Gender, Nutrition-Sensitive Agricultural Interventions, and Resilience: Evidence from Rural Bangladesh

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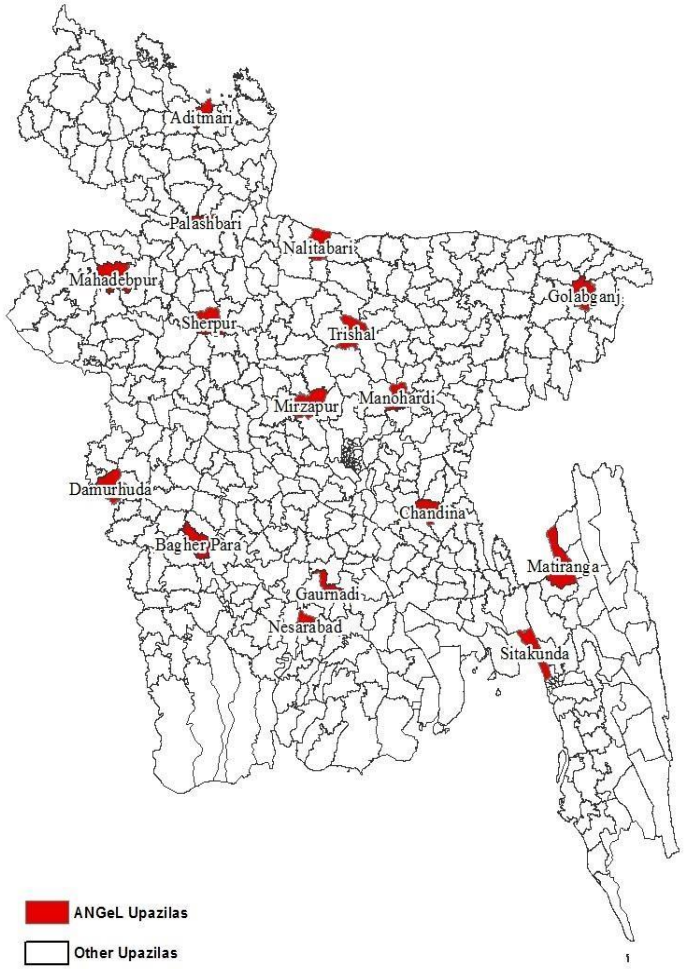
The Agriculture Nutrition and Gender Linkages (ANGeL) Project

- ANGeL aimed to increase farm incomes through agricultural production diversification, improve diet quality particularly the consumption of micronutrient rich foods, and increase women's empowerment in agriculture.

- ANGeL aimed to be scaleable. Agriculture and nutrition training was delivered by sub-assistant agricultural officers (SAAOs) – also referred to as agricultural extension agents – who are permanent employees of the Bangladesh Ministry of Agriculture. Treatment arms encompassed 16 sub-districts and all eight administrative divisions (regions) of Bangladesh

- ANGeL sought to be gender sensitive. Husbands and wives were trained together; the idea being to break down the distinction between "women's" activities (such as child rearing) and "men's" activities (such as growing crops).



ANGeL: Three treatment arms (1)

T-A: Agricultural Production training

- 17 sessions
  - Cultivation of fruit and vegetables
  - preparation of small plots and homestead gardens
  - water, pest and fertilizer management
  - harvest techniques
  - post-harvest storage
  - Poultry, diary and livestock rearing
  - fishpond cultivation

ANGeL: Three treatment arms (2)

T-AN: Agricultural Production training and Nutrition BCC

19 sessions of nutrition BCC:

- functional roles played by different types of foods
- importance of a balanced diet, micronutrients and sources of food containing these
- age-appropriate complementary foods
- optimal breastfeeding practices
- maternal nutrition and care
- safe food preparation
- WASH

ANGeL: Three treatment arms (3)

T-ANG: Agricultural Production training, Nutrition BCC, AND

Gender Sensitization consisted of 6 sessions of structured activities aimed at improving

- intra-family respect
- Appreciation
- Communication

C: Control

ANGeL: Three treatment arms

- **Treatment Arms (Additive Design)**

ARM	COMPONENTS	SESSIONS
T-A	Agriculture	17
T-AN	Agriculture + Nutrition	36 (17+19)
T-ANG	Agriculture + Nutrition + Gender	44 (17+19+8)
Control	No intervention	—

