Food Aid, Trade and Welfare

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Motivation

- The provision of food assistance is a global challenge.
  - Over 1.5B people rely on food-based safety nets globally (World Bank, 2017).
  - In emergency contexts, humanitarian food aid supports over 120M people annually.

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  - **In-kind**: fixed basket, simple implementation, paternalistic.
  - **Vouchers**: monetary balance redeemable at designated stores, flexible choices.
- Beneficiaries trade (barter & resell) to improve on endowments when:
  - Food aid does not match recipient preferences and excludes non-food items.

This Paper

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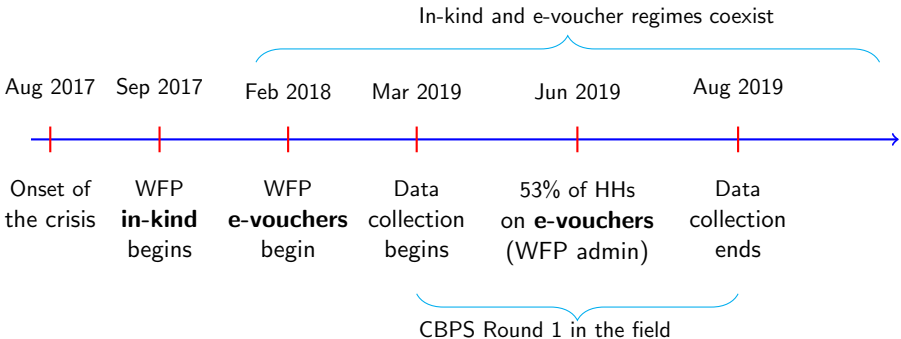
Main findings:

- Food consumption: no differences in food expenditure or caloric intake.
- Trade: e-voucher households barter less but resell rice more.
- Prices: resale prices below WFP store prices; $\sim$ 10% discount.
- Non-food consumption: e-voucher households spend $\sim$ 50% more.
- A model that rationalises this behavior.

Background: The Rohingya Crisis

- Onset of crisis in 2017: $\sim 750,000$ arrivals in 32 camps. map
- No formal labour market: individuals not authorized to work outside the camps.
- No cash transfers: WFP food aid is the dominant source of consumption.
- Fully dependent on food assistance to survive.

Roll-Out Timeline: In-Kind to E-Voucher



- Roll-out is driven by WFP-store readiness, not by household characteristics.
- Both regimes coexist throughout the CBPS Round 1 field period.

WFP Food Aid: From In-Kind to E-Vouchers

- **In-kind food aid**:
  - WFP determines varieties and quantities.
  - Fixed basket: Rice + Lentils + Oil.
  - Fixed quantities per 3 HH members.
  - Value: $\approx$ USD 19/month.
- **E-vouchers**:
  - Recipients choose varieties and quantities.
  - Variety expansion: 19 items.
  - Value: $\approx$ USD 9.5/person/month.
  - Redeemable only at WFP stores in camps.
  - Balance expires monthly: no savings.
  - Transition is full and mandatory.

WFP–UNHCR accounts

Data

- **Cox's Bazar Panel Survey (CBPS), Round 1, 2019.**
  - 7-day recall food consumption module.
  - 30-day recall non-food consumption module.
  - 30-day recall assistance received and trade module. Questionnaire
  - We cannot observe a household's modality directly: it is not self-reported in the survey.
- **WFP and UNHCR administrative records**: camp-level e-voucher beneficiary and population counts.
  - Camp classified as **e-voucher** if $< 20\%$ of HHs on in-kind; 28 of 32 camps classified.
- **Analysis sample**: 2,181 households (1,401 in-kind, 780 e-voucher); 4 camps unclassified at the 80/20 threshold.

Identification and Estimation

- We estimate the intent-to-treat (ITT) effect using OLS at the household level:

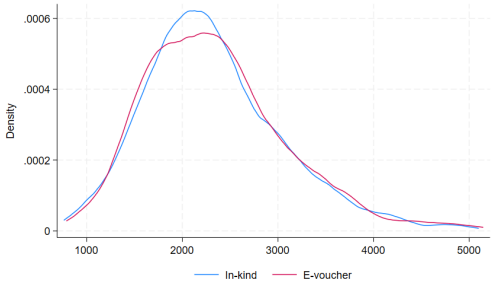
$$Y_{ci} = \beta_1 T_c + \gamma' X_i + \varepsilon_{ci}$$

  - Y_{ci} is our outcome of interest (consumption, probability of trade, etc).
  - X_i: hh-size, female-headship, dependency ratio, head's LFP and employment.
  - Survey-weighted; SE clustered at the camp level.

