AUSTRALIAN CONFERENCE OF ECONOMISTS
6-9 JULY 2025, SYDNEY
ECONOMICS FOR A CHANGING WORLD

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Maternal Access to Rural Advisory Services and Child Nutrition: Impacts and Pathways

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Presentation Outline

- Introduction
- Theoretical framework
- Data
- Empirical strategy
- Empirical results
- Conclusions and policy implications

Introduction

- Notwithstanding global progress in child nutrition in recent decades, undernutrition remains widespread, especially in rural areas (FAO, IFAD et al. 2023).
- The increasing significance of early childhood nutrition has sparked a surge in initiatives and interventions to decrease child malnutrition.
- Despite the existence of numerous interventions, their effectiveness is often under researched, particularly in rural areas where poverty and food and nutrition insecurity are prevalent.
- Regardless of establishing connections with sectors like agriculture, evaluations reveal inconsistent outcomes.

Introduction (continued)

- Women's empowerment is linked to child nutrition in various world regions (Christian, Atiglo et al. 2023).
- This benefits women's social standing and authority within the household and positively impacts child nutrition and health (Majlesi 2016)
- Due to the rural nature of child malnutrition efficiently using agriculture to enhance nutritional results is crucial (Qaim and Sibhatu 2018)
- Rural advisory services, with its well-developed infrastructure and coverage provides a unique opportunity to execute large-scale nutrition interventions, reaching numerous rural farm households.
- Maternal access to RAS impacts child nutrition through four pathways, namely changes in (1) innovation adoption, (2) productivity improvement, (3) market access, and (4) household income.

Theoretical framework

- We employ the unitary household model by Becker (1993) and the extension of it by Debela et al. (2020). Assume that the household consists of a husband, a wife and a child.
- The household utility on the consumptions (C) and the investment in human capital stock (H). Household utility (U) is maximized subject to a budget constraint and the human capital production function

$$\max U(C, H)$$

s.t.

$$C = w_i l_i + Y_i - p_c \qquad \ldots. (1)$$

$$H = f[(T_i - l_i), p_c]$$

The wage, w_i each mother receives depend on the set of jobs available, her skill and her personal characteristics, such that $w_i = w_i(J_i, X_i)$. At a particular wage, the household determines how much she will work, which could be on-farm and/or off-farm (l_i). T_i is the total time available to the mother for employment and childcare. That is, the time allocated to childcare. p_c is the monetary investment in the child which depends on mother's income from employment $(w_i l_i)$ and other family income (Y_i). The health outcome (H) depends on the time allocated for childcare $(T_i - l_i)$ and monetary investment in the child.

Theoretical framework(continued)

- Assume that effective participation in a RAS could impact child nutrition through the changes in the marginal value of labor. RAS could increase the wage, w_i^r due to the enhancement of skill set and the subsequent expansion of the set of jobs/activities available to the mother $(\text{i.e., } w_i^r > w_i)$.

- To the extent that household utility increases in child human capital, the household could spend more on child-specific consumption goods.

- An increase in wages due to the RAS should increase investment in childcare.

- However, increased wages would increase the mother's labor supply, reducing the time available for childcare.

- Therefore, there is a potential tradeoff between the effects of income and time allocation.

Data

-World Banks' Integrated Household Panel Survey (IHPS) from Malawi

-Unbalanced panel data-2010/11, 2013, 2016/17 and 2019/2020

-Unit of analysis: Children under 5 years of age (4300) and their mothers (3578)

Empirical Strategy

- The overall general specification for the paper takes the form

$$CDN_{imt} = \alpha_0 + \beta_1 MRAS_{mt} + \chi_2 MS_{mt} + \varphi_3 MD_{mt} + \lambda_4 CD_{it} + \gamma_5 MT_{mt} + \zeta_6 X_{ht} + \phi_7 L_{jt} + \delta_8 T_t + a_m + \varepsilon_{imt} \quad (2)$$

CDN_{imt} child nutrition outcomes (i.e., HAZ, WAZ, WHZ, Stunting, Wasting, and Underweight)

$MRAS_{mt}$ maternal access to RAS (dummy)

MS_{mt} source (Government and Private) of RAS (dummies)

MD_{mt} delivery mode (farmer field school, lead farmer group and mass media) of RAS (dummies)

