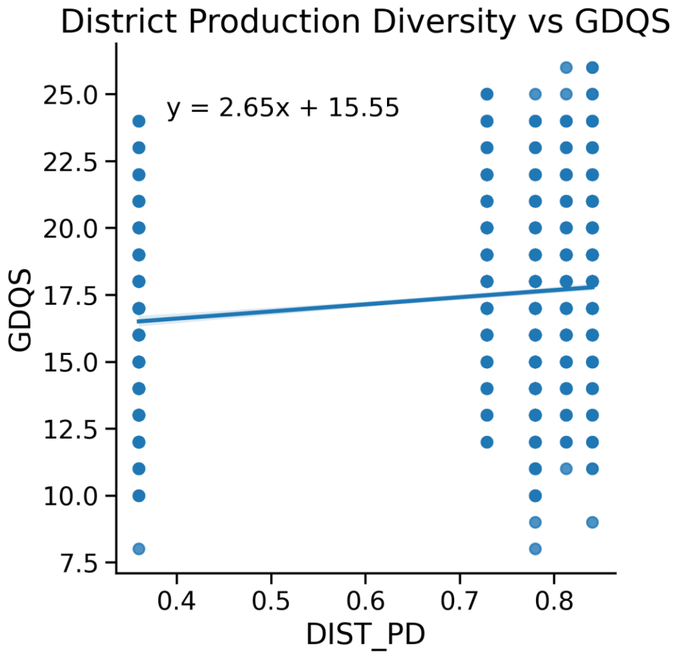
Data and Methods cont.

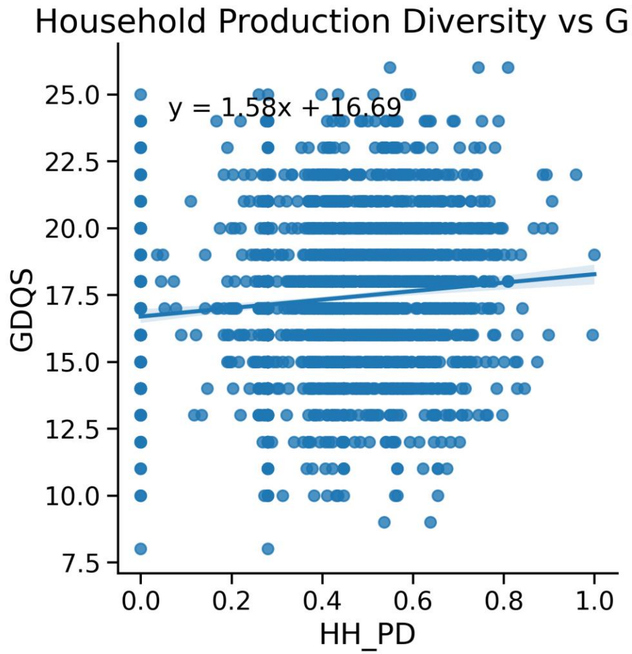
Variable	Notes
Global Diet Quality Score (GDQS)	Higher = better diet quality
Household production diversity (HH_PD)	Shannon index-based crop production diversity
District-level production diversity (DIST_PD)	Based on census production data
Commercialization index (COMM)	Value sold / total produced value