Program Roles and Responsibilities

- **Ministry of Agriculture**
- Overall implementation
- Provided sub-assistant agricultural officers (SAAOs) / agricultural extension agents (AEAs) to deliver training

- **Helen Keller International (HKI)**
- Developed agricultural production curriculum (with BARI and BRRI)
- Developed nutrition BCC curriculum (with BIRTAN and IFPRI)
- Designed and delivered gender sensitization curriculum ("Nurturing Connections")
- Trained the trainers

- **IFPRI**
- Evaluation design and implementation
- Technical assistance on curriculum development
- Data collection and analysis

ANGeL Selection Criteria

- Identify all (484) rural *upazilas* (sub-districts) that were agro-ecologically suitable for agricultural diversification and had good market connectivity. Purposively selected 16 so that each of the eight administrative divisions of Bangladesh was represented.

- From the list of all 525 blocks in these 16 *upazilas*, **we randomly selected 10 blocks from each *upazila***, yielding 160 blocks. These were randomly assigned as follows: 25 blocks to each treatment arm (T-A *x2*, T-N, T-AN, T-ANG) and 35 blocks to the control group. One village from each block was randomly selected.

- In each village, we conducted a census, identifying households that had: (1) Engaged in crop production in the previous 12 months; and (2) had a child aged less than 24 months. From this list, we randomly selected 25 to take part in the training and the surveys.

- This yielded 625 households in each treatment arm (3,125 households in total), and 875 households in the control group, for a total sample of 4,000 households.

Timeline and data collection

ANGeL

- Baseline data were collected between November 2015 and January 2016.
- ANGeL implementation began July 2016
- ANGeL implementation ended December 2017.
- Endline data collected between January and March 2018.
- At both baseline and endline, both the primary female beneficiary and primary male beneficiary were interviewed.

ANGeL2

- Enumerator training took place in February 2020 with survey scheduled for March 2020
- Enumerators were deployed to the field – and then recalled(!)
- Follow up survey (T-A, T-AN, T-ANG, C) took place in February-March 2022, allowing us to capture the impacts and consequences of the Covid-19 pandemic

