

Cash Transfers, Diet Quality, and Child Growth Among Refugee Children

Evidence from Turkey's ESSN Program

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Cash Transfers and Child Nutrition

- About 40% of forcibly displaced in 2020 were children, and displacement disrupts long-term human capital accumulation.
- Unconditional cash transfers (UCTs) are increasingly used in humanitarian and LMIC settings.
- Meta-analyses (Manley et al. 2020, 2022): small but significant gains in height-for-age (HAZ); mixed or null effects on WAZ and WHZ; strongest when paired with health or nutrition services.
- **Open question: do these effects generalize to refugee children?** Evidence is limited, especially outside camps.

Why Refugees Are Different

- Refugees are not simply chronically poor: alongside displacement shocks, they arrive with different pre-migration diets, preferences, and expectations.
- **Before the conflict**, Syrian households typically ate **more diverse, balanced diets** than in the low-income settings where UCTs are usually evaluated.
- **After displacement**, they must adapt to a new food environment and price structure, often substituting toward **cheaper, energy-dense foods**.
- **Return intentions** shift spending toward savings, debt, and remittances, and lower incentives to adapt to the host food environment.
- So cash may work **less by adding calories** and **more by restoring diet quality**, leaving it theoretically **ambiguous** whether general-population findings carry over.

Literature Review: Cash Transfers for Refugees

- Much less evidence for refugee children despite high vulnerabilities; few studies use child-level data.
- **Turkey:** Özler et al. (2021), Aygün et al. (2024), Robson et al. (2024) — food security, schooling, child labor, multidimensional poverty (not child growth).
- **Lebanon:** Altındağ & O’Connell (2023), Moussa et al. (2021), De Hoop et al. (2019) — food coping, morbidity, schooling; household-level.
- **Somalia / Kenya:** Grijalva-Eternod et al. (2018), MacPherson & Sterck (2021) — gains in food access and diversity, but weak or absent child anthropometric effects.
- **Key challenge:** converting improved food access into measurable child health outcomes.

This Study: The ESSN, Data, and Design

- We study the **ESSN**, the world's largest humanitarian cash transfer program for refugees, targeting Syrians in Turkey.
- Turkey hosted **3.6 million** Syrian refugees (2020), the largest refugee population at the time; nearly all live in **urban host communities**, not camps.
- ESSN (since 2016): unconditional monthly transfers, ~1.8 million beneficiaries.
- Data: the **2018 Turkey DHS**, nationally representative of Syrian refugees, with **child-level** anthropometrics and food intake.
- Design: a **fuzzy RDD** on the ESSN dependency-ratio eligibility cutoff (≥ 1.5).

What We Find

- **Growth:** HAZ increases by **0.57–0.79 SD**; WHZ falls; reductions in **both** underweight and overweight.
- **Nutrition:** a large, robust **decline in energy-dense, nutrient-poor (EDNP) foods**; a suggestive rise in protein.
- Cash improves **diet quality**, not merely calories, easing the **dual burden** of under- and overnutrition.
- **Contribution:** the first study to jointly use **child-level anthropometrics and food intake** to evaluate a large-scale refugee cash transfer, with a **rigorous RDD** design.

Key Features of ESSN

- Eligibility: based on demographic criteria (e.g., high dependency ratio, ≥ 4 children, female-headed, elderly, disabled).
- Transfer size: 120 TL per person per month (plus quarterly top-ups).
- Example: a 6-person Syrian household received ~ 720 TL/month (\approx USD 149 at 4.83 TL/USD), about 36% of average consumption and 55% of male labor income.

Data Source

- 2018 Turkey Demographic and Health Survey (TDHS)
- Nationally representative of both natives and Syrian refugees
- Provides anthropometric measures: height, weight, weight-for-height
- Detailed child-level food consumption data (last 24 hours) for ages ≤ 36 months
- Household roster enables construction of ESSN eligibility (family definition, dependency ratio)

Child Anthropometric Outcomes

- Standardized z-scores based on WHO growth standards:
 - Height-for-Age (HAZ) – long-term growth
 - Weight-for-Age (WAZ) – composite measure
 - Weight-for-Height (WHZ) – acute malnutrition / overweight
- Indicators for stunting, underweight, overweight derived from thresholds (± 2 SD)

Child Nutrition Measures

- Food recall module for children ≤ 36 months
- Grouped into 5 food categories:
 - Milk / formula
 - Proteins (meat, eggs, legumes)
 - Carbohydrates (bread, grains)
 - Vegetables
 - Energy-dense nutrient-poor food (EDNP: sweets, chips, sugary drinks)

Sample Construction

- Dependency ratio (dependents per working-age adult)
- Two samples defined:
 - Sample A: All families with a dependency ratio in $[0,3]$
 - Sample B: Excludes households eligible via other criteria (stronger first stage)
- Child-level analysis restricted to registered, usual residents with complete anthropometric data
- Final analysis samples: ~1,111 children (Sample A), 662 children (Sample B)

Descriptive Statistics

- Syrian refugee children lag behind international peers in height-for-age (mean HAZ = -0.8 SD)
- Weight-for-age close to average (-0.05 SD), weight-for-height relatively high ($+0.6$ SD)
- Notable incidence of overweight (9%)
- Nutritional intake: low protein and vegetable consumption, high junk food prevalence (59%)
- Baseline highlights dual burden: stunting and overweight coexist

Identification Strategy

- Fuzzy Regression Discontinuity Design (RDD) framework
- Compare households just below vs. just above cutoff
- Running variable: dependency ratio
- Exploit ESSN eligibility rule: dependency ratio ≥ 1.5
- Discrete support requires parametric modeling (Lee & Card, 2008)
- Baseline: split linear trends on each side of cutoff within [0,3] interval
- Cluster standard errors at dependency-ratio level + wild bootstrap p-values

Family Composition in the Sample

A) Number of Children in Each Cell

# prime adults	# dependents										%	
	0	1	2	3	4	5	6	7	8	9		
1	1	2	6	10								1.7
2	7	75	212	243	179	111	65					80.3
3		10	17	34	31	12	20	13			1	12.4
4		2	13	11	5		1	1	7		4	4.0
5		1		3	1	6	2					1.2
6				2								0.2
7						3						0.3

B) Dependency Ratio for Each Cell

# prime adults	# dependents										%	
	0	1	2	3	4	5	6	7	8	9		
1	0	1.00	2.00	3.00								1.7
2	0	0.50	1.00	1.50	2.00	2.50	3.00					80.3
3		0.33	0.67	1.00	1.33	1.67	2.00	2.33			3.00	12.4
4		0.25	0.50	0.75	1.00		1.50	1.75	2.00	2.25		4.0
5		0.20		0.60	0.80	1.00	1.20					1.2
6				0.50								0.2
7						0.71						0.3

Notes: Prime adults include individuals aged 18 to 59. The dependents are the rest of the household members. The cells are given in bold when the dependency ratio is 1.5 or higher.