CD_{it} vector of child characteristics

MT_{mt} vector of maternal characteristics

X_{ht} vector of household characteristics

Empirical Strategy(continued)

- L_{jt} region fixed effect
- T_{it} time fixed effect
- a_m time-invariant mother specific unobserved heterogeneity, or time-invariant element beyond control

- **Correlated Random Effects-Control Function Model** (Bates, Papke et al. 2024)

To control for endogeneity and time-invariant unobserved heterogeneity while accounting for missing time periods for some units

- **Exogeneity of instrument**

We utilize the presence of an extension officer in the community based on literature (Kubitza and Krishna 2020) as an instrument to fulfill essential criteria in employing the control function technique(Wooldridge 2015)

Empirical Strategy(continued)

Table A3: Testing and relaxing the exclusion restriction (D'Haultfœuille et al., 2024)

Variable	KS Statistics	P-value
HAZ	0.231	0.675
WAZ	0.356	0.330
WHZ	0.291	0.456
STUNTING	0.173	0.284
WASTING	0.139	0.413
UNDERWEIGHT	0.108	0.338

Null hypothesis: Exclusion restriction is satisfied.

Empirical Strategy(continued)

- **Causal Mediation Effects** (Hicks and Tingley 2011)

- Evaluation of agricultural interventions on nutrition outcomes has primarily focused on quantifying their effects and direction, rather than examining specific pathways (Webb and Kennedy 2014).

- **Robustness Check**

-We employed the interactive fixed effect counterfactual (IFEct) estimator to further address unobserved time-varying factors that could affect results (Liu et al., 2022).

-Addresses this key shortcoming of the most used difference-in-difference approach by using a factor-augmented model to relax the strict exogeneity assumption.

Empirical Results

- **Descriptives Statistics**

Table 1: Descriptive statistics

	Pooled Sample		Maternal rural advisory services				
			Without access		With access		
Variable	Mean	SD	Mean	SD	Mean	SD	Mean Difference
Outcome variable							
Height-for-age z-score (HAZ)	-1.404	0.689	-1.318	0.613	-1.432	0.709	0.114***
Weight-for-age z-score (WAZ)	-1.198	0.947	-0.953	0.893	-1.275	0.951	0.322***
Weight-for-height z-score (WHZ)	-1.356	1.082	-1.128	0.750	-1.427	1.158	0.298***
Stunting (HAZ<-2)	0.335	0.472	0.238	0.427	0.365	0.482	-0.127***
Wasting (WHZ<-2)	0.346	0.476	0.328	0.470	0.351	0.477	-0.023
Underweight (WAZ<-2)	0.154	0.361	0.073	0.260	0.180	0.384	-0.107***
Treatment variable							
Maternal rural advisory services (=1)	0.760	0.426	-	-	-	-	-
Mediator (source)							
Government/public (=1)	0.231	0.422	-	-	-	-	-
Private (=1)	0.190	0.392	-	-	-	-	-
Mediator (mode)							
Farmer field school (=1)	0.163	0.369	-	-	-	-	-
Lead farmer group (=1)	0.046	0.209	-	-	-	-	-
Mass media (=1)	0.198	0.398	-	-	-	-	-
Child characteristics							
Gender of child (=1 male)	0.506	0.500	0.509	0.500	0.505	0.500	0.003
Age of child (months)	27.567	14.580	26.918	13.807	27.771	14.811	-0.852
Maternal characteristics							
Mother's years of schooling (year)	1.252	2.920	0.088	0.653	1.618	3.243	-1.530
Mother's age (year)	44.634	16.954	44.087	16.555	44.806	17.077	-0.718
Mother's credit access (=1)	0.063	0.242	0.002	0.044	0.082	0.274	-0.080***
Mother's off-farm work (=1)	0.799	0.401	0.978	0.148	0.743	0.437	0.235***
Household characteristics							
Farm size (ha)	0.116	0.251	0.014	0.111	0.148	0.273	-0.133***
Household size (number)	1.511	2.630	0.175	1.062	1.931	2.829	-1.756***

