Characterizing adopters of sustainable intensification innovations: Evidence from the Africa RISING (AR) program in Malawi and Tanzania

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1. Objective

- Compare beneficiaries of AR[1] agricultural technology innovations with randomly selected non-beneficiaries and control households in Malawi and Tanzania, using geographic information systems and baseline household survey data.
- Conduct targeting analysis to inform and support future farmers' selection, based on statistical methods.

2. Methodology

- Three groups of households are compared: beneficiaries, non-beneficiaries in targeted villages, and non-beneficiaries in non-targeted villages (in the same agricultural potential area of targeted villages, but sufficiently far from target villages to avoid contamination).
- Descriptive statistics are complemented with inferential analysis using multivariate regression techniques (not shown here).

[1] Africa RISING is a research-for-development program that aims to create opportunities for smallholder farmers to move out of hunger and poverty through sustainable intensification of their farming systems

3A. Descriptive – Household level summary (Malawi –left panel-; Tanzania –right panel-)

	AR beneficiary	Non-Beneficiary	Control	1 vs 2	1 vs 3	2 vs 3
	(1)	(2)	(3)	(4)	(5)	(6)
Household (hh) size	4.95	4.58	4.59	**	***	
Avg. adult yrs of education	5.21	4.53	4.73	***	***	
% of hh w/ female head	0.27	0.35	0.34	*	**	
Total wealth index	0.20	-0.10	-0.11	***	***	
Total value of animals owned(MWK)('000)	63.6	36.7	24.0	**	***	**
Tropical livestock units-total	0.46	0.29	0.21	***	***	**
Per capita land operated(ha)	0.28	0.24	0.23	**	***	
% of hhs with closest parcel <15 minutes(one way)	0.75	0.57	0.54	***	***	
Average travel time to seed supplier(minute&oneway)	43.2	42.5	38.9			
Amount of fertilizer used(kg)	118.2	87.3	80.2	***	***	
Total person-days used(incl. communal labor)	327.2	253.2	228.5	***	***	
Value of all crops harvested(MWK)('000)	203.5	155.4	125.5	**	***	*
Value of AR target crops harvested(MWK)('000)	131.3	110.2	85.7	***	***	***
% of hhs using improved variety:maize	0.87	0.63	0.62	***	***	
Yield of maize(kg/ha)	2389.8	2332.5	1828.7		***	***
% of hhs practicing intercropping	0.82	0.86	0.68		***	***
% of hhs using irrigation: rainy season	0.010	0.0049	0.0074			
% of hhs using manure on (any) plot in either season	0.68	0.57	0.43	***	***	***
Observations	398	205	539	603	937	744

*p<0.10, **<0.05; ***<0.001

	AR beneficiary	Non Beneficiary	Control	Babati IE	1 vs 2	1 vs 3	1 vs 2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Household(hh) size	7.41	5.96	5.43	6.22	***	***	***
Avg adult yrs of education	7.97	7.49	7.09	7.72	*	***	*
% of hh w/ female head	0.088	0.13	0.17	0.11		**	
Total wealth index	0.59	0.069	-0.27	0.021	***	***	***
Total value of animals owned(TSH)('000)	2354.0	1058.2	1806.0	1709.9	***		***
Tropical livestock units-total	4.57	2.50	4.24	3.14	***		***
Per capita land operated(ha)	0.26	0.49	0.59	0.27	***	***	***
% of hhs with closest parcel <15 minutes(one way)	0.90	0.61	0.60	0.81	***	***	***
Average travel time to seed supplier(minute&oneway)	41.2	32.0	66.1	53.0	**	***	**
% of hhs practicing intercropping	0.91	0.79	0.62	0.94	**	***	**
% of hhs using irrigation	0.020	0.0096	0.023	0.032			
% of hhs using manure	0.77	0.41	0.37	0.71	***	***	***
% of hhs using improved variety:maize	0.92	0.42	0.37	0.85	***	***	***
Yield of maize(kg/ha)	2704.6	1431.8	1323.9	2538.5	***	***	***
Observations	102	104	265	317	206	367	206

