

# Farming system patterns: cluster analysis from a Humidtropics baseline survey in Western Kenya

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Integrated Systems Research  
3-6/03/2015 Ibadan

## Introduction & Aim

Humidtropics SRT 1.2 provides representative **context data** for various technical investigations and interventions. **Farm typologies** are an important component of better understanding target populations for targeting, technology adaptation and impact assessment.

Applying **cluster analysis** to household survey data allows for a transparent approach to forming relevant typologies. The selection of appropriate variables is a core decision. Within Humidtropics appropriate **typology dimensions** include

1. **income & wealth**,
2. **productivity & commercialisation**,
3. **nutrition & food security**

This analysis presents household clusters and their distribution based on these dimensions as a contribution to the programme-wide discussion on typologies, target populations and entry points.

## Results

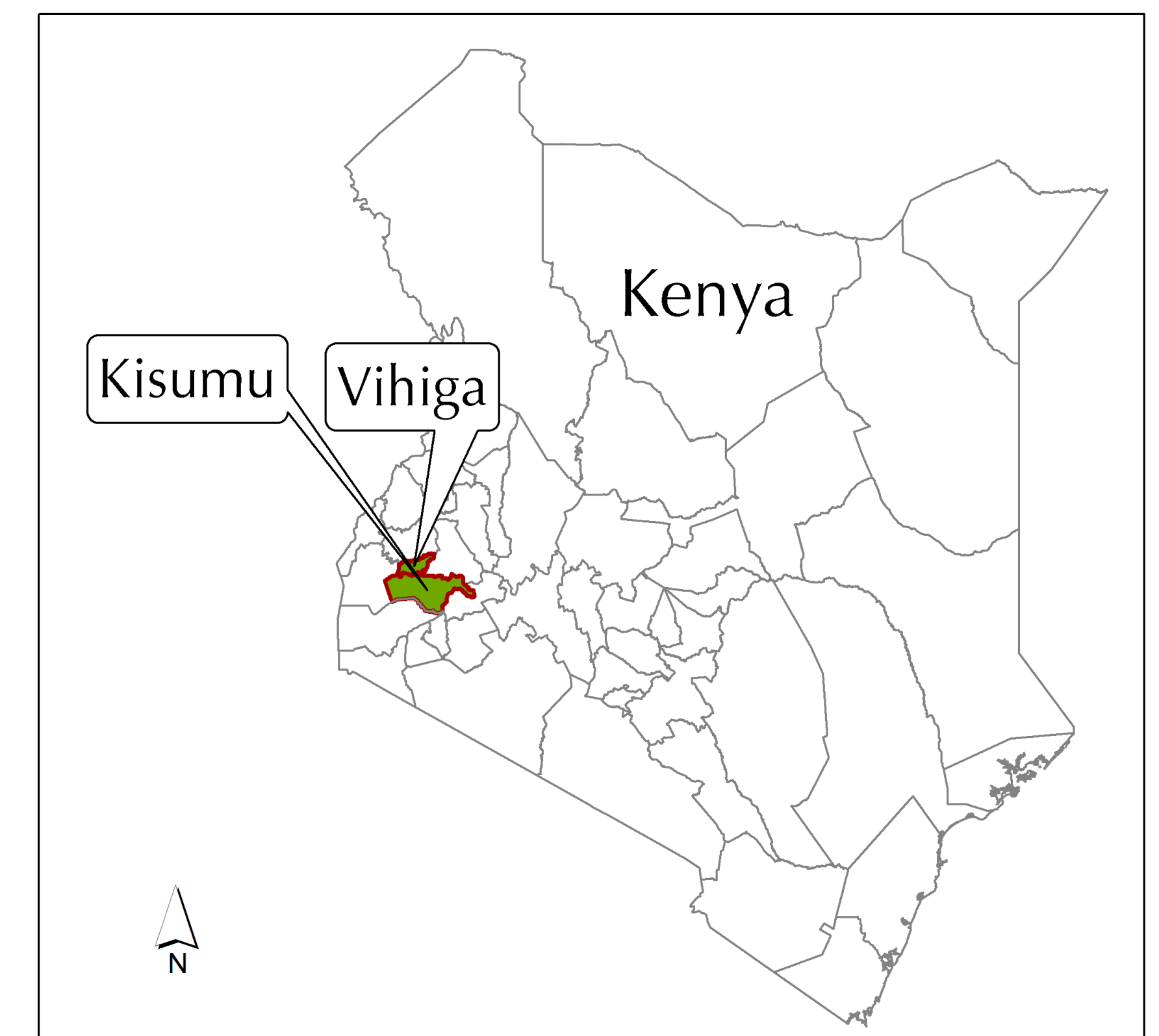
## Method

A well-tested tool for collecting farming systems data (**ImpactLite**; Douxchamps et al. 2014, Silvestri et al. 2014) was adapted to the needs of Humidtropics and initially employed in Kisumu and Vihiga counties of the Western Kenya action site. 400 households, randomly selected from 20 sub-locations, were interviewed between June and August 2014, covering cropping and livestock production as well as indicators for value-chain integration, income, wealth, food balances and nutrition.

A two-step cluster analysis procedure was applied (hierarchical and k-means) using these variable combinations

1. **cultivated land, TLU, domestic asset index** (Njuki et al. 2011), **off-farm income**
2. **crop & livestock productivity** (prod. value/ cult. land), **market integration** (sales value / production value)
3. **Individual diet diversity index**