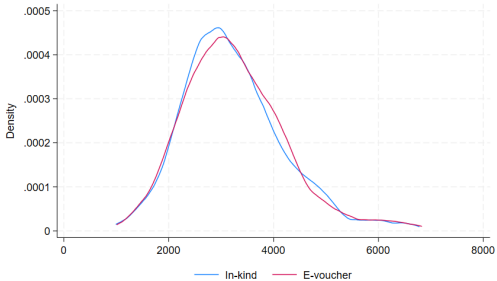
- **Identifying assumption.** Conditional on X_i, timing of camp conversion is orthogonal to unobservables affecting recipient outcomes.

- **Diagnostics.** Balanced on size, age, head characteristics. balance Robustness: 90/10 cutoff; in-kind sizes 2 or 4. details

Calories & Food Expenditure: Equal Across Modalities



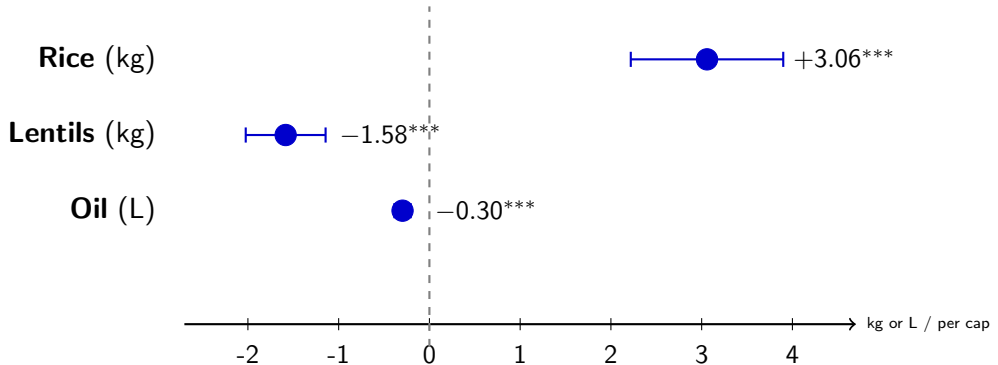
Per-capita daily calories



AME daily calories

- No significant difference in caloric intake or food expenditure.
- Robust to AME normalisation, item-level checks, and equal per-cap transfer (in-kind sizes 2 & 4). robustness regression table

Aid Composition: E-Voucher Households Pick More Rice



Revealed preference on lentils: in-kind receives 2.20 kg/cap and consumes about *half*;

e-voucher chooses 0.60 kg/cap and consumes *all*. Full Table.

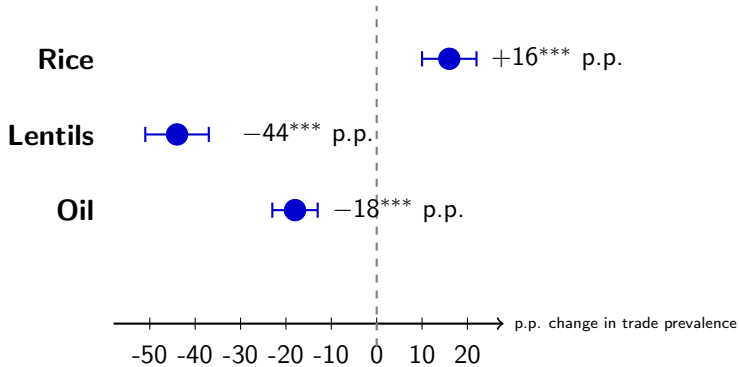
Rice Received vs. Rice Consumed: E-Voucher Households Are Net Sellers

Per-capita per month, in kg of rice:

	In-kind HHs	**E-voucher HHs**	**Difference**
Rice received from WFP	10.9	14.0	$+3.1^{***}$
Rice consumed	12.2	12.4	+0.2 (n.s.)
Net trade (consumed − received)	+1.3	−1.6	−2.9