Histogram of the Running Variable

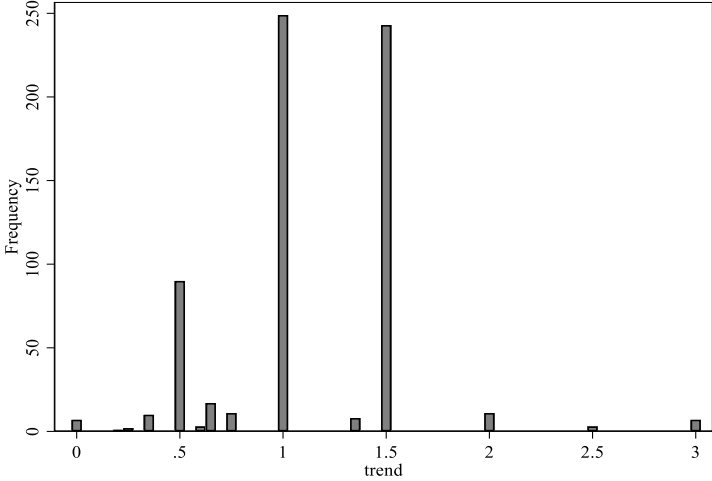
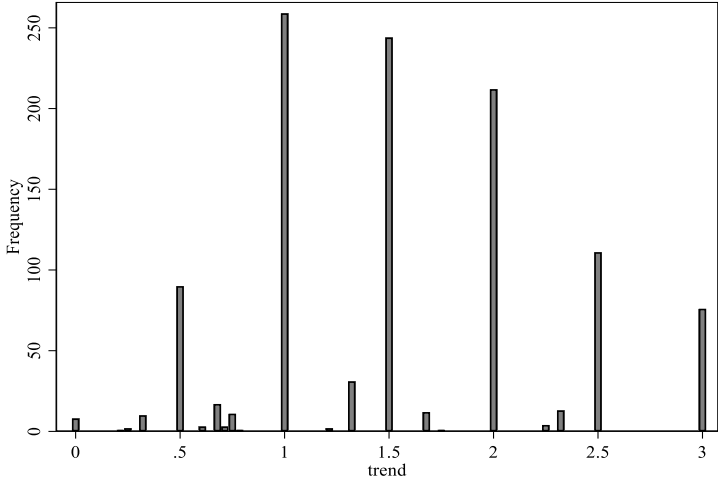
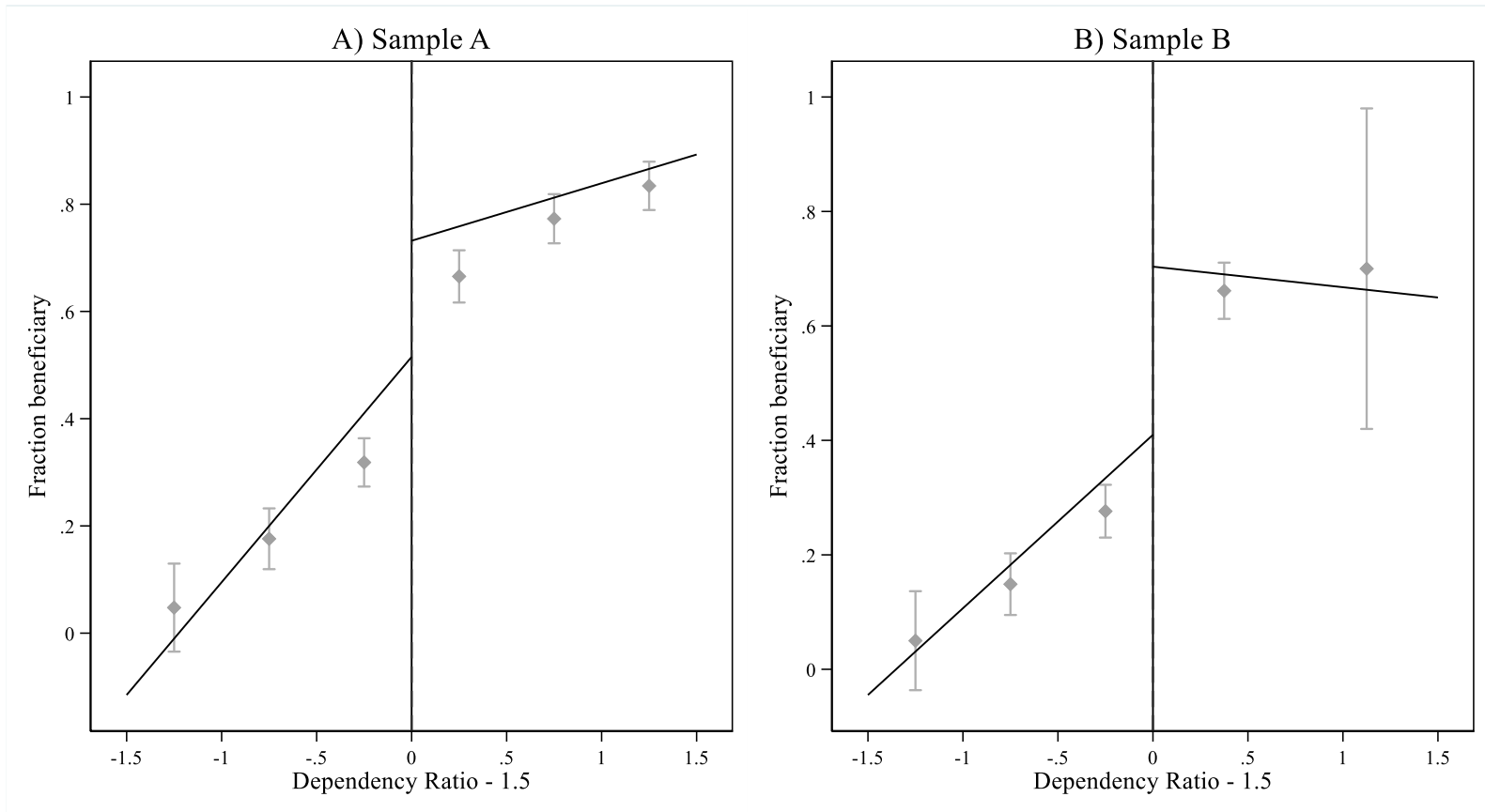