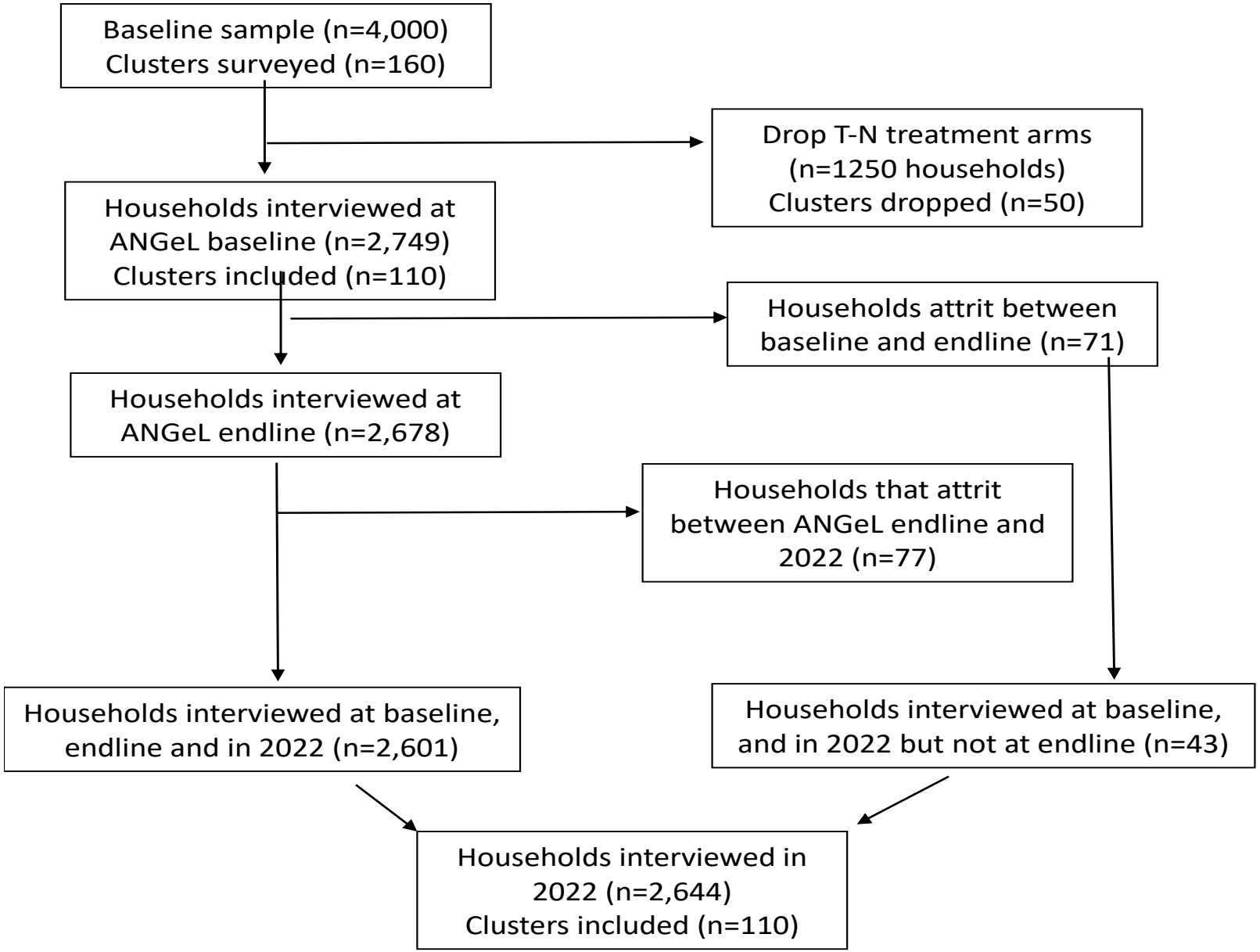
ANGeL: Implementation and key findings

- Implementation fidelity was high:
  - The median woman attended **79 to 94 percent of all training sessions**. The median man attended 75 to 94 percent of all the training sessions
  - Spouses nearly always attended training together.
  - If any training sessions were missed, 56 to 67 percent of participants reported that the SAAO came to them to discuss the material that was missed.

- More than 90% of participants said the contents of the training sessions were very or moderately informative; tests showed that participants learned material taught in the training sessions

- All agricultural treatment arms had , in percentage terms, large effects on measures of production at the intensive margin. Treatment arms that included agricultural training increased the production of vegetables and fruit and eggs and dairy products relative to the control group. Impacts did not differ across T-A, T-AN, and T-ANG, suggesting that the bundled treatments did not have any additive impacts on agricultural production relative to the agricultural production training delivered alone.

Participant Flow Diagram: ANGeL2



Issues in Tracking Households Over Time

Attrition

Is it correlated with treatment status

Is it “large” in magnitude, with implications for statistical power

Over time, household members marry, move, die and form new households. We adopt the following rules when a household split occurred:

Where the household had been in one of the treatment arms, we follow the household that contained the individual(s) who had participated in ANGeL training

Where the household had been in the control group, we follow the household that contained the individual(s) who was the primary respondent during the original ANGeL study.

	Attrition between 2016 (baseline) and 2022	Households split between 2018 (endline) and 2022
	Percent	
T-A	4.8	6.1
T-AN	2.9	8.9
T-ANG	3.0	8.9
Control	4.2	7.4
All	3.8	7.8
	Number	
Sample Size	2,749	2,644

- Household attrition is uncorrelated with treatment status
- Likelihood of household splitting is uncorrelated with treatment status

Shocks: Cyclone Fani and Covid-19

- In May 2019, northeast India and Bangladesh were struck by Cyclone Fani. India suffered most from this storm as it initially made landfall in Odisha state. Fani then travelled east and north, through Bangladesh. Four of the 16 districts included in the ANGeL study reported damage.
  - *However,* only 12 percent of our sampled households reported any damage – mostly crop losses or damage to housing. There was relatively little loss of livestock or productive assets

- Covid occurs in two waves:
  - March-June 2020 – initial pandemic and widespread lockdowns. Sharp rise in household food insecurity
  - March-August 2021 – delta variant of Covid that affected south Asia and intermittent lockdowns
  - By late 2021, delta variant had run its course and lockdowns were largely ended