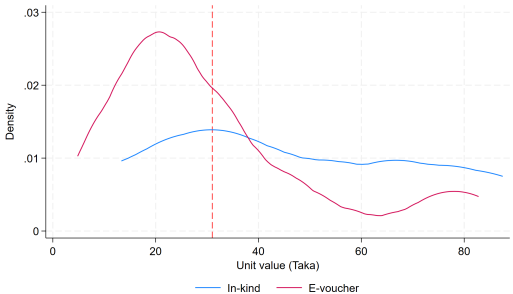
- In-kind households are net buyers.
- E-voucher households are net sellers.

Trade Prevalence by Item: Rice Rises Under E-Voucher

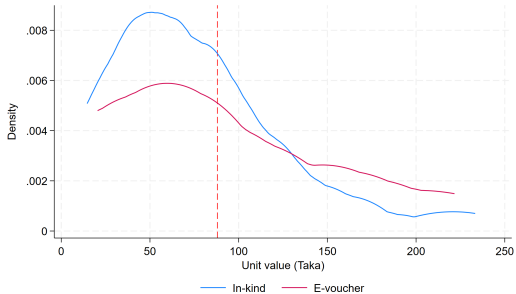


- Rice is the only aid item where trade prevalence *rises* under E-voucher.
- Informal trade is widespread under both modalities (9–60% across items).
- Mirrors the holdings pattern: more rice held → more rice traded. regression

Resale Unit Values: $\sim$ 10% Below WFP Store Prices for Rice, Lentils, Oil



Rice (Tk per kg)

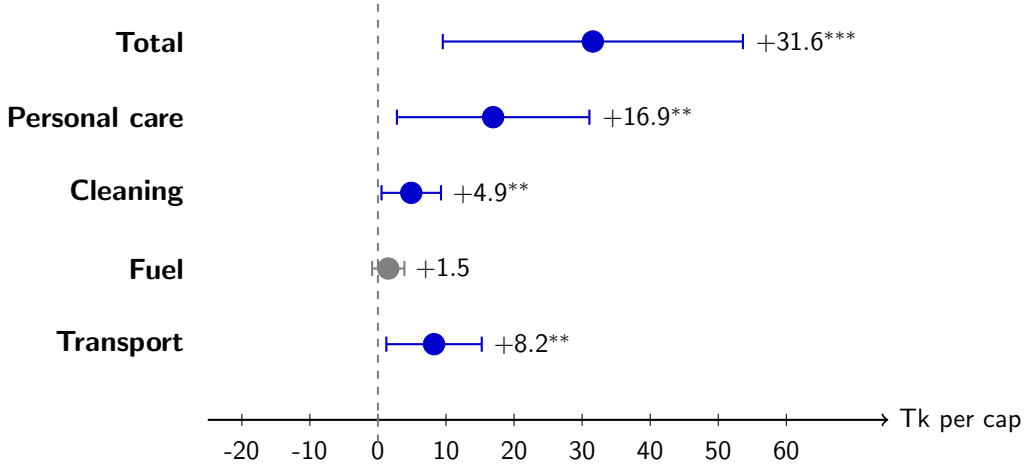


Oil (Tk per litre)

- Resale price distributions for rice and oil sit below WFP store prices (red dashed).
- Rice: median resale $\approx$ 28 Tk/kg vs WFP 31 Tk/kg, a $\sim$ 10% discount.

unit-value method

Non-Food Exp: E-Voucher Households Spend $\sim$ 50% More on Basics



$\Rightarrow$ E-voucher households spend more cash on items the voucher cannot buy.

- Not an income effect. Size-2/4 restriction: $\sim$ 35 Tk gap vs. $\sim$ 31 Tk main.

regression table | robustness

The Resale Discount Reveals High Valuation of Cash

- Recipients accept $\sim$ 10% below WFP store prices to resell rice for cash.
- Consistent with high marginal value of outside money (cash), used to buy non-food the basket excludes.
- 32% of E-voucher households sell rice; aggregate $\sim$ 3% of voucher value.

The 10% discount is the price of liquidity
and a lower bound on the marginal value of non-food.

Taking Stock: What Did We Find?