Figure 1: RDD Graph for ESSN Beneficiary Status

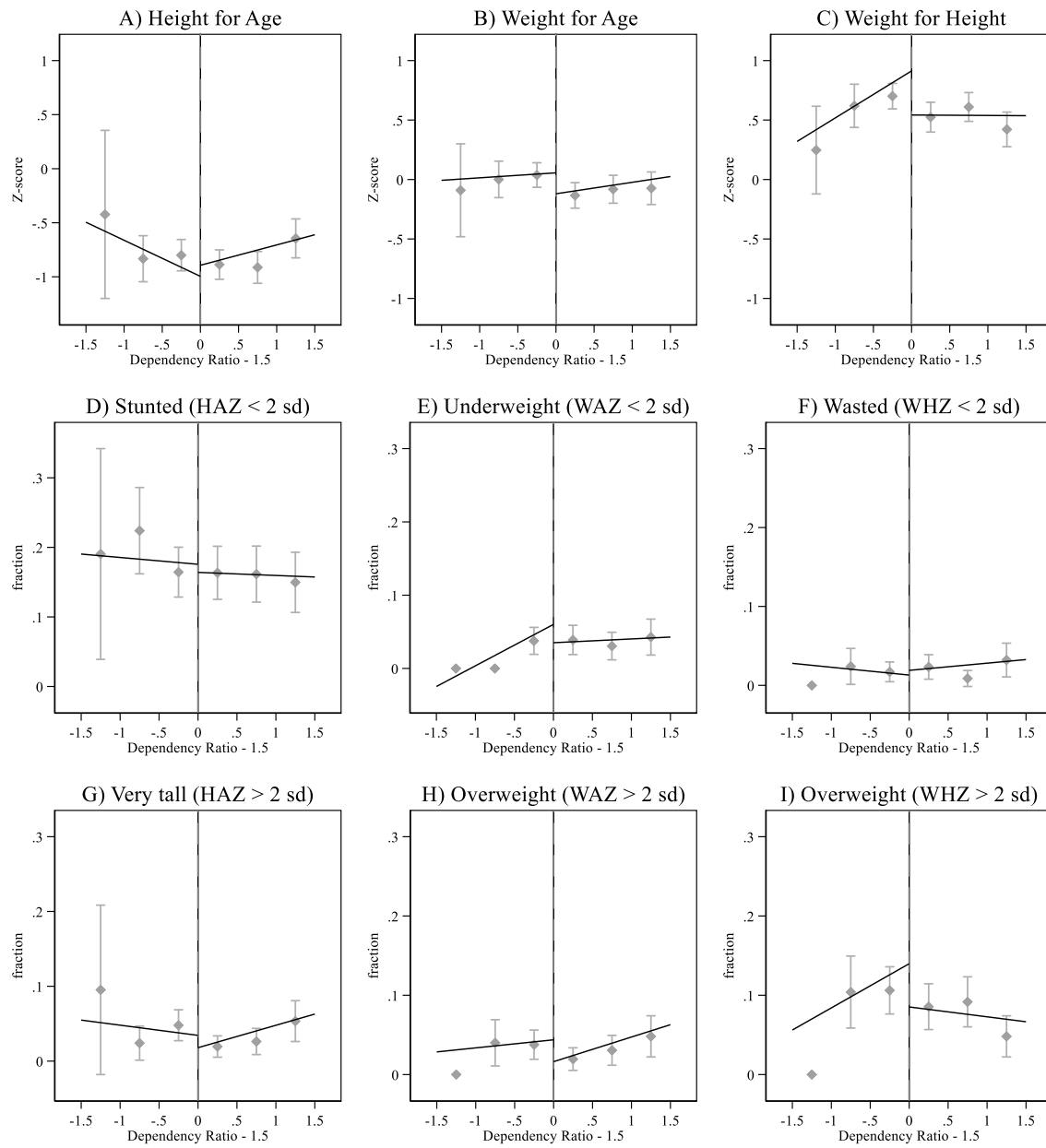


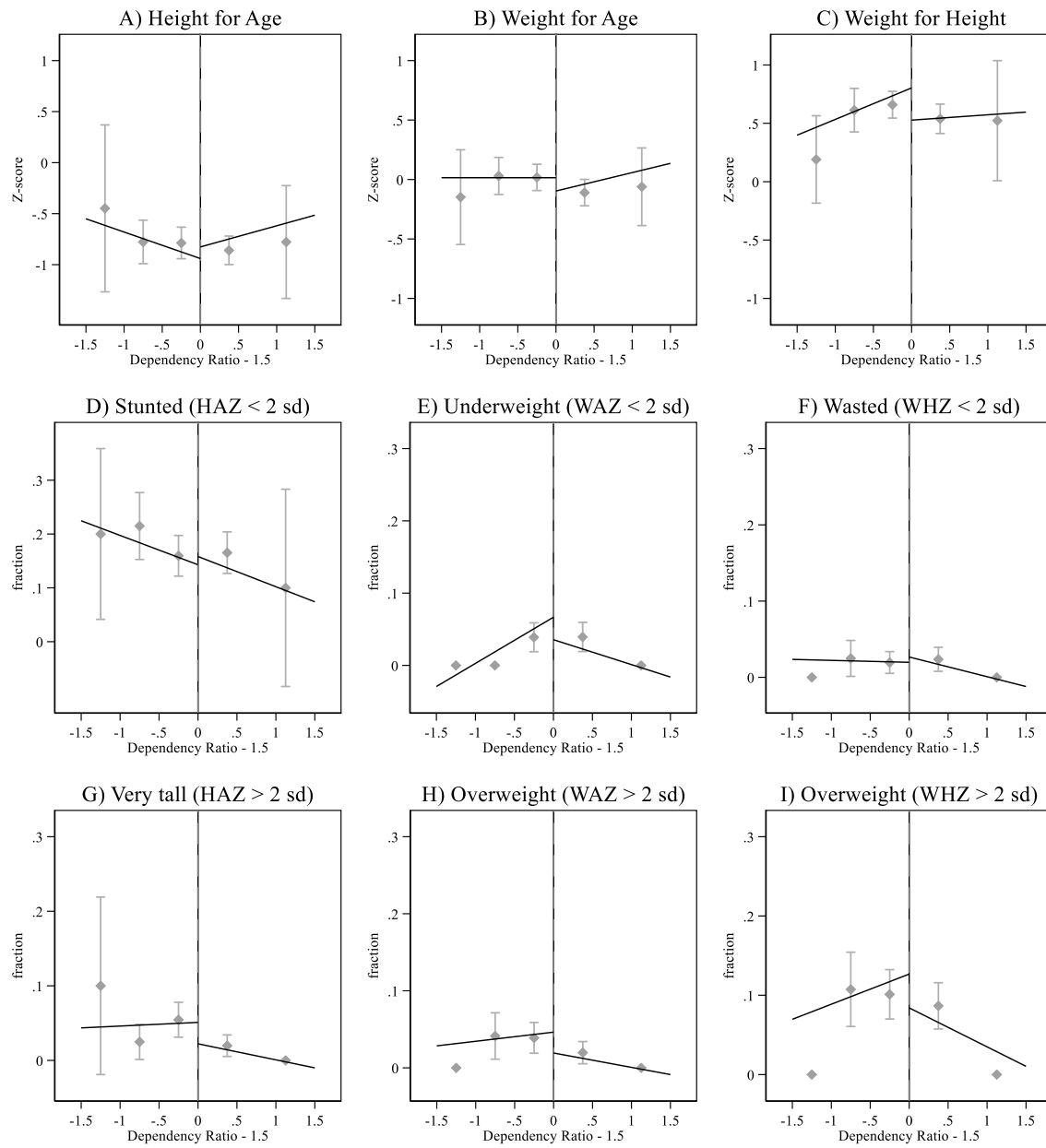
First Stage & Threats to Identification

- Crossing the cutoff increases ESSN participation probability by ~23–27 pp.
- First-stage F-statistics: **13.87 (Sample A)** and **53.31 (Sample B)**.
- Substantial variation in household structures across the cutoff, which avoids systematic bias.
- Manipulation of the dependency ratio is unlikely: strict registration, audits, and monitoring.
- Tests: covariate balance, smooth density of the running variable, placebo cutoffs.