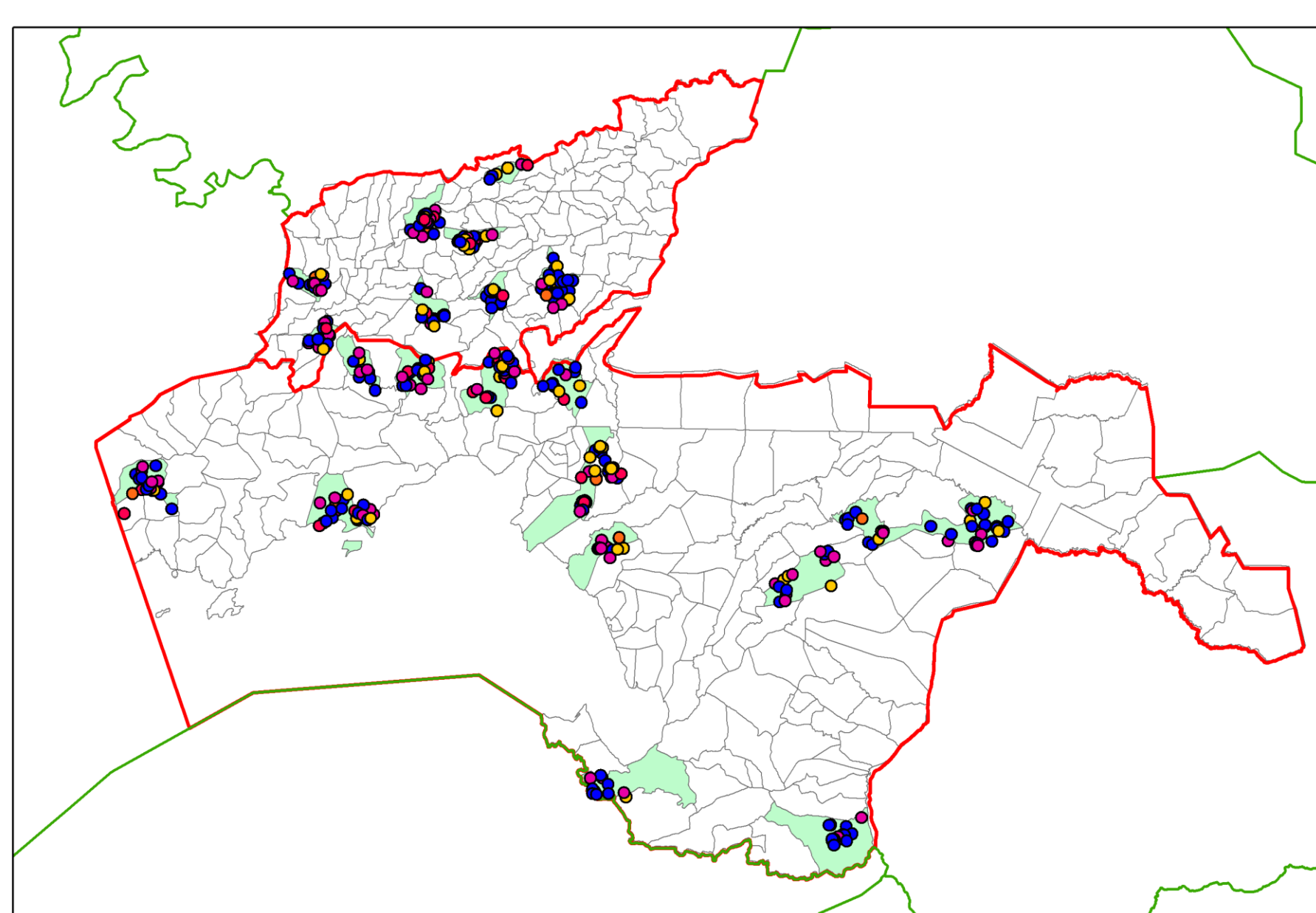
Selected counties



The resulting household cluster categories are applied to household locations to assess their geographic distribution.