1. E-voucher households choose differently: more rice, fewer lentils and oil.
2. But food consumption **equalises** across modalities through trade.
3. The welfare gap is in **non-food**: $\sim 50\%$ more, $\sim 4\%$ of the e-voucher value.
4. Rice plays a **dual role**: consumption good and medium of exchange.
5. Resale prices sit $\sim 10\%$ below WFP store prices; households pay $\sim 3\%$ of the e-voucher value to get cash.

Recipients trade their way around the planner's restrictions.
The price they pay is the resale discount.

formal model

A Model That Rationalises the Empirics

- **Setup.** Households allocate between
  - Essential food (rice): provided by aid, tradable in a secondary market.
  - Non-essential goods (hygiene, transport): only accessible outside camp for cash.
- **Trade equalises food consumption.** E-voucher HHs (higher rice endowment) sell; in-kind HHs (lower rice endowment) buy. In equilibrium, both groups consume the same amount.
- **Cash differs, so non-food differs.** E-voucher HHs convert their larger food endowment into more cash $\rightarrow$ more non-food consumption.
- **Welfare gain** from E-voucher $\approx 4\%$ of voucher value.

$\Rightarrow$ *Restricting trade would not raise food consumption.*

Theory I (setup) Theory II (welfare)

Conclusion

1. **Modality affects welfare through non-food, not food.** Food expenditure and caloric intake equalise across modalities through secondary-market trade.
2. **Secondary-market trade is welfare-improving, not a leakage.** Resale and barter allow recipients to access goods excluded from the bundle. Restrictions on trade would not raise food consumption.
3. **Rice has intrinsic liquidity value in this context.** In the absence of cash assistance, rice fulfils this role. The implied cost of liquidity is a $\sim 10\%$ resale discount, $\sim 3\%$ of the e-voucher value, borne by recipient welfare.

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Thank you. Comments and questions welcome.

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Appendix

Theory I: Why Does Food Consumption Not Differ?

Back

- Quasi-linear utility:

$$U(c_x, c_d) = u(c_x) + c_d, \qquad u' > 0,\ u'' < 0$$

- c_x = essential food (rice); c_d = non-food, only accessible outside camp for cash.
- Endowments: $m^E > m^K$ (in-kind basket includes low-value lentils); both groups also hold cash d.
- Refugees can trade food x at exogenous price p_x in a secondary market.
- Equilibrium consumption:

$$c_x^E = c_x^K = u'^{-1}(p_x/p_d), \qquad c_d^J = d + p_x\left(m^J - u'^{-1}(p_x/p_d)\right)$$

$\Rightarrow$ Food consumption equalises; non-food differs ($c_d^E > c_d^K$).

Proposition 1. *Under quasi-linear preferences and an active secondary market, food consumption equalises across e-voucher and in-kind households; non-food consumption is higher under e-vouchers.*

Theory II →

Cash-vs-in-kind theory: Thurow (1974); Currie and Gahvari (2008).

Theory II: Welfare and Trade Persistence

Back

- Welfare gap is the cash equivalent of the non-food difference:

$$U^E - U^K = c_d^E - c_d^K = p_x(m^E - m^K) \approx 4\% \text{ of e-voucher value}$$

- Extension (Proposition 2): adding preference heterogeneity ($a_i u(c_x) + c_d$, with $a_i \in \{a_1, a_2\}$) generates trade *within* each regime as well, matching the data fact that both regimes trade extensively.
- As $m^K \to m^E$, the cross-regime gap shrinks but secondary-market trade persists via preference heterogeneity.

Implication. The observed secondary market is an equilibrium feature, not a deviation. Restrictions on trade would not raise food consumption.

← Theory I

Commodity money in cash-constrained economies: Radford (1945); Burdett, Trejos and Wright (2001).

Backup: WFP-UNHCR 2019 noticed the parallel market

Back

"Households under the in-kind modality were found to be more prone to selling parts of their assistance, predominately the pulses, as compared to households under the e-voucher modality. This was owing to their need to buy fresh food and vegetables, not provided in their current assistance package.

A large share of e-voucher beneficiaries on the other hand, use their monthly cash allowance to purchase large amounts of rice at the outlets. Anecdotal evidence suggest that rice is readily and easily re-saleable in the informal market, albeit at poor terms of exchange."