Impact of ANGeL treatments

Estimate intent-to-treat (ITT) impacts :

$$Y_{ibt} = \alpha_t + \beta_A TA_b + \beta_{AN} TAN_b + \beta_{ANG} TANG_b + \beta_X X_{ibt-1} + \varepsilon_{ibt} \quad (1)$$

where Y_{ibt} is the outcome of interest for individual *i* residing in block *b* at time *t*;

TA_b, TAN_b, and $TANG_b$ are dummy variables that take the value of 1 if block *b* was assigned to T-N, T-A, T-AN, and T-ANG, respectively, and takes the value of 0 otherwise;

X_{ibt-1} is a vector of baseline covariates; and ε_{ibt} is an error term.

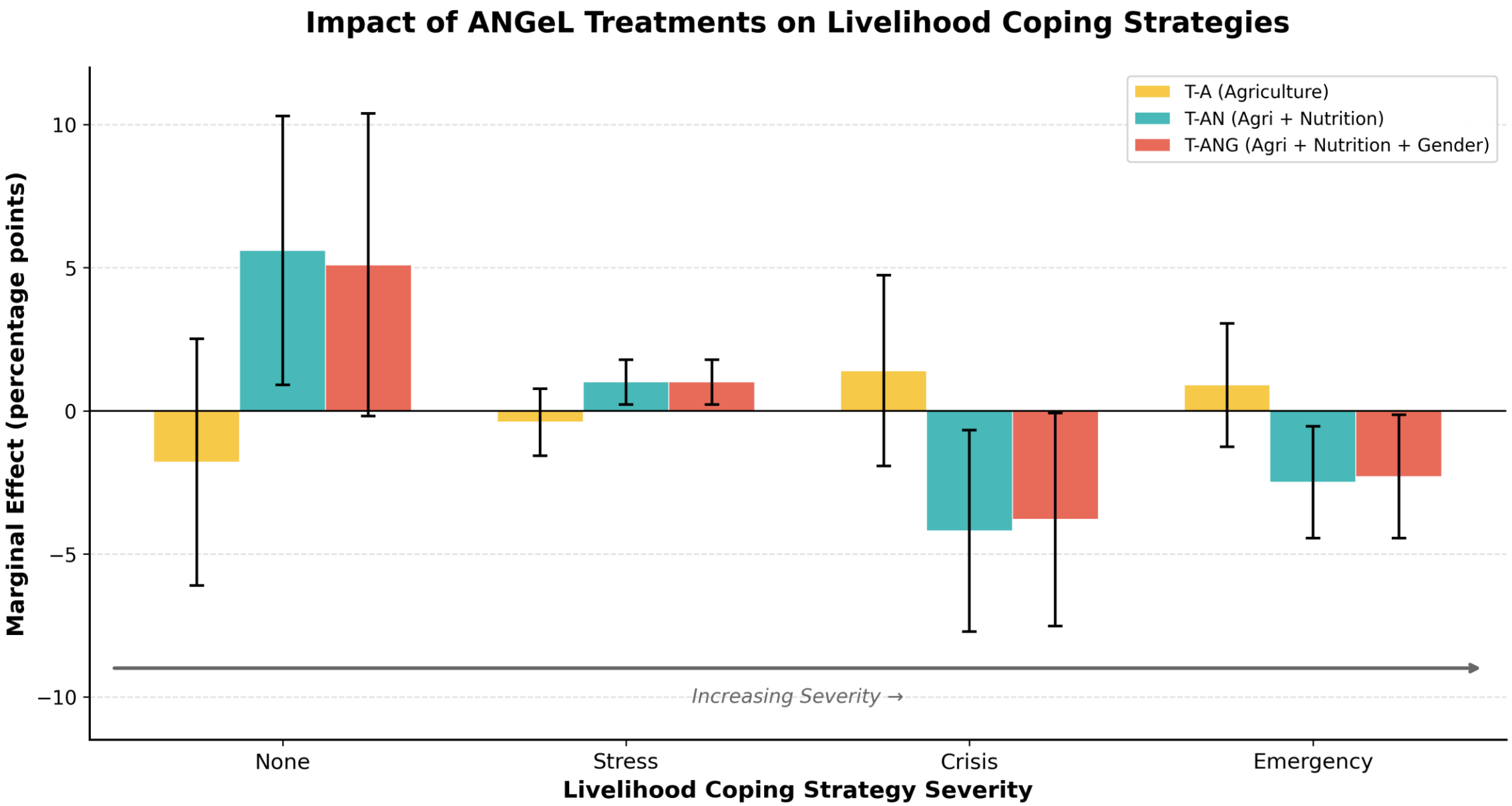
β_A, β_{AN}, and β_{ANG} represent the impact estimates for T-A, T-AN, and T-ANG, respectively.