Results

RDD Graphs for Anthropometric Outcomes



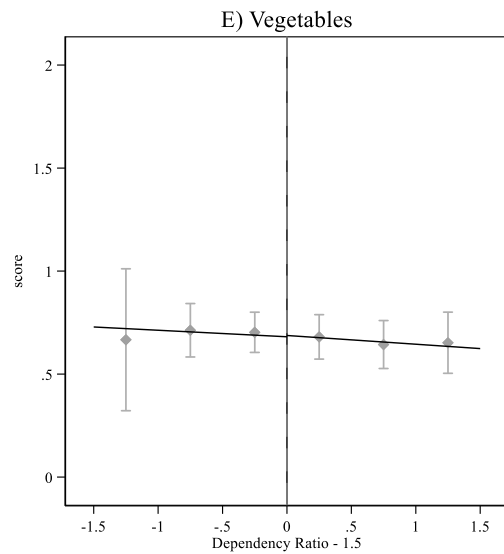
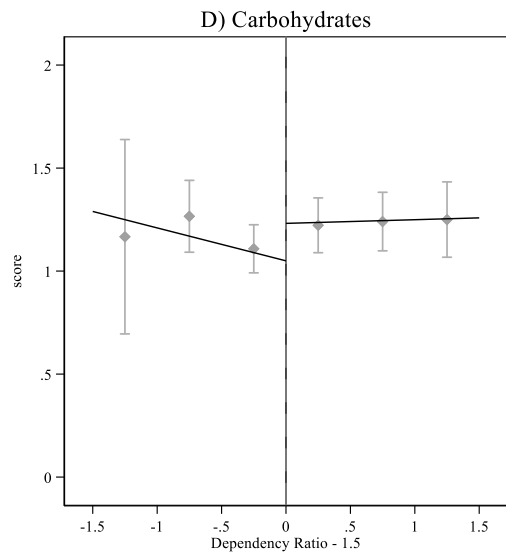
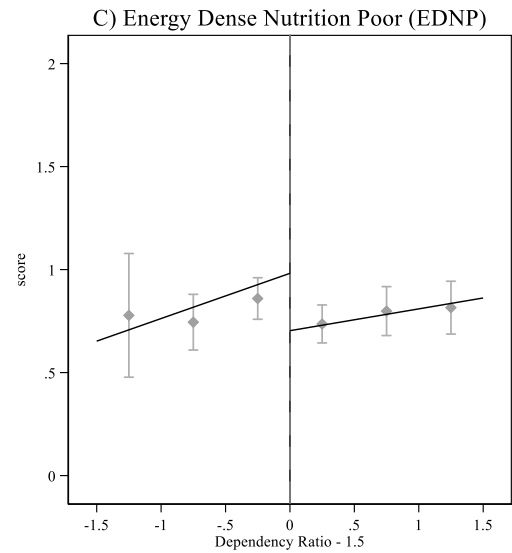
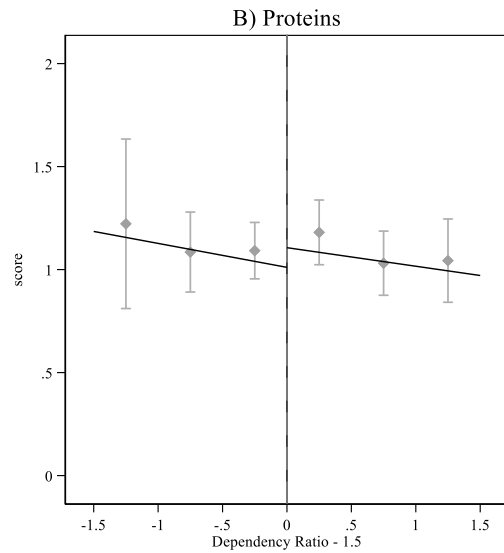
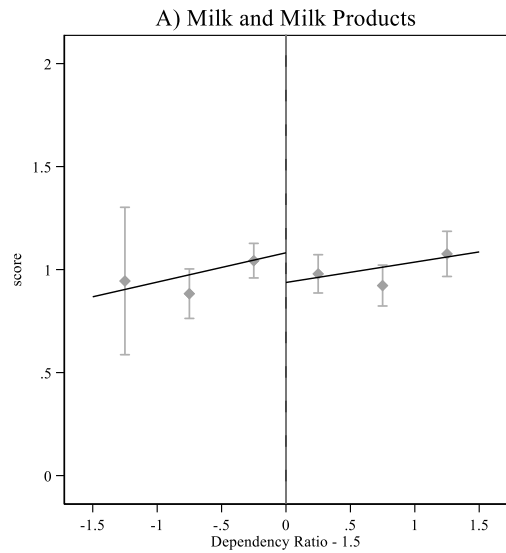


The Effect of ESSN Cash Transfers on Child Anthropometric Outcomes

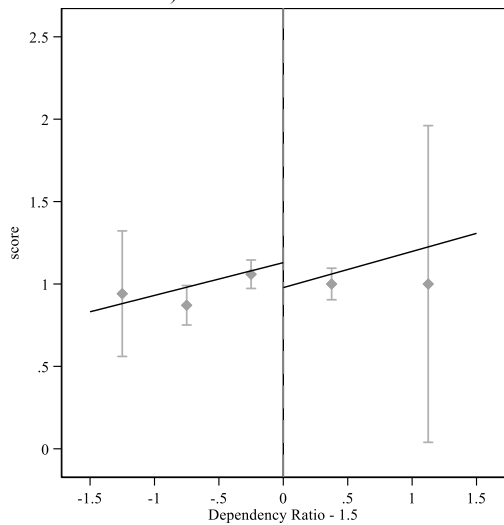
	HAZ	Stunted (HAZ<2 sd)	Tall (HAZ>2 sd)	WAZ	Underweight (WAZ<2 sd)	Overweight (WAZ>2 sd)	WHZ	Wasted (WHZ<2 sd)	Overweight (WHZ>2 sd)
Panel A: Full sample									
ESSN	0.571*	-0.018	-0.070	-0.933**	-0.099**	-0.167***	-1.831***	0.021	-0.248**
	[0.297]	[0.173]	[0.054]	[0.370]	[0.049]	[0.057]	[0.693]	[0.028]	[0.105]
Bootstrapped p-value	0.031	0.923	0.298	0.006	0.040	0.008	0.009	0.492	0.032
Panel B: Sample excluding households who are eligible via other criteria									
ESSN	0.785***	0.062	-0.057	-0.359	-0.133***	-0.121***	-1.122***	0.014	-0.188***
	[0.164]	[0.126]	[0.062]	[0.286]	[0.044]	[0.026]	[0.381]	[0.026]	[0.072]
Bootstrapped p-value	0.000	0.671	0.428	0.355	0.037	0.001	0.077	0.671	0.093

Notes: The data come from the 2018 round of the Turkey Demographic and Health Survey. Both samples include refugee babies born in the last five years preceding the survey. Sample B excludes children from households that are eligible for the ESSN program due to a condition other than the dependency ratio. Each estimate comes from a separate regression based on a fuzzy regression discontinuity design and shows the effect of receiving cash transfer on the outcome stated in the associated column. Each regression controls for baby's sex, mother's height and body mass index, and dummies for the interaction of the region and type of current residence, household head's education, the interaction of household's sex and age, mother tongue, arrival year, birth province and type of birth region. Sampling weights at the household level are used. Regressions in panel (A) also include dummies for the other four eligibility criteria for the ESSN transfers. Standard errors are clustered by the dependency ratio. The p-value statistic displays the wild cluster bootstrapped p-value. The number of observations are 1,111 and 662, and the first-stage F-statistics are 14.94 and 53.31, respectively, in panels A and B. Statistical significance: *10% level, **5% level, ***1% level.