WFP–UNHCR Joint Assessment Mission (2019), p. 19.

Backup: Data

Back

- **Cox's Bazar Panel Survey (CBPS), Round 1, 2019.** Representative survey of Rohingya refugees and Bangladeshi hosts; 5,020 households, 2,495 Rohingya.
- **Modules used:** assistance (8 food categories, monthly receipt, trading and counterparties); consumption (7-day recall, 132 items mapped to assistance categories); household roster and socio-demographics.
- **WFP administrative records**: camp-level e-voucher beneficiary counts.
- **UNHCR population estimates**: denominator for the camp-level in-kind share.
- **Final analysis sample**: 2,181 Rohingya households; 1,401 in-kind camps, 780 e-voucher camps. 28 of 32 camps classified.

Backup: Robustness

Back

- **Stricter classification.** Camps with in-kind share $> 90\%$ vs $< 10\%$. Sample shrinks but main qualitative results hold (consumption equalisation; non-food gap; resale of rice).
- **Equal per-capita aid value.** Restrict in-kind sample to household sizes 2 and 4 (two baskets each, same US$9.5 per person as e-voucher). The non-food gap survives at ~ 35 Tk per capita per month, statistically indistinguishable from the ~ 31 Tk gap in the main sample.
- **Mechanism check.** Same restricted sample: in-kind households of sizes 2 and 4 receive 2.57 kg per capita per month of lentils but consume only 1.18 kg, trading the remaining 54%. They consume 0.72 kg per capita per month more rice than they receive, acquiring the difference through barter.
- **Resale price.** The ~ 28 Tk/kg unit value is robust to alternative item-mapping assumptions and alternative proxies for traded quantity.

Backup: Probability of resale (regression)

Back

	(1) Any Item	(2) Rice	(3) Lentils	(4) Oil
E-voucher	-0.232***	0.186***	-0.431***	-0.180***
	(0.050)	(0.046)	(0.058)	(0.035)
	[0.001]	[0.000]	[0.000]	[0.002]
	{0.003}	{0.000}	{0.000}	{0.001}
Observations	2150	2146	1912	2093
Controls	YES	YES	YES	YES
Control mean	0.605	0.121	0.567	0.259

Notes: E-voucher is a dummy equal to one if the household lives in a camp where e-voucher is used. Resale is defined as trading WFP-provided aid and receiving cash in return (SS07 = 01; SS08 non-missing). Column 1 is a household-level indicator equal to 1 if the household resold any of rice, lentils, or oil in the past month; Columns 2–4 use item-level indicators. Survey design used for standard errors in all regressions. Standard errors clustered at the camp level (28 camps) in parentheses; stars reflect these SEs. Wild cluster bootstrap p-values (Roodman et al. 2019; 9999 replications, bootstrap clusters = camps) in brackets. Randomization-inference p-values (Young 2019; 1999 camp-level permutations of treatment) in braces. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Backup: Food-aid regressions

Back

	(1) Rice (kg)	(2) Lentils (kg)	(3) Oil (liters)
E-voucher	3.059***	-1.584***	-0.296***
	(0.427)	(0.222)	(0.046)
Observations	2161	2161	2161
Controls	YES	YES	YES
In-kind mean (control)	10.885	2.197	1.001

Notes: E-voucher is a dummy equal to one if the household lives in a camp where e-voucher is used. Units in columns 1–2 are in kilograms; column 3 is in liters. Survey design used for standard errors in all regressions. Standard errors clustered at the camp level (28 camps) in parentheses; stars reflect these SEs. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Backup: Food-consumption regressions

Back

	WFP goods				
	In-kind food			*WFP-store only food*	
	(1) Rice	(2) Lentils	(3) Oil	(4) Corn	(5) Dairy
E-voucher	0.180	-0.412***	-0.063	0.014	0.017
	(0.232)	(0.093)	(0.041)	(0.097)	(0.017)
Observations	2161	2161	2161	2161	2161
Controls	YES	YES	YES	YES	YES
In-kind mean (control)	12.162	1.042	0.965	0.574	0.035

Notes: E-voucher is a dummy equal to one if the household lives in a camp where e-voucher is used. Columns 1, 2, and 4 are in kilograms. Columns 3 and 5 are in liters. Survey design used for standard errors in all regressions. Standard errors clustered at the camp level (28 camps) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Backup: Non-food regressions