Standard errors clustered at the block (unit of randomization) level

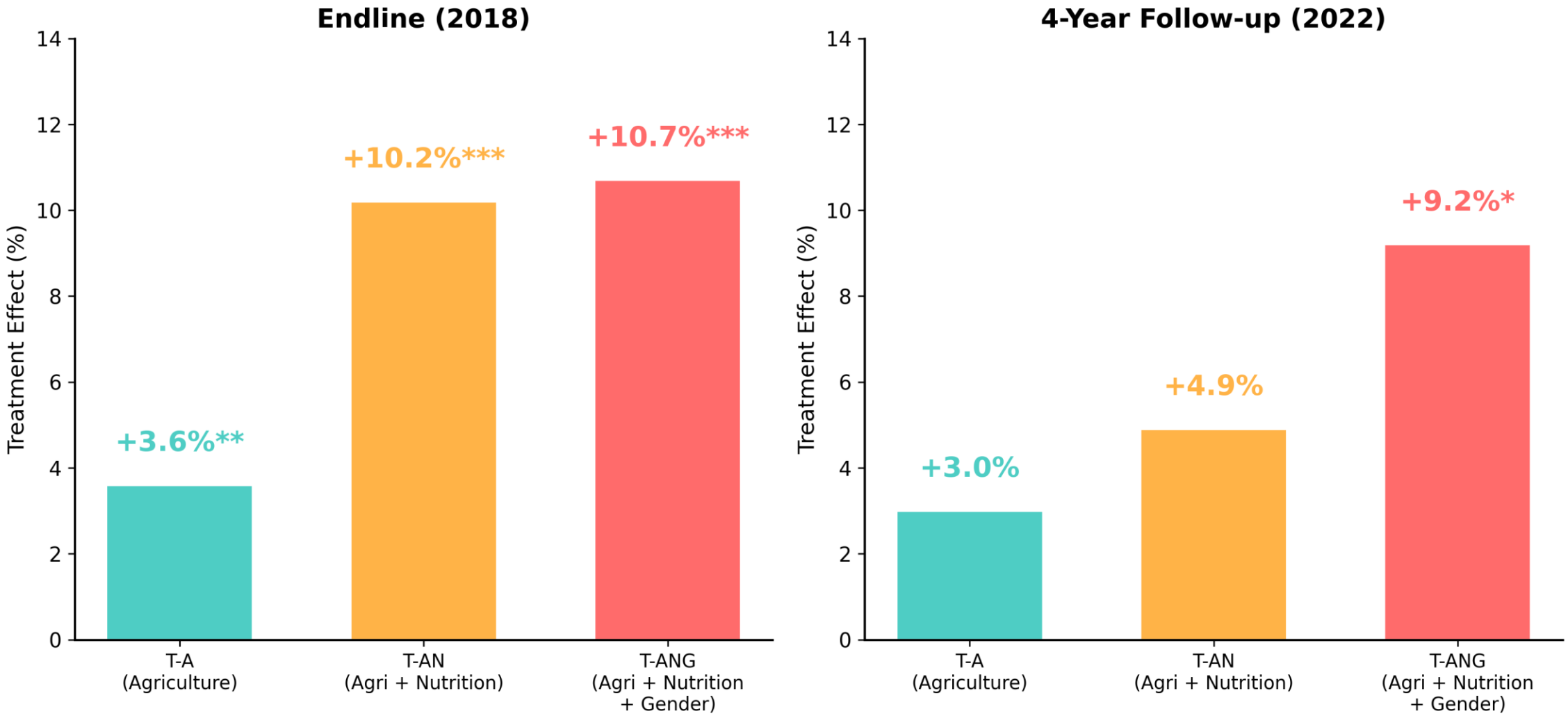
Livelihoods Coping Strategy Index

- Based on 10 questions: "We would now like to ask whether, and how often, members of your household have to engage in any of the following behaviours due to a lack of food or a lack of money to buy food or meet other basic needs since the start of the coronavirus (Covid 19) pandemic in March 2020?"
- Based on WFP (2023), we divide these into three categories