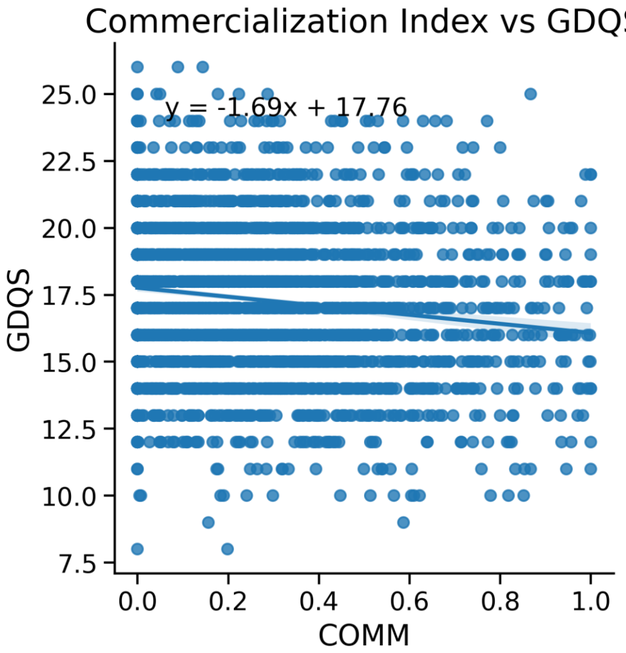




Results/findings







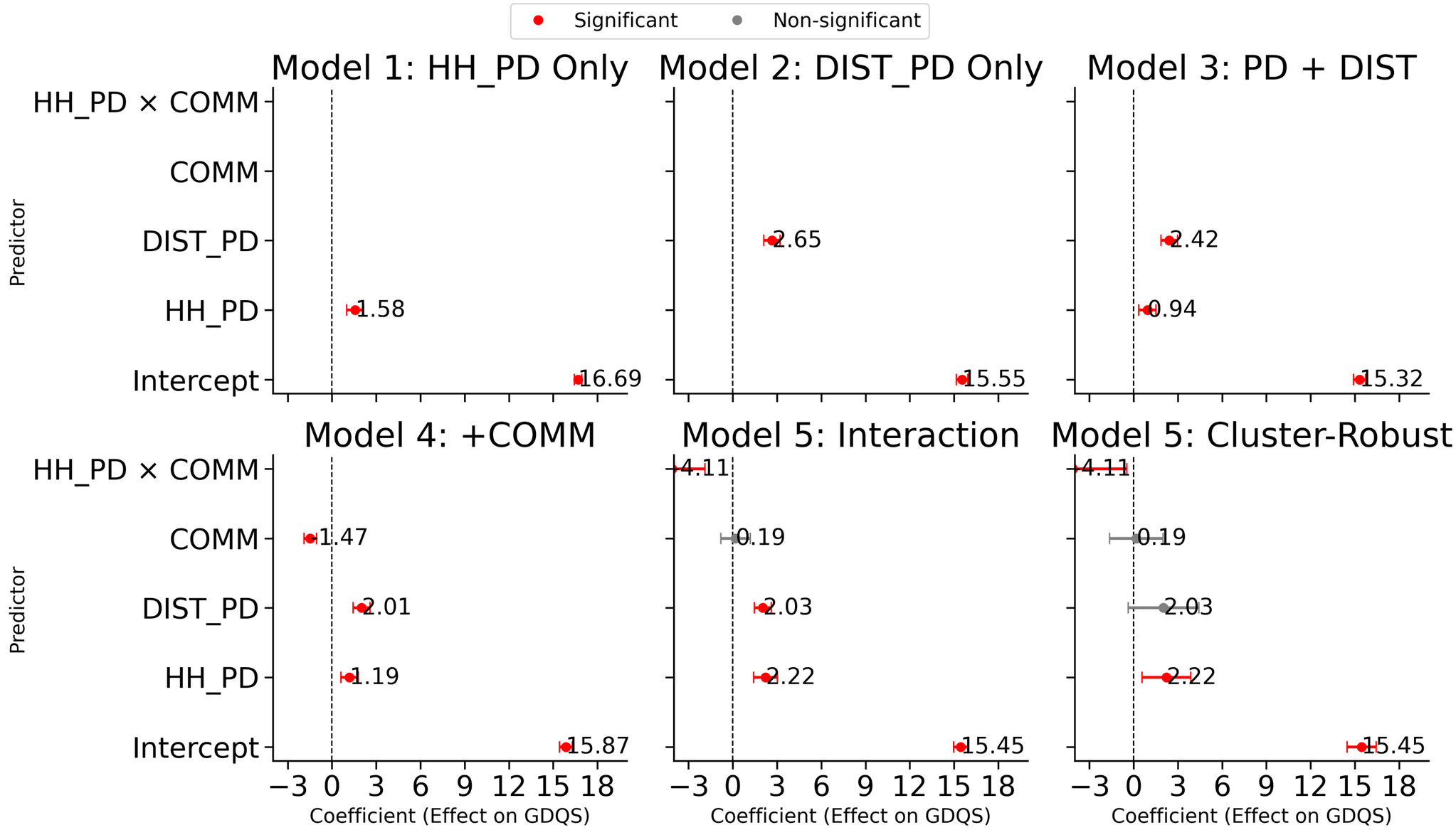
Results/findings: OLS, interaction, cluster-robust, and mixed-effects models Predicting GDQS