Back

	(1) All	(2) Personal care	(3) Cleaning supplies	(4) Fuel	(5) Transport
E-voucher	31.578***	16.927**	4.893**	1.516	8.242**
	(11.249)	(7.214)	(2.232)	(1.210)	(3.579)
Observations	2161	2161	2161	2161	2161
Controls	YES	YES	YES	YES	YES
Control mean	65.822	18.305	9.796	0.715	37.006

Notes: E-voucher is a dummy equal to one if the household lives in a camp where e-voucher is used. Column 1 includes the total non-food per-capita expenditure across items; Column 2 includes Cosmetics and personal care products (soap, shampoo, toothpaste, toilet paper, cosmetics, etc.); Column 3 includes Household supplies & cleaning products (soap, washing powder, detergents, cleaning products, garbage bags, paper napkins, aluminum foil, matches, candles, lamp wicks, etc.); Column 4 includes Fuels and lubricants for personal vehicles (diesel, gas/petrol, alcohol and two-stroke mixtures; lubricants, brake and transmission fluids, etc.); and Column 5 includes Passenger transport by road (bus, minibus, taxi, etc.) or railway. Standard errors clustered at the camp level (28 camps) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Backup: What aid items are exchanged for

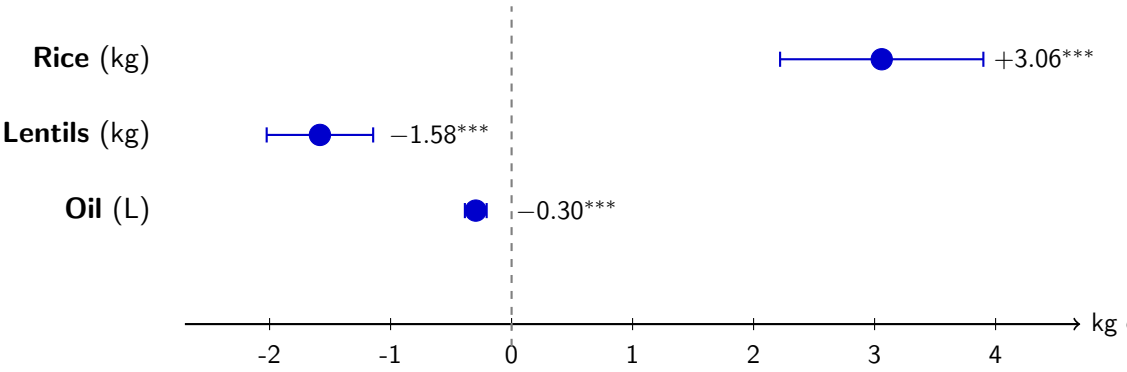
Back

What do households receive in exchange?							
Item	**Cash**	**Vegetables**	**Fish/Meat**	**Grain**	**Spices**	**HH Items**	**Other**
Rice	44%	51%	10%	27%	7%	8%	7%
Lentils	94%	5%	3%	2%	2%	1%	1%
Oil	95%	2%	1%	1%	2%	1%	0%

Rice alone is widely bartered for goods. Lentils and oil are almost exclusively resold for cash. The dual role of rice (consumption good and medium of exchange) shows up nowhere else in the basket.