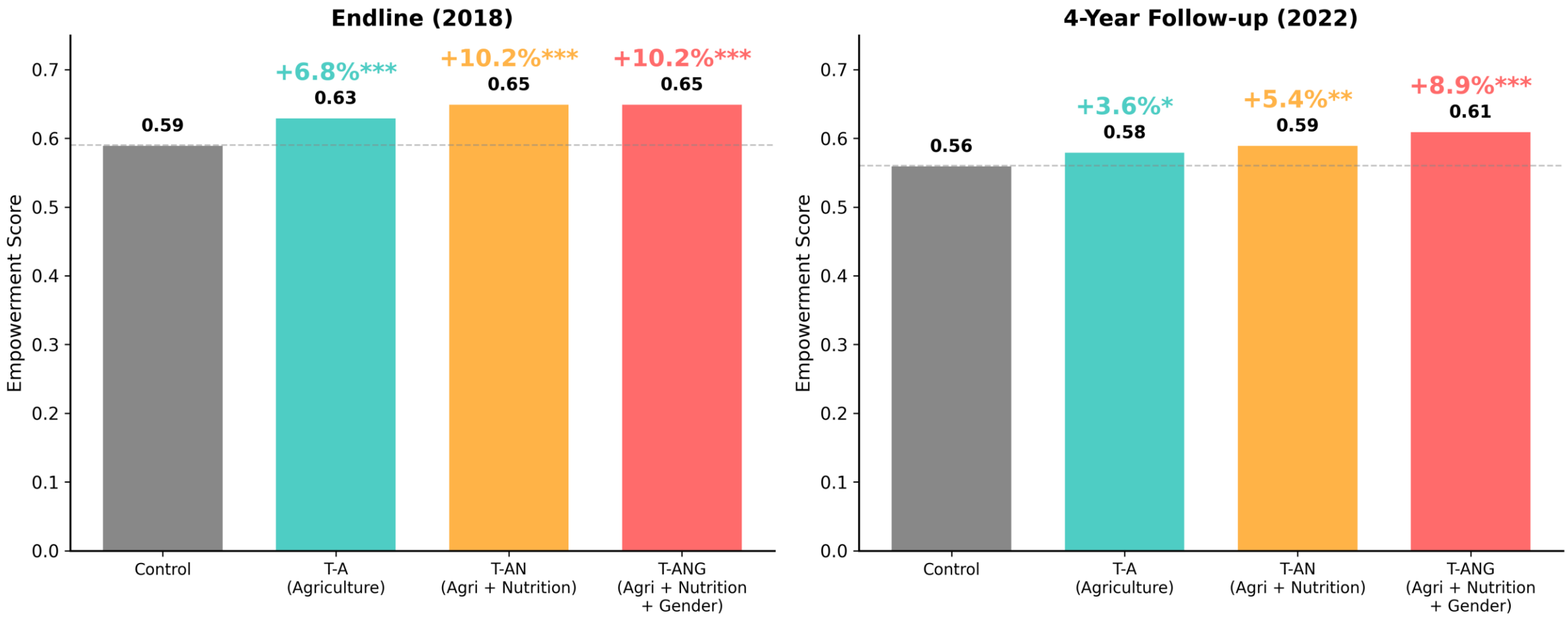
Spent savings	STRESS
Bought food on credit	STRESS
Borrowed money to buy food	STRESS
Selling household goods (radio, furniture, mobile, solar panel)	STRESS
Reduced health expenditure	CRISIS
Reduced other essential non-food expenditures such as education, clothing	CRISIS
Reduced expenses on agricultural, livestock or fisheries inputs	CRISIS
Mortgaging or selling jewelry/gold	EMERGENCY
Selling productive assets or means of transport (incl livestock)	EMERGENCY
Selling land	EMERGENCY