Variable	Pooled Sample		Maternal rural advisory services				Mean Difference
			Without access		With access		
	Mean	SD	Mean	SD	Mean	SD	
Distance to nearest ADMARC (km)	2.196	4.245	0.257	1.802	2.807	4.596	-2.550***
Distance to the nearest asphalt road (km)	10.692	11.428	5.327	7.661	12.382	11.890	-7.055***
Distance to the nearest extension office (km)	1.999	4.231	0.164	1.002	2.577	4.672	-2.413***
Extension agent in the community (=1)	0.120	0.325	0.015	0.120	0.154	0.361	-0.139***

***, **, and * denote significance levels of 1%, 5%, and 10%.

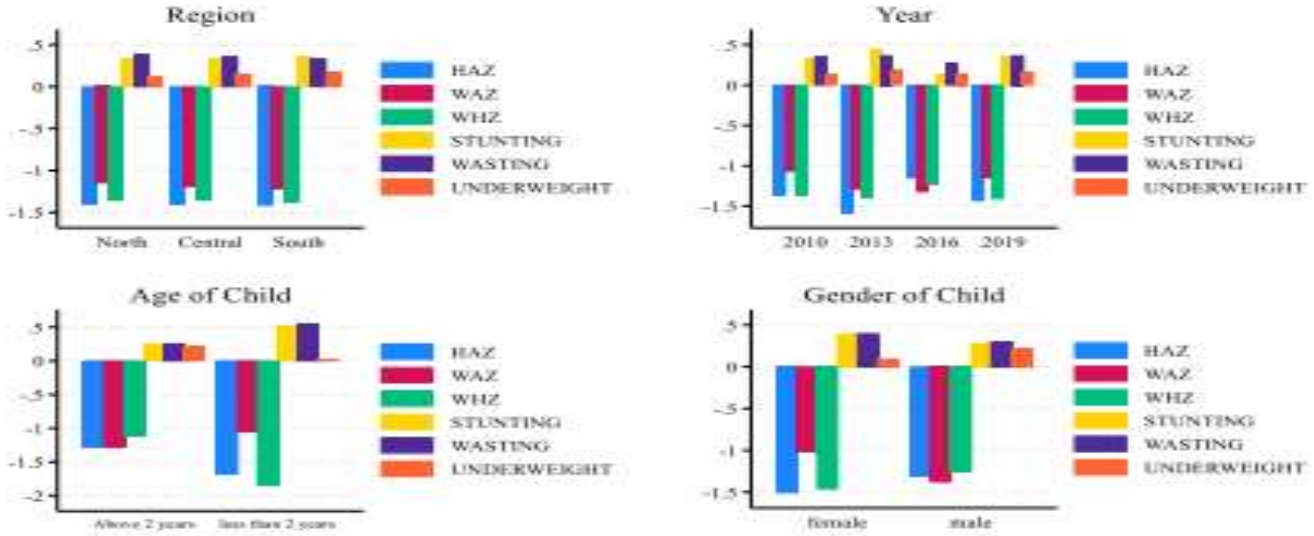

Figure 1: Mean anthropometrics by regions, years, age, and child gender.

Table 2: CRE-CF results of the effect of maternal rural advisory services access on child nutrition.

PANEL A	HAZ		WAZ		WHZ	
	Coeff.	SE	Coeff.	SE	Coeff.	SE
Maternal rural advisory services access	-0.659***	0.199	-0.133	0.277	-0.889***	0.310
Gender of child	0.158***	0.036	-0.457***	0.053	0.257***	0.048
Log (Age of child)	0.190***	0.034	-0.023	0.054	0.267***	0.045
Log (Mother's years of schooling)	0.037	0.070	-0.022	0.097	0.006	0.117
Log (Mother's farm size)	-0.270	0.218	-0.206	0.252	-0.322	0.269
Log (Household size)	-0.056	0.104	0.015	0.131	0.069	0.202
Log (Mother's age)	0.484	0.748	-0.486	1.053	1.458	1.257
Log (Distance to the nearest asphalt road)	0.051	0.064	0.012	0.086	-0.017	0.112
Log (Distance to the nearest extension office)	-0.092	0.092	0.074	0.113	-0.193	0.151
Log (Distance to the nearest ADMARC)	0.038	0.064	-0.040	0.084	-0.127	0.119
Mother's credit access	-0.027	0.090	0.041	0.110	0.094	0.108
Mother's off-farm work	-0.144**	0.067	-0.087	0.096	0.042	0.097
RAS*Gender of Child	0.036	0.043	0.120*	0.063	-0.093	0.062
RAS*Age of Child	0.127***	0.037	-0.037	0.057	0.205***	0.052
RAS*Maternal Farm size	0.064	0.170	-0.226	0.201	-0.315*	0.189
RAS*Maternal Credit Access	0.107	0.091	0.104	0.112	-0.108	0.116
RAS*Maternal Off-farm work	0.188**	0.081	-0.082	0.117	0.018	0.128
Mundlak variables	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Interactions	Yes	Yes	Yes	Yes	Yes	Yes
Residuals	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-2.980**	1.377	0.593	1.894	-4.532*	2.371