Backup: Coefficient plot, food aid received

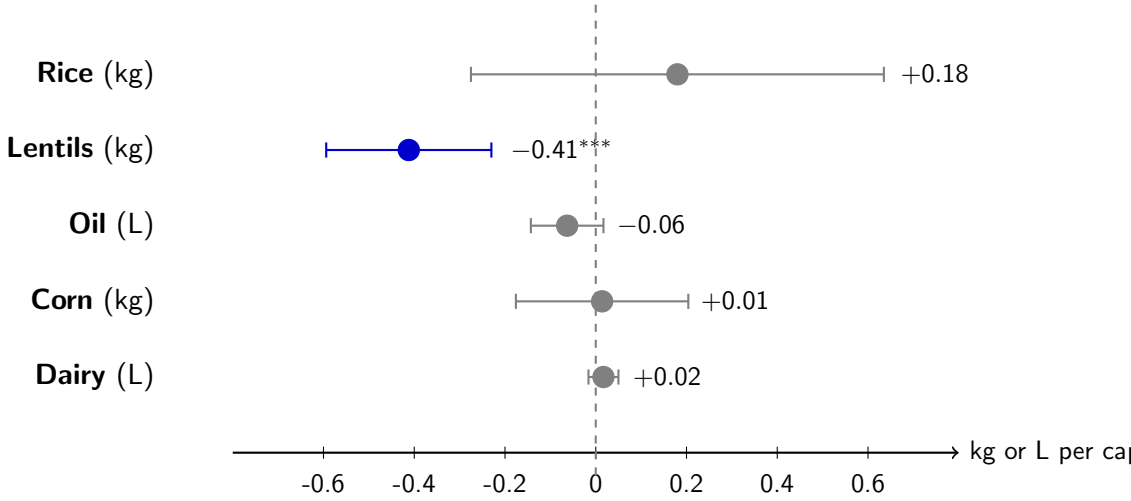
Back



Point estimates and 95% confidence intervals, camp-clustered SE. From table_3_total_aid_pc. See full table at table.

Backup: Coefficient plot, food consumption

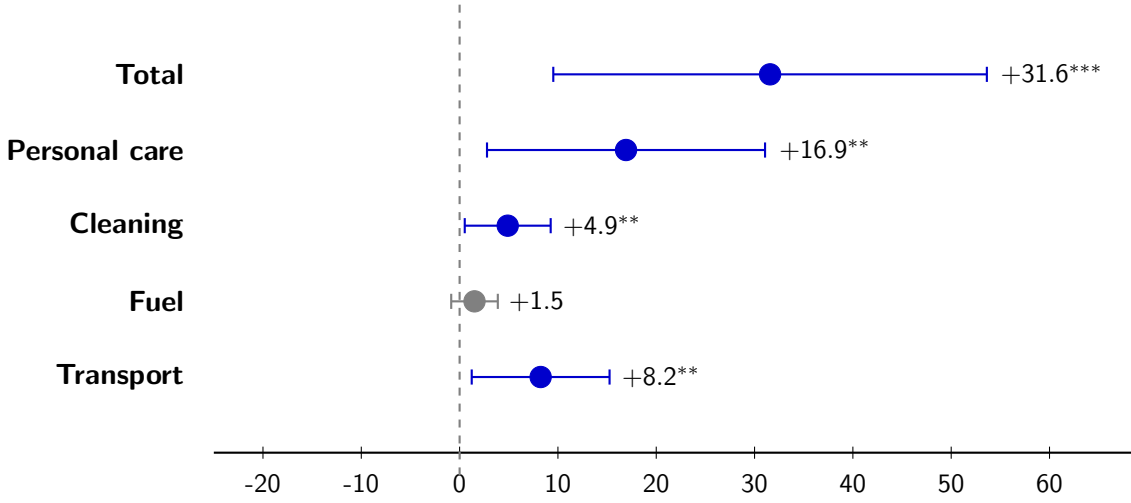
Back



Point estimates and 95% CI, camp-clustered SE. Significant: lentils only. From table_4_Cons_pc.

Backup: Coefficient plot, non-food expenditure

Back



Point estimates and 95% CI, camp-clustered SE. Significant: all except fuel. From table_nonfood_pc.

table

Backup: Balance Table

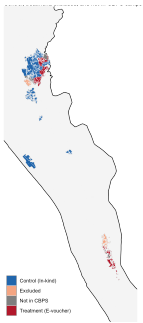
Back

Variable	In-Kind	E-voucher	Difference	SE	p-value	N
Head is male	0.247	0.310	0.063	0.022	0.004	2181
Head Age	38.315	37.662	-0.654	0.689	0.344	2181
Head has no schooling	0.603	0.628	0.025	0.029	0.387	2181
Head is Muslim	0.999	0.998	-0.001	0.002	0.412	2181
Head is Bengali	0.008	0.007	-0.001	0.005	0.773	2181
Head born in Myanmar	0.982	0.971	-0.011	0.008	0.154	2181
Household size	5.035	4.971	-0.064	0.112	0.569	2181
Working age members	2.431	2.346	-0.084	0.063	0.185	2181
Members under 15	2.493	2.509	0.017	0.084	0.841	2181
Adults 65 and over	0.112	0.115	0.004	0.015	0.811	2181
Dependency ratio	1.226	1.336	0.110	0.049	0.025	2161
Head in labor force	0.619	0.580	-0.039	0.022	0.078	2181
Head is employed	0.643	0.716	0.073	0.035	0.037	1148
Head unemployed	0.480	0.423	-0.057	0.035	0.107	1323
Worked hours by Head	33.299	35.041	1.742	1.879	0.355	609
Head Wage	313.382	298.585	-14.797	13.024	0.258	854