Predictor	Model 1: HH_PD Only	Model 2: DIST_PD Only	Model 3: PD + DIST	Model 4: +COMM	Model 5: Interaction	Model 5: Cluster-Robust	Mixed Effects (5 districts)
Intercept	16.690 (0.130)***	15.549 (0.195)***	15.324 (0.207)***	15.868 (0.221)***	15.453 (0.249)***	15.453 (0.502)***	15.226 (2.093)***
HH_PD	1.581 (0.292)***	–	0.940 (0.298)**	1.192 (0.298)***	2.222 (0.412)***	2.222 (0.839)**	0.474 (0.414)
DIST_PD	–	2.654 (0.280)***	2.421 (0.289)***	2.012 (0.293)***	2.031 (0.292)***	2.031 (1.218)	2.834 (2.877)
COMM	–	–	–	-1.467 (0.219)***	0.188 (0.508)	0.188 (0.921)	0.495 (0.487)
HH_PD × COMM	–	–	–	–	-4.105 (1.137)***	-4.105 (1.859)*	-0.638 (1.120)
R^2 / Adj R^2	0.011 / 0.010	0.032 / 0.032	0.036 / 0.035	0.051 / 0.050	0.056 / 0.055	0.056 / 0.055	–
Observations	2708	2708	2708	2708	2708	2708	2708

HH_PD = Household-level production diversity;
DIST_PD = District-level production diversity;
COMM = Commercialization index;
HH_PD × COMM = interaction term.

* p < 0.05, ** p < 0.01, *** p < 0.001
(Standard errors in parentheses)