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Empirical Results (continued)

- **Robustness check**

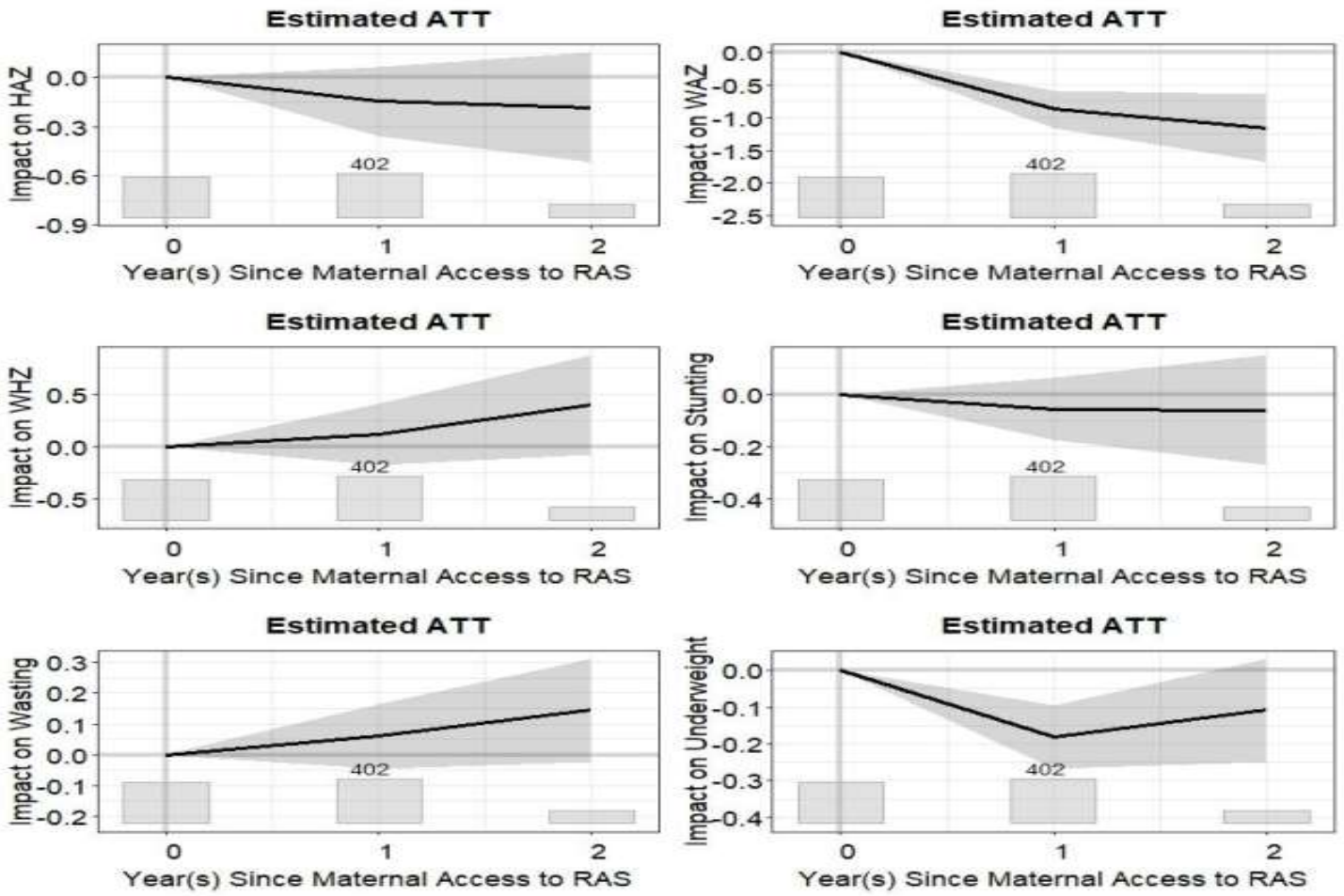

Figure 2: Dynamic treatment effect of interactive fixed counterfactual estimator of the impact of maternal access to RAS on child nutrition.