Notes: The table reports characteristics of the household head, including sex, age, religion, nationality, labor force participation, employment status, unemployment status, hours worked, and wage. Household composition variables include the number of children under 15, the number of adults aged 65 and above, household size, the number of working-age adults, and the household dependency ratio. SE stands for standard error. Share of Households in E-voucher camps 36%

Backup: Camp Map

Back



Camp classification under the 80/20 cutoff: in-kind (green), e-voucher (orange), excluded (grey).

Backup: Assistance Questionnaire

Back

SS01. Did your household receive (…) in the past year?	**SS02.** Did your household receive (…) in the last month?	**SS03.** Who gave you this (…) the last time?	**SS04.** How much did your household receive in the last month?		**SS05.** Did you barter for part of (…) in the past month?	**SS06.** Did you barter for the majority (more than 50%) of (…)?	**SS07.** What do you get in exchange? **[SELECT ALL THAT APPLY]**	**SS08.** How much cash did you receive in exchange? **[ANSWER ONLY IF CASH IS SELECTED IN SS07]**	**SS09.** With whom do you barter? **[SELECT ALL THAT APPLY]**
			a. Amount in weight/volume/ number	b. Unit					
01. Yes 00. No →**NEXT SOURCE**	01. Yes 00. No								
"	"	01. Government of Bangladesh 02. UNHCR 03. IOM 04. BRAC 05. UNICEF 06. WFP 07. Other UN agency 08. Other NGO(s) 09. Religious organizations -96. Other, specify							
"	"		|_|_|_|_|	01. gr 02. kg 03. ml 04. liter 05. Number	01. Yes 00. No →**NEXT SOURCE** -97. Refused → **NEXT SOURCE** -99. Don't know →**NEXT SOURCE**	01. Yes 00. No	01. Cash 02.Vegetables →**SS09** 03. Fish/meat →**SS09** 04. Food grains (mainly cereal like mun) →**SS08** 05. Spices and condiments →**SS08** 06.Household items →**SS08** -96. Others, specify →**SS08** -97. Refused →**SS08** -99. Don't know →**SS08**	|_|_|_|_| takas	01. Myanmar nationals 02. Bangladeshis

Backup: Trade detail

Back

Assistance	Received	Traded	Traded $> 50\%$	with Rohingya?	with Bangladeshi?
Rice	100%	45%	23%	58%	54%
Pulses	98%	46%	65%	49%	54%
Oil	99%	20%	38%	46%	57%

Source: CBPS Round 1 assistance module. Trade is widespread across both refugee and host counterparties.

Backup: Variable construction and unit values

Back

- **Trade definition**: barter (goods-for-goods) and resale (goods-for-cash). Observed at the household-item level in the assistance module.
- **Tradable aid** for household i, item j:

$$\text{Tradable}_{ij} = \text{AidReceived}_{ij} - \text{Consumed}_{ij}$$

- **Resale unit value** (cash received per unit of aid):

$$\text{Price}_{ij} = \frac{\text{CashReceived}_{ij}}{\text{TradedQuantity}_{ij}}$$

- **Identifying assumption**: $\text{TradedQuantity}_{ij} = \text{Tradable}_{ij}$. Households are hand-to-mouth, monthly e-voucher balance expires, dense camp setting limits storage. Intra-temporal trade assumption.
- **Robustness**: alternative proxies for TradedQuantity (e.g., upper / lower bounds based on inventory balance) give qualitatively unchanged results (**??** in the paper).
- **Winsorization**: raw quantity and expenditure variables winsorized once at the 95th percentile using positive values within each food category. Unit values not re-winsorized to avoid double-treatment.