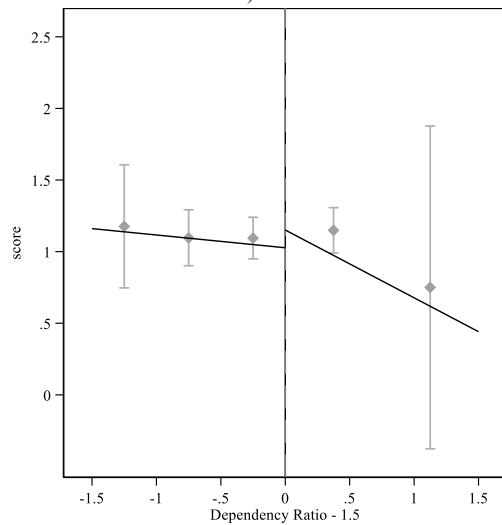
RDD Graphs for Food Consumption



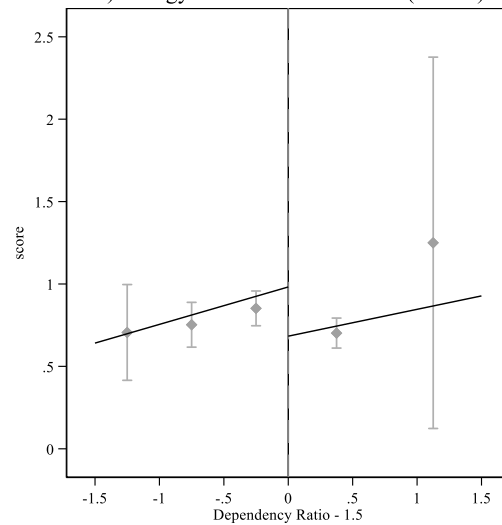
A) Milk and Milk Products



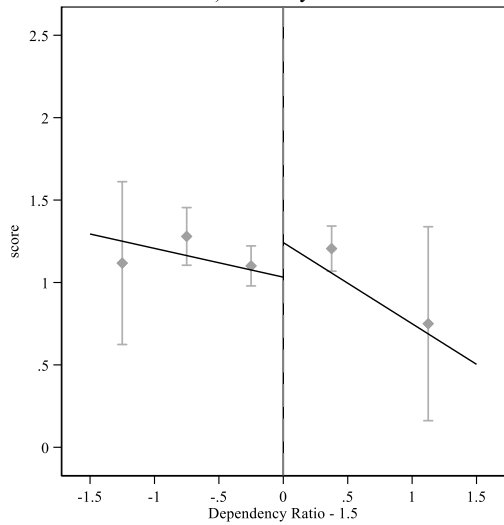
B) Proteins



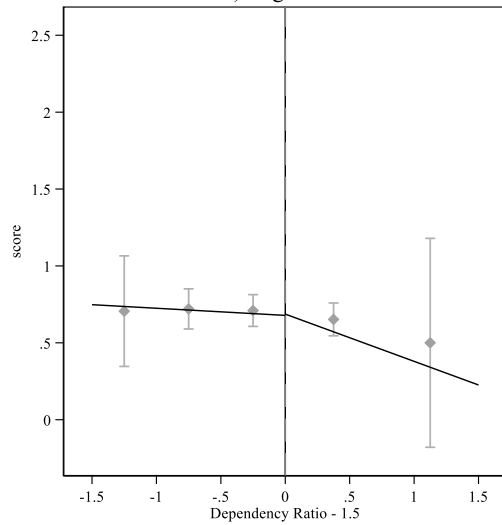
C) Energy Dense Nutrition Poor (EDNP)



D) Carbohydrates



E) Vegetables



The Effect of ESSN Cash Transfers on Food Consumption Outcomes

	Milks	Proteins	Junks	Carbs	Veggies
Panel A: Full sample					
ESSN	-0.486 [0.509]	0.497 [0.609]	-1.627*** [0.336]	0.748 [0.508]	0.282 [0.312]
Bootstrapped p-value	0.493	0.469	0.000	0.236	0.333
Romano-Wolf p-value	0.753	0.753	0.020	0.634	0.753
Panel B: Sample excluding households who are eligible via other criteria					
ESSN	-0.435 [0.501]	1.188*** [0.422]	-1.613*** [0.324]	0.852 [0.726]	0.150 [0.278]
Bootstrapped p-value	0.483	0.306	0.000	0.321	0.564
Romano-Wolf p-value	0.733	0.248	0.089	0.693	0.762

Notes: The data come from the 2018 round of the Turkey Demographic and Health Survey. Both samples include refugee babies born in the last five years preceding the survey. Both samples include refugee babies born in the five years preceding the survey and who are 6 to 35 months old at the survey date. Sample B excludes children from households that are eligible for the ESSN program due to a condition other than the dependency ratio. Each estimate comes from a separate set of regressions and displays the effect of receiving cash transfer on the number of food items consumed in the stated category. See Tables 1 and 2 for the details of each estimation strategy and sample restrictions. The food data are available for children born in the last three years, and the sample is additionally restricted to children who are aged 6 months or older. The Romano-Wolf p-value statistics for multiple hypotheses are displayed. The number of observations are 351, 317, and 685 respectively in Panel A, B, and C; the first-stage F-statistics are 17.93, 22.40, and 35.53. Statistical significance: *10% level, **5% level, ***1% level.

Mechanism: Diet Quality, Not Calories

- HAZ rises while WHZ and overweight fall, consistent with improved **diet quality** rather than simply more calories.
- The robust dietary change is a **fall in EDNP foods**; protein gains are positive but not robust.
- Why can growth improve without a robust protein increase?
 - Pre-displacement Syrian diets were relatively **protein-adequate**; the deficit lies in diet **quality and diversity**, not absolute protein.
 - EDNP-heavy diets are linked to **chronic low-grade inflammation**, which suppresses linear growth (DeBoer et al. 2017; Wells et al. 2020).
 - We observe **items consumed**, not calories: less EDNP may reallocate intake toward more balanced foods.

Why Our Effects Exceed the Literature

- Our HAZ effect (**0.6–0.8 SD**) is large relative to recent humanitarian evaluations (e.g., Kurdi 2021: 0.31 SD). Four moderators explain why:
 - **Low baseline:** mean HAZ of **-0.81**, 17% stunted, leaving room to improve.
 - **Large transfer:** about **36%** of household consumption, versus the typical **10–25%**.
 - **Sustained duration:** continuous since 2016, the horizon linear growth requires (effects fade quickly elsewhere, e.g., Lebanon).
 - **Favorable setting:** urban, non-conflict, middle-income, with healthcare access and functioning food markets.
- The WHZ decline is **partly mechanical** (HAZ \uparrow with flat or negative WAZ implies WHZ \downarrow) and reflects movement **toward** the reference median from an elevated baseline.

Robustness Checks

Child Growth, 2SLS Estimates with Alternative Bandwidths

	OLS		2SLS							
	ESSN	HAZ	Stunted (HAZ<2 sd)	Tall (HAZ>2 sd)	WAZ	Underweight (WAZ<2 sd)	Overweight (WAZ>2 sd)	WHZ	Wasted (WHZ<2 sd)	Overweight (WHZ>2 sd)
A) Full Data										
	0.228***	0.644**	0.038	-0.022	-0.852**	-0.099**	-0.123**	-1.755***	0.035	-0.270**
	[0.063]	[0.275]	[0.148]	[0.066]	[0.350]	[0.050]	[0.056]	[0.665]	[0.029]	[0.123]
Bootstrap p-value	0.116	0.004	0.815	0.770	0.010	0.030	0.056	0.003	0.288	0.040
B) Bandwidth [0,6]										
	0.221***	0.718**	0.016	-0.026	-0.836**	-0.086*	-0.130**	-1.800**	0.025	-0.291**
	[0.064]	[0.345]	[0.170]	[0.067]	[0.325]	[0.044]	[0.052]	[0.700]	[0.030]	[0.134]
Bootstrap p-value	0.092	0.016	0.923	0.748	0.006	0.064	0.049	0.008	0.455	0.023
C) Bandwidth [0,4.5]										
	0.224***	0.698**	-0.018	-0.042	-0.930***	-0.084*	-0.137***	-1.939**	0.031	-0.321**
	[0.063]	[0.350]	[0.178]	[0.061]	[0.358]	[0.043]	[0.052]	[0.759]	[0.032]	[0.149]
Bootstrap p-value	0.079	0.023	0.919	0.612	0.002	0.092	0.053	0.004	0.352	0.028
D) Bandwidth [0,3]										
	0.231***	0.571*	-0.018	-0.070	-0.933**	-0.099**	-0.167***	-1.831***	0.021	-0.248**
	[0.062]	[0.297]	[0.173]	[0.054]	[0.370]	[0.049]	[0.057]	[0.693]	[0.028]	[0.105]
Bootstrap p-value	0.088	0.031	0.923	0.298	0.006	0.040	0.008	0.009	0.492	0.032