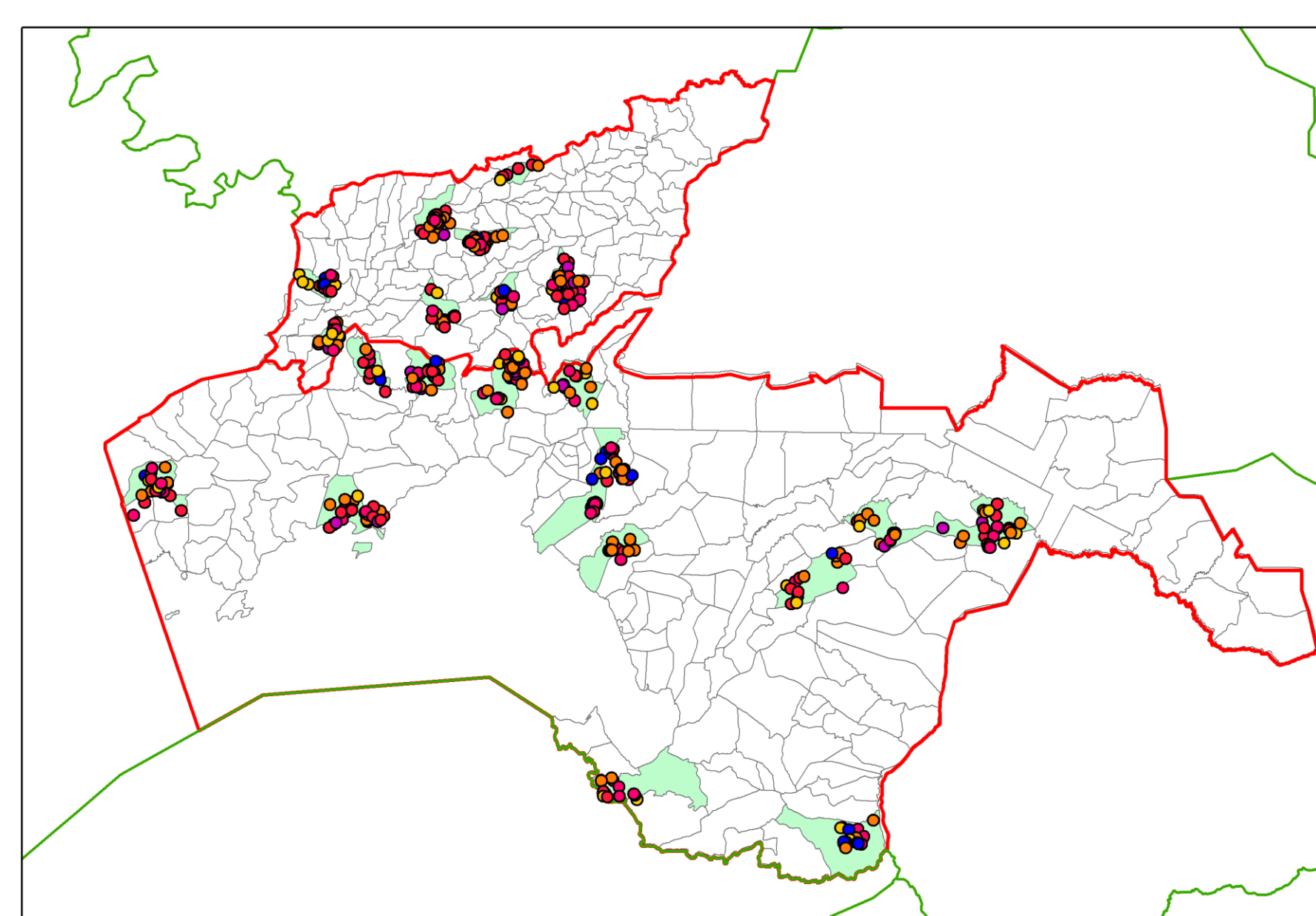
cluster	n	income & wealth					productivity & commercialisation						nutrition			
		1	2	3	4	5	1	2	3	4	5	6	1	2	3	4
distribution	n	61	12	33	99	165	50	103	114	68	22	34	72	103	114	102
cultivated land [ac]	mean	1.43	2.36	2.02	1.08	1.19	0.78	1.45	1.18	1.59	1.37	1.46	0.96	1.45	1.18	1.55
	se	0.23	0.56	0.27	0.09	0.09	0.11	0.15	0.12	0.16	0.37	0.22	0.14	0.15	0.12	0.13
tlu	mean	4.41	7.75	6.47	5.07	4.26	3.01	6.21	4.15	5.19	2.82	5.84	2.95	6.21	4.15	5.41
	se	0.55	2.37	0.94	0.56	0.39	0.48	0.67	0.47	0.63	0.68	0.81	0.39	0.67	0.47	0.50
domestic asset index	mean	23.57	65.81	49.53	23.84	14.06	13.54	29.90	17.04	29.22	10.66	31.43	12.66	29.90	17.04	29.95
	se	1.94	18.72	6.73	6.41	1.31	1.71	6.81	2.18	3.66	1.96	4.92	1.33	6.81	2.18	2.92
off-farm income [KES]	mean	113,000	445,000	241,000	52,248	12,388	45,108	81,796	58,796	101,000	31,700	113,000	41,045	81,796	58,796	105,000