Impact of ANGeL Treatments on Livelihood Coping Strategies
T-A (Agriculture)
T-AN (Agri + Nutrition)
T-ANG (Agri + Nutrition + Gender)
Marginal Effect (percentage points)
10
5
0
−5
−10
Increasing Severity →
None
Stress
Crisis
Emergency
Livelihood Coping Strategy Severity

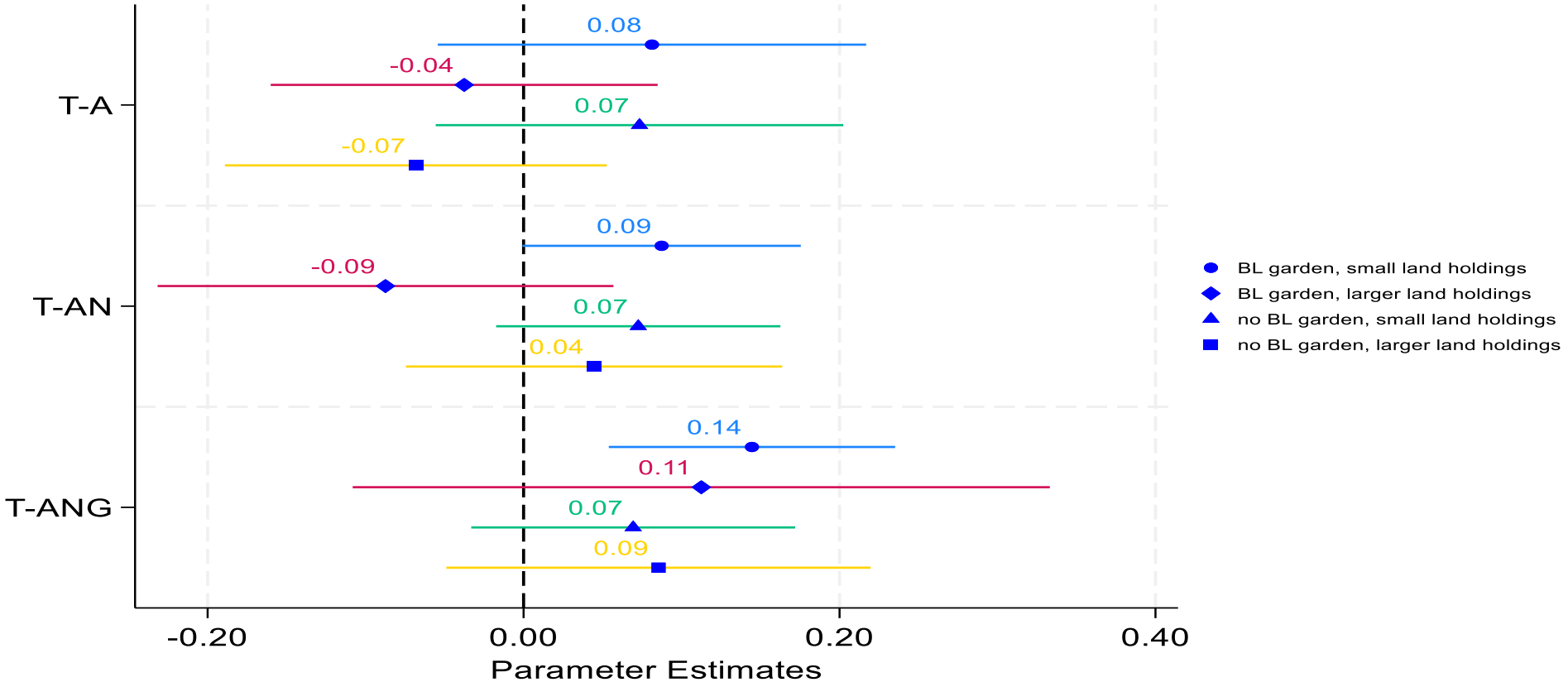
ANGeL: Impact on Real Per Capita Consumption