Notes: The data and the specification are as in Table 4 for the ESSN variable and as in Table 5 for child growth outcomes. The p-value statistic displays the wild cluster bootstrapped p-value. The number of observations is 1,204 in panel A, 1,198 in panel B, 1,181 in panel C, 1,111 in panel D, and . The F-statistic is 12.86 in panel A, 11.81 in panel B, 12.52 in panel C, 13.87 in panel D, . Statistical significance: *10% level, **5% level, ***1% level.

Food Consumption, Alternative Bandwidths

	Milks	Proteins	Junks	Carbs	Veggies
A) Full Data					
	-0.194	0.645	-1.408***	1.064**	0.346
	[0.617]	[0.545]	[0.333]	[0.468]	[0.378]
Bootstrap p-value	0.832	0.321	0.000	0.084	0.422
Romano-Wolf p-value	0.842	0.663	0.059	0.218	0.663
B) Bandwidth [0,6]					
	-0.399	0.746	-1.393***	0.919**	0.487
	[0.534]	[0.545]	[0.330]	[0.442]	[0.448]
Bootstrap p-value	0.601	0.290	0.000	0.109	0.370
Romano-Wolf p-value	0.574	0.555	0.010	0.248	0.574
C) Bandwidth [0,4.5]					
	-0.375	0.624	-1.330***	0.930**	0.488
	[0.539]	[0.558]	[0.340]	[0.466]	[0.433]
Bootstrap p-value	0.637	0.369	0.000	0.101	0.327
Romano-Wolf p-value	0.654	0.654	0.040	0.297	0.654
D) Bandwidth [0,3]					
	-0.486	0.497	-1.627***	0.748	0.282
	[0.509]	[0.609]	[0.336]	[0.508]	[0.312]
Bootstrap p-value	0.493	0.469	0.000	0.236	0.333
Romano-Wolf p-value	0.753	0.753	0.020	0.634	0.753

Alternative Specifications

- 1) Single (Not Split) Linear Polynomials in Dependency Ratio
- 2) Single (Not Split) Quadratic Polynomials in Dependency Ratio
- 3) Linear Polynomials in Number of Dependents and Number of Prime Adults
- 4) Linear Polynomials in $\text{Log}(\text{Number of Dependents})$ and $\text{Log}(\text{Number of Prime Adults})$

Robustness: Multiple Hypothesis Testing

- Corrections: **Romano–Wolf** (familywise error), **Anderson** q-values (sequential), **Benjamini–Hochberg** (false discovery rate).
- The **EDNP** reduction is the most robust dietary result, significant under all corrections in both samples.
- For anthropometrics, the **less conservative** corrections (Anderson, BH) keep HAZ, WAZ, and WHZ significant; HAZ strengthens in Sample B (Romano–Wolf $p = 0.032$).
- Reductions in **underweight and overweight (WAZ)** survive the corrections.
- **Protein** does **not** survive bootstrapping or MHT, so we treat it as **suggestive only**.

Robustness: Weak-Instrument-Robust Inference

- First-stage F-statistics: **13.87 (Sample A)** and **53.31 (Sample B)**; Sample A is only marginally above the rule-of-thumb of 10.
- As a precaution, we report **Anderson–Rubin (1949) 90% confidence intervals** for Sample A, valid regardless of first-stage strength.
- The AR intervals **exclude zero** and match the benchmark signs:
 - HAZ $[0.028, +\infty)$; WAZ $(-\infty, -0.453]$; WHZ $(-\infty, -0.978]$.
 - Overweight by WAZ $(-\infty, -0.089]$, Overweight by WHZ $(-\infty, -0.111]$; EDNP $(-\infty, -0.990]$.
- Main findings are **robust to weak-instrument concerns**.

Robustness: Discrete RDD (Local Randomization)

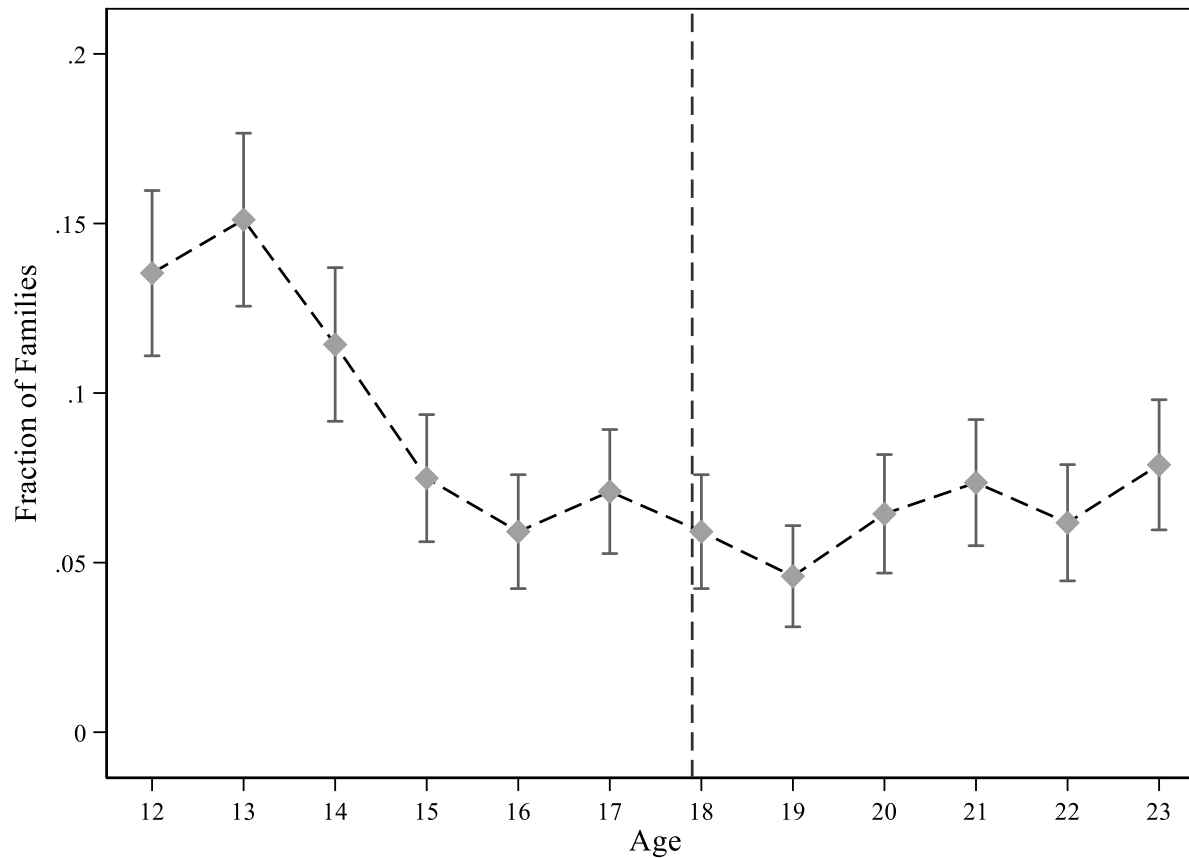
- Local-randomization design (Cattaneo, Idrobo & Titiunik 2017): treats units in a narrow window as **as-good-as-randomized**, with **no functional-form** assumption.
- Trade-off: more design-robust but **data-demanding**; our parametric RDD that gains power by pooling the $[0,3]$ window.
- Within the preferred window the first stage is **strong** (**~ 0.35** , **$p < 0.001$**), even where narrowing the continuous bandwidth weakens it.
- **Corroborates** the larger effects: WHZ (reduced form -0.178 , $p = 0.086$), WAZ (-0.165 , $p = 0.072$), EDNP (-0.151 , $p = 0.082$).
- Underpowered for HAZ and the extreme-value indicators; their absence reflects **limited local power**, not a contradiction.