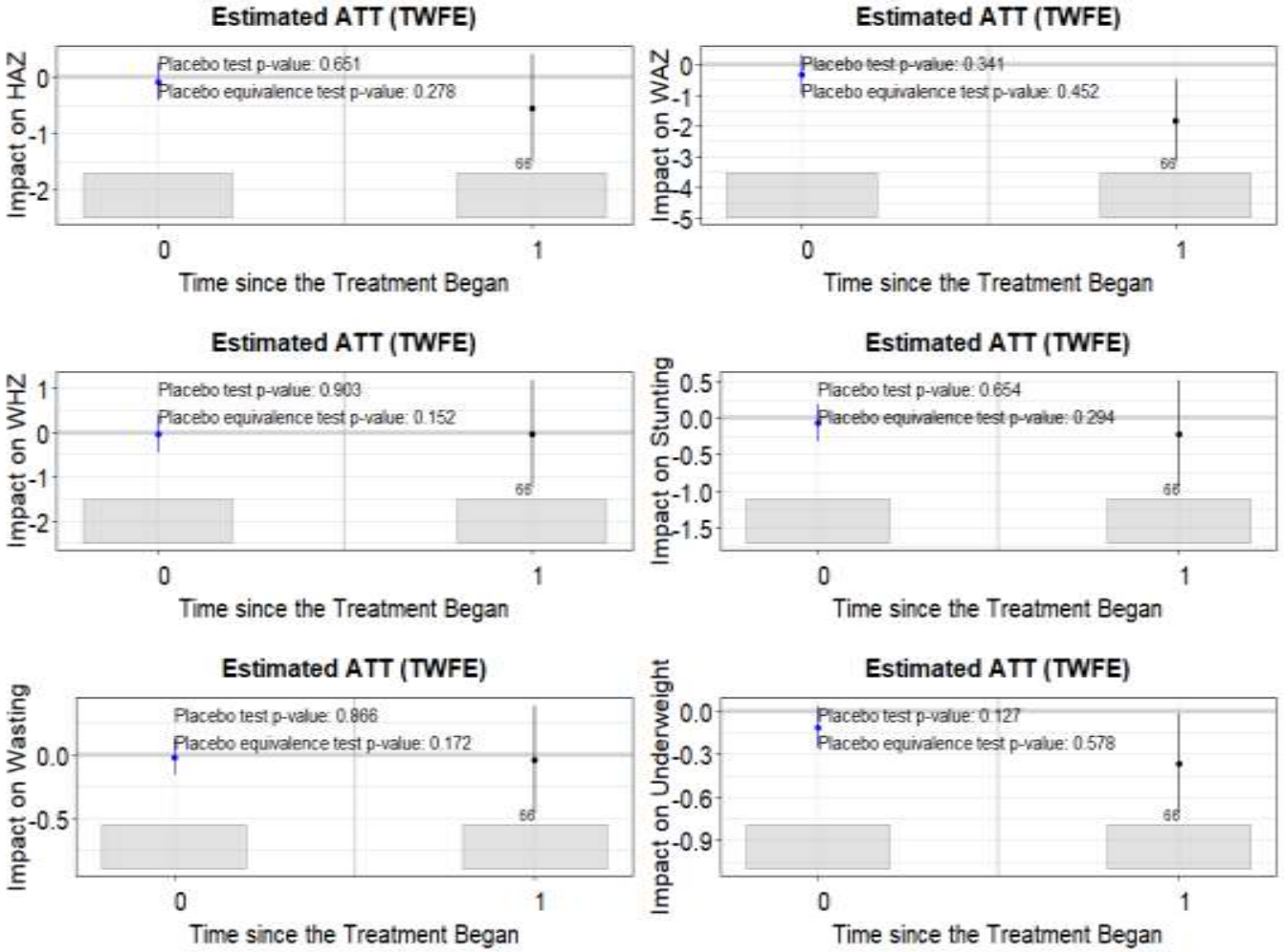

Figure 3: Placebo test of interactive fixed counterfactual estimator of the impact of maternal access to RAS on child nutrition.