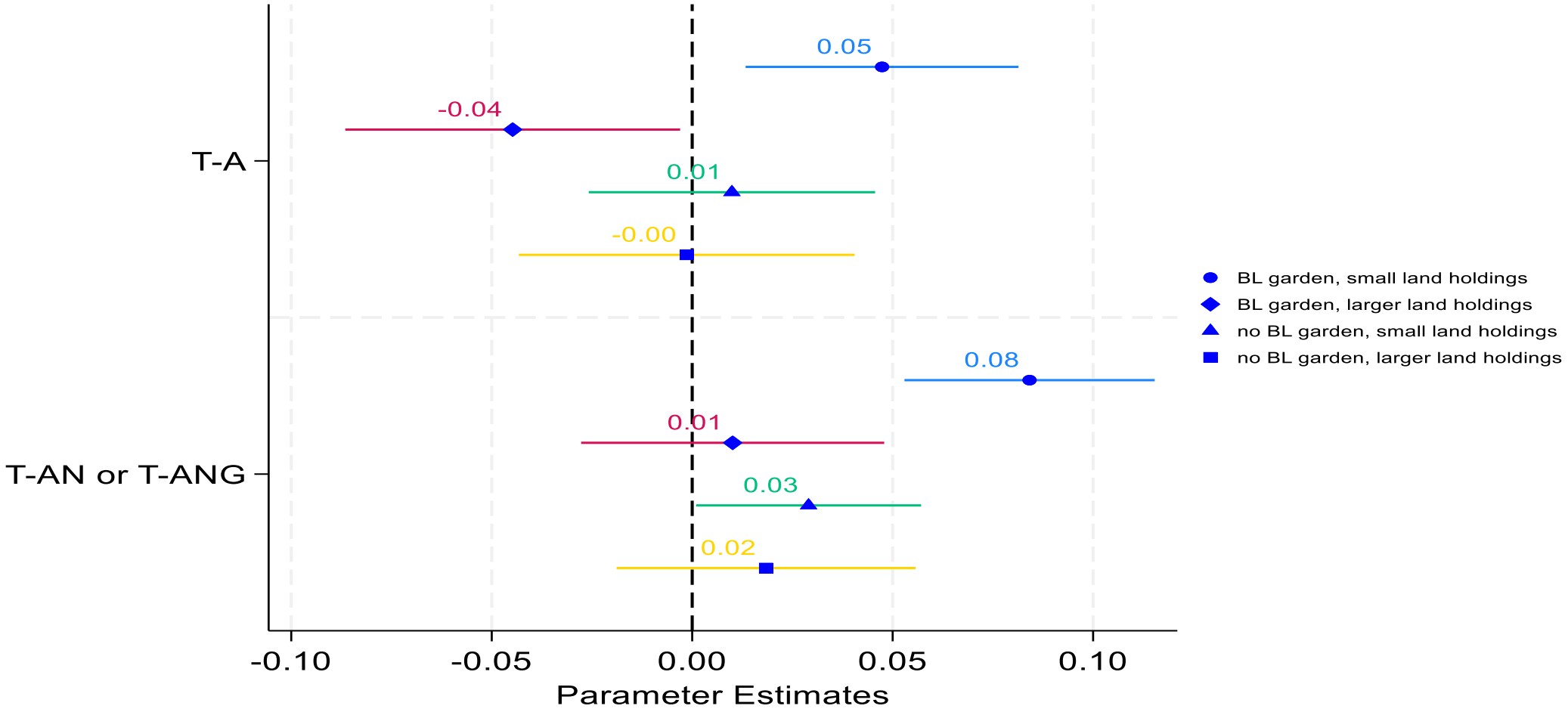
ANGeL: Empowerment Score by Treatment Arm



Impact concentrated on households with homestead garden and small land holdings at baseline (per capita consumption)



Impact concentrated on households with homestead garden and small land holdings at baseline (hGDQS)



What do these results show … so far

- Combined training in the diversification of agricultural production and nutrition BCC (with or without gender sensitization training) built resilience
    - It reduced the need for the use of livelihood coping strategies during a period when households were coping with the economic consequences of the Covid-19 pandemic (and some were dealing with the consequences of Cyclone Fani)
    - They were less likely to experience reductions in real per capita consumption
    - They were more likely to maintain the gains in consumption and improvements in diet that they had obtained as a result of the ANGeL intervention
- Agricultural training alone did not build resilience