Alternative Identification Method: Age-18 Cutoff

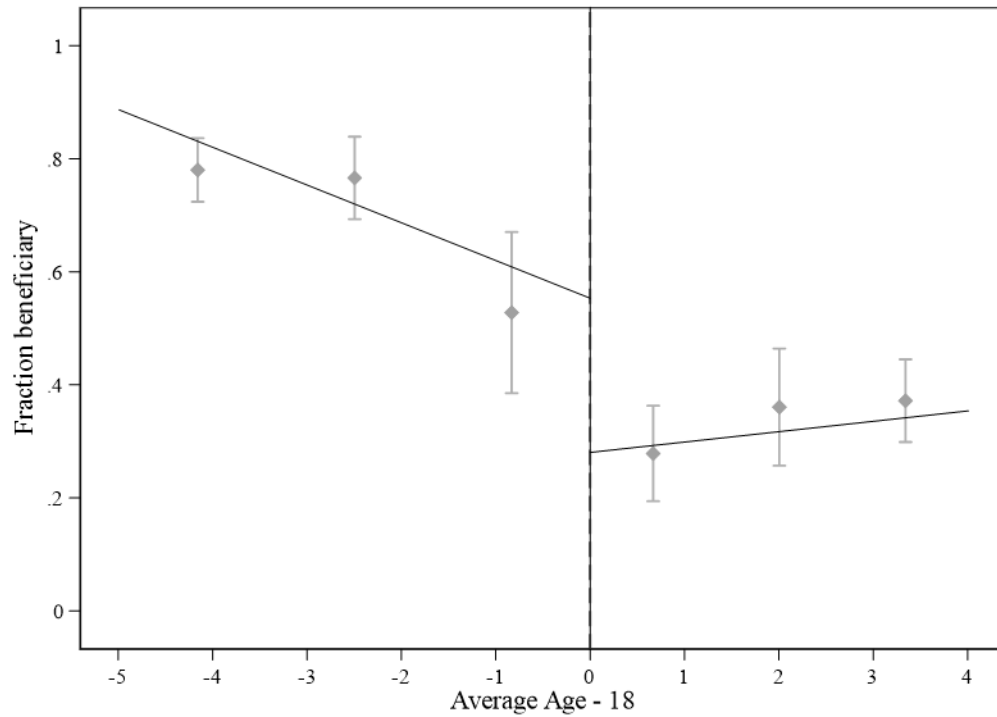
- ESSN eligibility changes mechanically when a child turns 18:
 - Dependents ↓, Prime-age adults ↑, #Children ↓
- This rule creates a sharp, non-manipulable discontinuity.
- Implement fuzzy RDD using age relative to 18 as running variable.
- Families with members near 18: use average age within window (e.g., 15–20, 14–21, 13–22, 12–23).

A Check of Identification Assumption

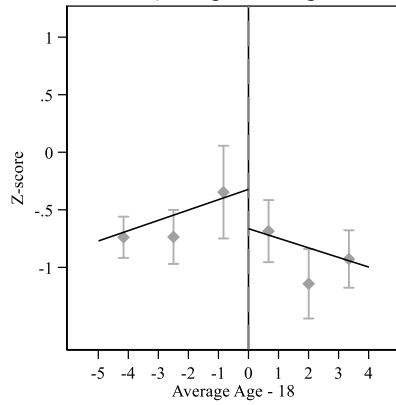
Fraction Families with a Child at Age x



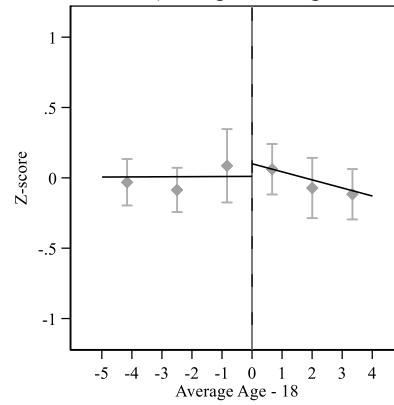
RDD Graph for ESSN Beneficiary Status



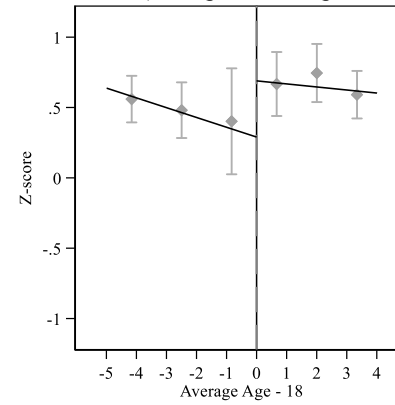
A) Height for Age



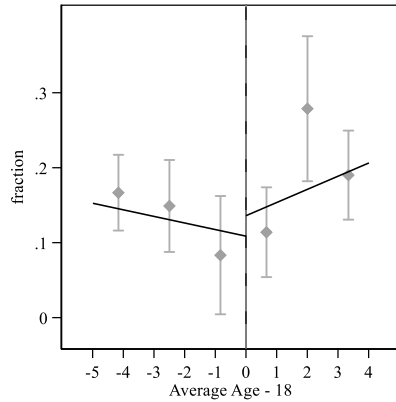
B) Weight for Age



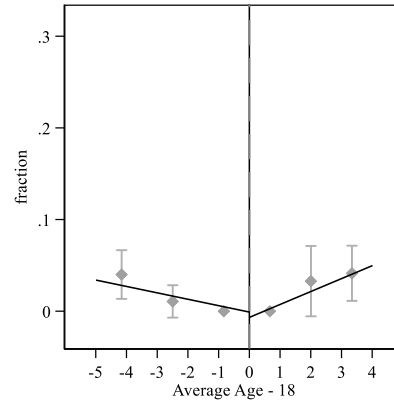
C) Weight for Height



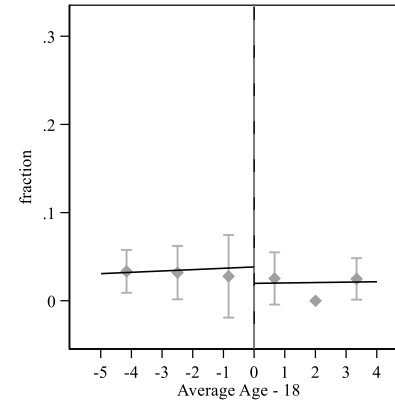
D) Stunted (HAZ < 2 sd)