Empirical Results (continued)

- **Causal Mediation Analysis**

Table 3: Mediation effect analysis of child nutrition measures

	ACME	ADE	Total Effect	% Total Mediated	ACME sensitivity parameter ρ
HAZ					
Government source	0.003	-0.127**	-0.124**	-0.022	-0.100
Private source	-0.093**	-0.673**	-0.766**	0.121	-0.600
Farmer field school	-0.152**	-0.603**	-0.756**	0.201	-0.400
Lead farmer	0.003	-0.752**	-0.748**	-0.005	0.000
Mass media	-0.101**	-0.656**	-0.757**	0.134	-0.400
WAZ					
Government source	-0.002	-0.333**	-0.336	0.008	0.000
Private source	-0.012**	-0.325**	-0.337**	0.036	-0.200
Farmer field school	-0.010**	-0.327**	-0.337**	0.030	-0.100
Lead farmer	-0.000	-0.337**	-0.337**	0.000	0.100
Mass media	-0.008**	-0.330**	-0.338**	0.023	-0.100
WHZ					
Government source	0.005	-0.428**	-0.422**	-0.013	0.000
Private source	0.011	-0.431**	-0.420**	-0.027**	0.100
Farmer field school	0.001	-0.423**	-0.421	-0.003	0.000
Lead farmer	-0.003	-0.421**	-.424**	0.007	0.300
Mass media	0.015	-0.436**	-0.421**	-0.036	0.100
STUNTING					
Government source	-0.001	-0.129**	-0.130**	0.009	0.000
Private source	-0.016**	-0.115**	-0.131**	0.121	-0.700
Farmer field school	-0.022**	-0.107**	-0.129**	0.174	-0.400
Lead farmer	0.001	-0.129**	-0.128**	-0.004	0.000
Mass media	-0.016**	-0.113**	-0.130**	0.127	-0.400
WASTING					
Government source	0.001	-0.009	-0.008	-0.023	0.000
Private source	0.003	-0.011	-0.008	-0.117	0.100
Farmer field school	0.004	-0.012	-0.008	-0.145	0.100
Lead farmer	-0.001	-0.008	-0.009	0.035	0.300
Mass media	0.005	-0.012	-0.007	-0.178	0.100
UNDERWEIGHT					
Government source	0.002	-0.121**	-0.120**	-0.014**	0.000
Private source	-0.004**	-0.115**	-0.119**	0.032	-0.200
Farmer field school	-0.003**	-.117**	-0.120**	0.026	-0.100
Lead farmer	0.000	-0.120**	-0.120**	-0.003	0.000
Mass media	-0.003**	-0.117**	-0.120**	0.027	-0.100

***, ** and * denotes significance level of 1%, 5%, and 10%

Conclusions and Policy Implications

- Maternal access to RAS statistically reduces HAZ and WHZ while decreasing the probability of the child being stunted and wasting.
- Maternal access to RAS reduced the prevalence of stunting and wasting in children by 39.1 and 19 percentage points, respectively
- Maternal access to RAS decreased height-for-age and weight-for-height scores by 0.659 and 0.889 standard deviations, respectively.
- Heterogeneity in the effect of maternal access to RAS on the various child nutrition outcomes based on the age and gender of the child
- Government, private sources, farmer field schools, and mass media modes positively affect child nutrition.

Conclusions and Policy Implications (continued)

Recommendations and Further Research

- Interventions, such as education, training, and off-farm work options, to empower women, enhance their access to productive resources, and enhance access to RAS to improve child nutrition.
- Both governmental and private sources should be enhanced to facilitate the delivery of RAS, especially among mothers.
- Encourage the implementation of farmer field schools and mass media modes of RAS among mothers or women as they are likely to be more effective.
- Additional study is necessary to assess the different models' cost-effectiveness in delivering rural advisory services to women and their impact on child nutrition outcomes.