Results/findings: effects of predictors

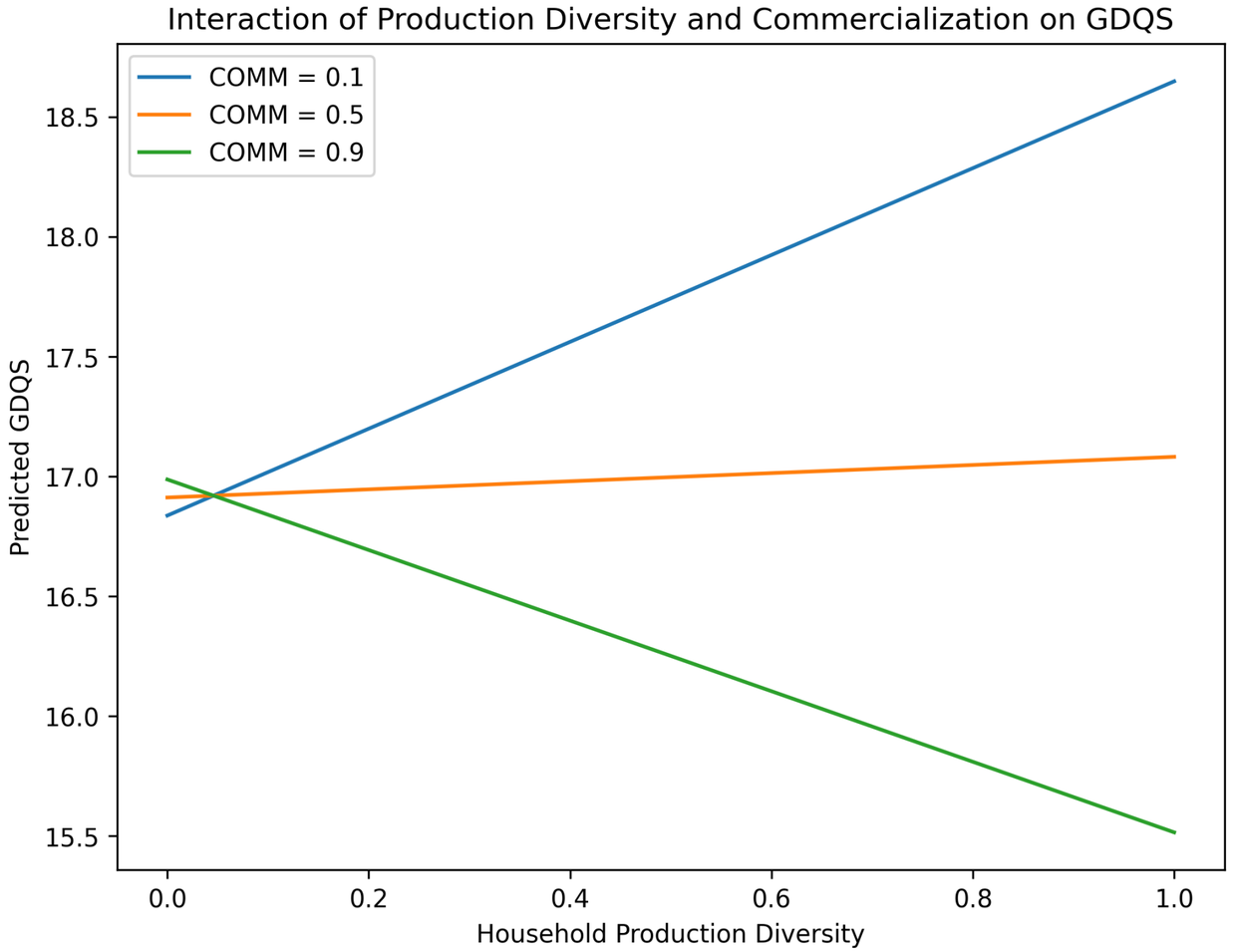


Results/findings: Interaction HH_PD × COMM

- The association between household production diversity and diet quality depends strongly on the level of commercialization.
- Marginal effect equation of household production diversity on diet quality

$$\partial GDQS/(\partial HH\_PD) = 2.22 - 4.11 \cdot COMM$$

- Commercialization moderates the household production diversity–diet relationship, weakening and eventually reversing the association between diversification and diet quality.