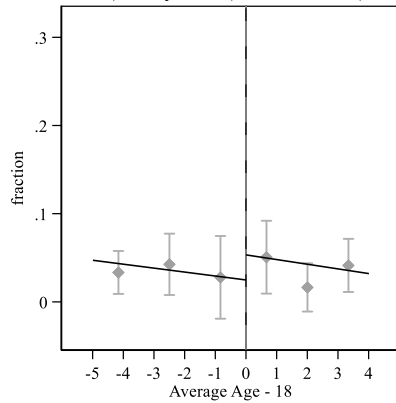
E) Underweight (WAZ < 2 sd)



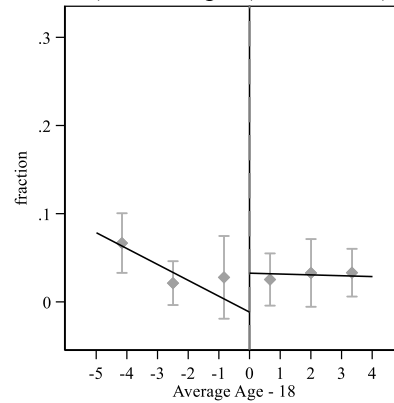
F) Wasted (WHZ < 2 sd)



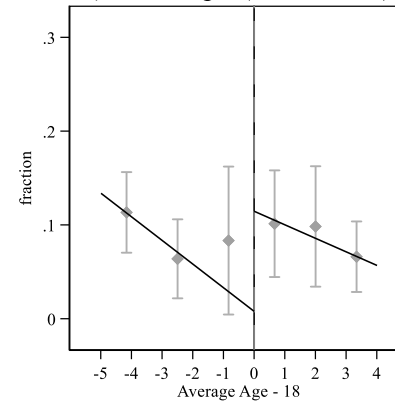
G) Very tall (HAZ > 2 sd)

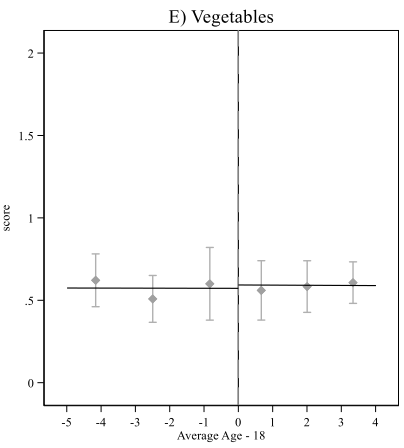
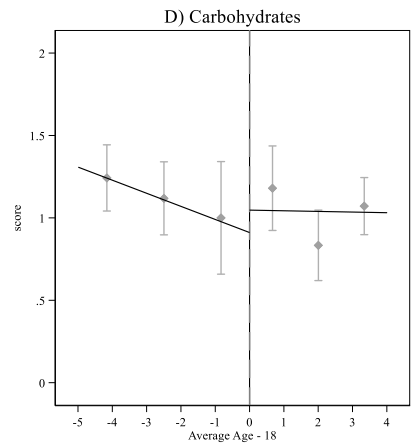
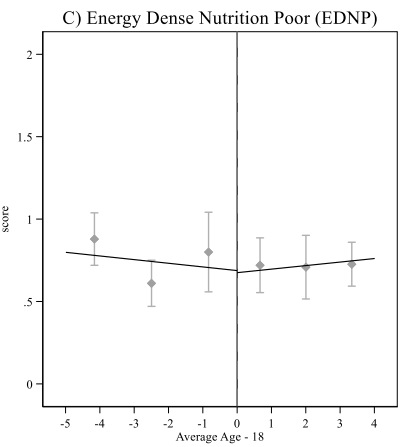
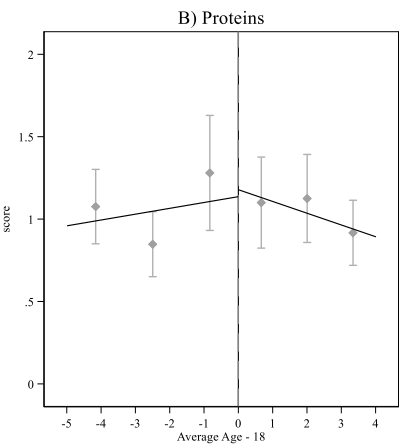
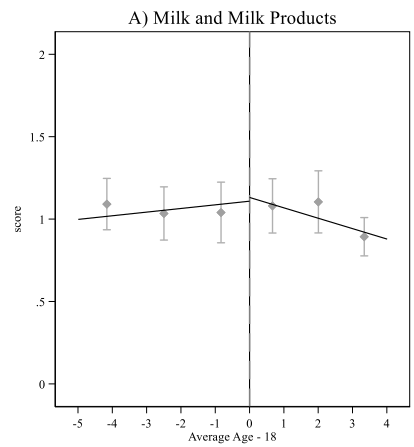


H) Overweight (WAZ > 2 sd)



I) Overweight (WHZ > 2 sd)





Results

- Consistent findings:
 - – HAZ \uparrow (except smallest sample)
 - – WHZ \downarrow and overweight probability \downarrow across all samples
 - – Some evidence underweight \downarrow
- Food consumption results statistically insignificant:
 - – Smaller sample (only ages 6–35 months)

Cost-Effectiveness

- Fully-loaded cost \approx **USD 1,532** per beneficiary child per year (range 1,379–1,684).
- **Per SD of HAZ:** \approx **USD 2,253** (range 1,745–2,954), broadly in line with McIntosh–Zeitlin (\sim USD 1,682, from Manley et al. 2022).
- **Per pp of underweight averted:** \approx **USD 132** (range 104–170), above narrow nutrition programs (e.g., Pakistan \sim USD 9–13 per pp).
- But the ESSN is a **multipurpose** transfer: nutrition gains are a **by-product** of support that also cuts child labor, raises schooling, lowers poverty, and improves food security, so cost per unit of total impact is far more favorable.

Conclusion

Child Growth Outcomes

- HAZ \uparrow **0.57–0.79 SD** \rightarrow improved long-term growth.
- WHZ \downarrow **1.1–1.8 SD** \rightarrow reduced overweight risk.
- Reduces **both extremes**: underweight \downarrow **9.9–13.3 pp**; overweight \downarrow (WAZ **12–17 pp**; WHZ **19–25 pp**).
- WAZ: negative in Sample A, weaker in Sample B — consistent with the fall in overweight.

Nutrition Outcomes

- EDNP (junk) food consumption \downarrow **~ 2 SD** — robust across samples, bandwidths, and MHT corrections.
- Protein: **suggestive only** — positive, but not robust to bootstrapping or multiple-hypothesis testing.
- No robust changes in milk, carbohydrates, or vegetables.
- Dietary improvements are consistent with the growth gains.

Policy Implications

- ESSN transfers improve diet quality and child growth.
- They address the dual burden of under- and overnutrition.
- Cash alone, if sizable and sustained, can be effective in refugee contexts.
- Cost-effective once the program's full range of benefits is considered.
- Relevance for large-scale humanitarian assistance programs.