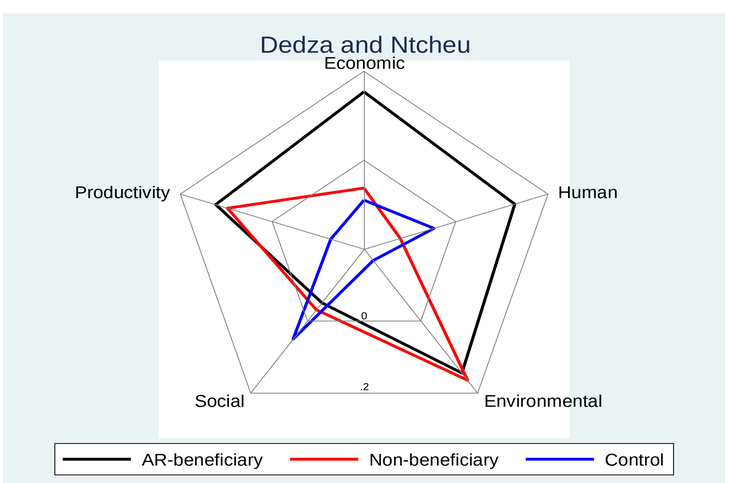
*p<0.10, **<0.05; ***<0.001

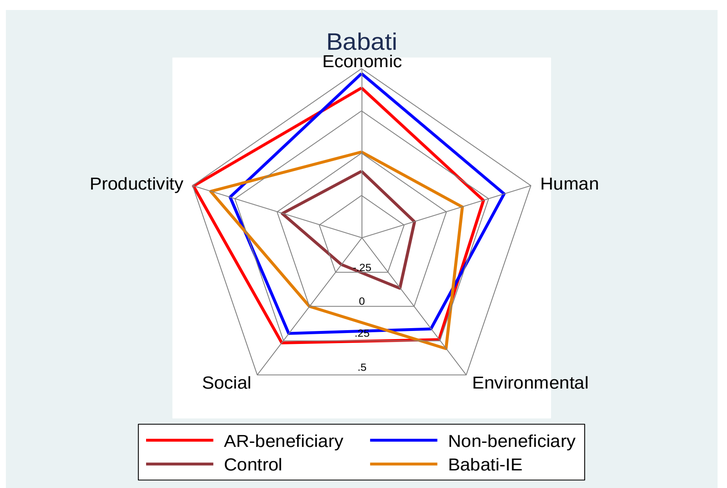
3B. Descriptive – Community level summary (Malawi –left table and radar- and Tanzania –right table and radar-)

	AR villages	Non-AR villages	1 vs 2
	(1)	(2)	(3)
LGP(date)	162.5	161.8	
Slope(degree)	1.35	1.00	
Mkt access(Minutes travelled to nearest 50K)	235.5	182.9	**
PopDen(# per sqkm)	198.6	332.1	***
Rainfall(mm)	937.3	919.4	***
Temp(Celsius*10)	212	209.9	
% of villages in tropic_warm/semiarid aez	0.85	0.75	
Access to basic services index	0.075	-0.043	
% of villages w/ extension services	0.96	0.68	***
% of villages w/ veterinary services	0.48	0.71	*
% of villages w/ primary livestock market	0.28	0.18	
% of villages w/ farmers cooperative groups	0.85	0.46	***
% of villages w/ access to improved maize seed	0.46	0.43	
Observations	26	28	54

	AR villages	Non-AR villages	1 vs 2
	(1)	(2)	(3)
LGP(date)	177.9	175.6	
Slope(degree)	2.80	1.87	
Mkt access(Minutes travelled to nearest 50K)	130.4	186.1	
PopDen(# per sqkm)	35.3	31.4	
Rainfall(mm)	761.1	754.6	
Temp(Celsius*10)	201	197.6	
% in tropic_warm/semiarid aez	0.45	0.57	
Access to basic services index	0.12	-0.048	
% of villages w/ extension services	1	1	
% of villages w/ veterinary services	0.57	0.39	
% of villages w/ primary livestock market	0.71	0.67	
% of villages w/ farmers cooperative groups	0.29	0.33	
% of villages w/ access to improved maize seed	1	0.72	
Observations	7	18	25

*p<0.10, **<0.05; ***<0.001





Economic = HH expenditure/wealth; Human = education; Environmental = Soil type, Social =market access, Productivity =maize yield

4. Results

- AR target villages seem to differ from non-target villages along some biophysical and economic dimensions, such as access to market and agricultural extension services.
- Similarly, beneficiaries in both countries seem to differ from non-beneficiaries along several dimensions. The former show better education, larger family size, higher farm size, more durable assets, greater likelihood to own livestock, and have better quality housing
- Beneficiaries also use more agricultural inputs, are more likely to practice intercropping, and obtain higher yields in the last harvesting season.

5. Conclusions

- Our findings highlight the need to rethink targeting criteria for AR and other participatory systems-based sustainable intensification innovations, something that could potentially bear serious implications upon scaling up.
- Not only could adoption rates of agricultural innovations be lower than expected, but final outputs and outcomes may prove unsatisfactory when scaled up to the broader population -less endowed than the targeted farmers-.

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