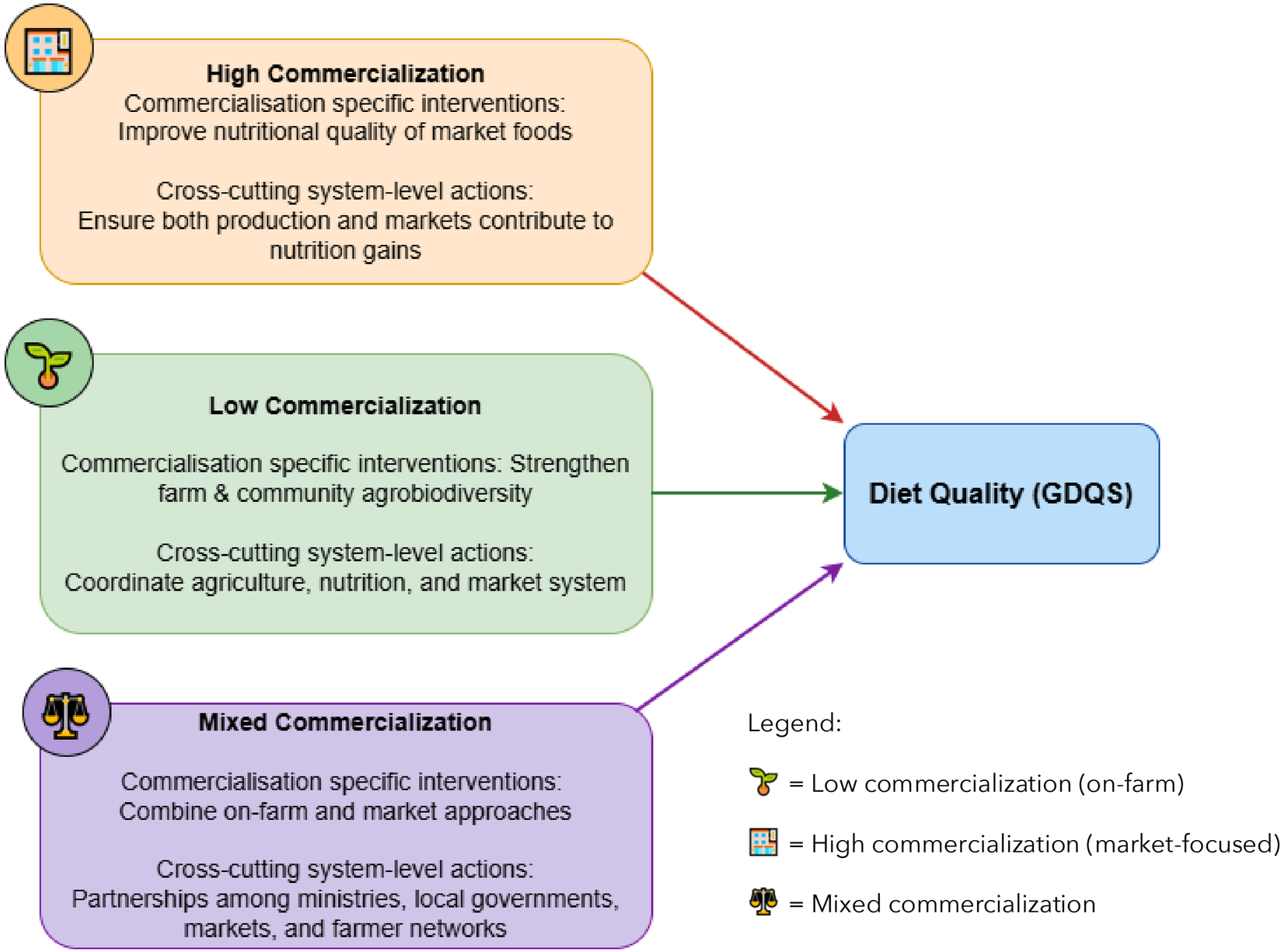
Results/findings: key insights and takeaways

- Higher household production diversity is **positively associated** with diet quality.
- District-level production diversity is **strongly associated** with diet quality, even after controlling for household diversity.
- The association between commercialization and diet quality is **context-dependent** and becomes statistically weak once interactions are introduced.
- The interaction indicates that the association between household production diversity and diet quality **changes with the level of commercialization**, weakening as commercialization increases.

- Household and district production diversity are consistently positive predictors of diet quality.
- Commercialization alone is not consistently significant, but it modifies the effect of household production diversity when included in an interaction.
- Significance patterns are clearer in standard SE models; cluster-robust SEs show uncertainty but do not change the direction of effects.

Implications for scaling and policy

Programs that improve both household-level and district-level production diversity are likely to enhance diet quality, but the effect may be tempered by market commercialization dynamics.



My participation was made possible through the generous support of the

Delivering for Nutrition 2025 Conference funders

This work was funded by CGIAR initiative on Transforming Agrifood System in South Asia