	se	3,147	21,676	8,533	1,376	744	8,561	10,276	8,212	13,324	8,947	25,641	6,561	10,276	8,212	12,260
crop productivity [KES/ac]	mean	57,007	23,797	70,301	131,000	37,793	31,869	127,000	38,395	62,475	40,121	68,866	34,369	127,000	38,395	64,605
	se	10,425	3,890	30,350	89,899	4,412	4,506	89,941	5,978	15,983	12,188	18,002	4,814	89,941	5,978	12,177
livestock productivity [KES/ac]	mean	55,225	5,552	19,991	16,500	13,393	17,022	21,128	36,524	6,376	4,060	17,375	13,094	21,128	36,524	10,042
	se	32,802	3,597	10,161	3,594	2,562	4,705	5,381	18,225	1,076	1,794	5,783	3,393	5,381	18,225	2,106
market integration [%]	mean	17.68	13.87	17.06	17.96	15.38	15.04	18.37	12.75	18.51	12.43	24.37	14.25	18.37	12.75	20.46
	se	3.23	4.73	3.52	2.51	1.56	2.83	2.50	1.62	3.11	4.08	4.70	2.31	2.50	1.62	2.60
ind. diet div. score	mean	5.93	6.50	6.24	5.65	5.35	4.00	6.00	5.00	7.00	2.50	8.25	3.55	6.00	5.00	7.42
	se	0.18	0.44	0.20	0.13	0.11	0.00	0.00	0.00	0.00	0.14	0.10	0.10	0.00	0.00	0.07

Income & wealth



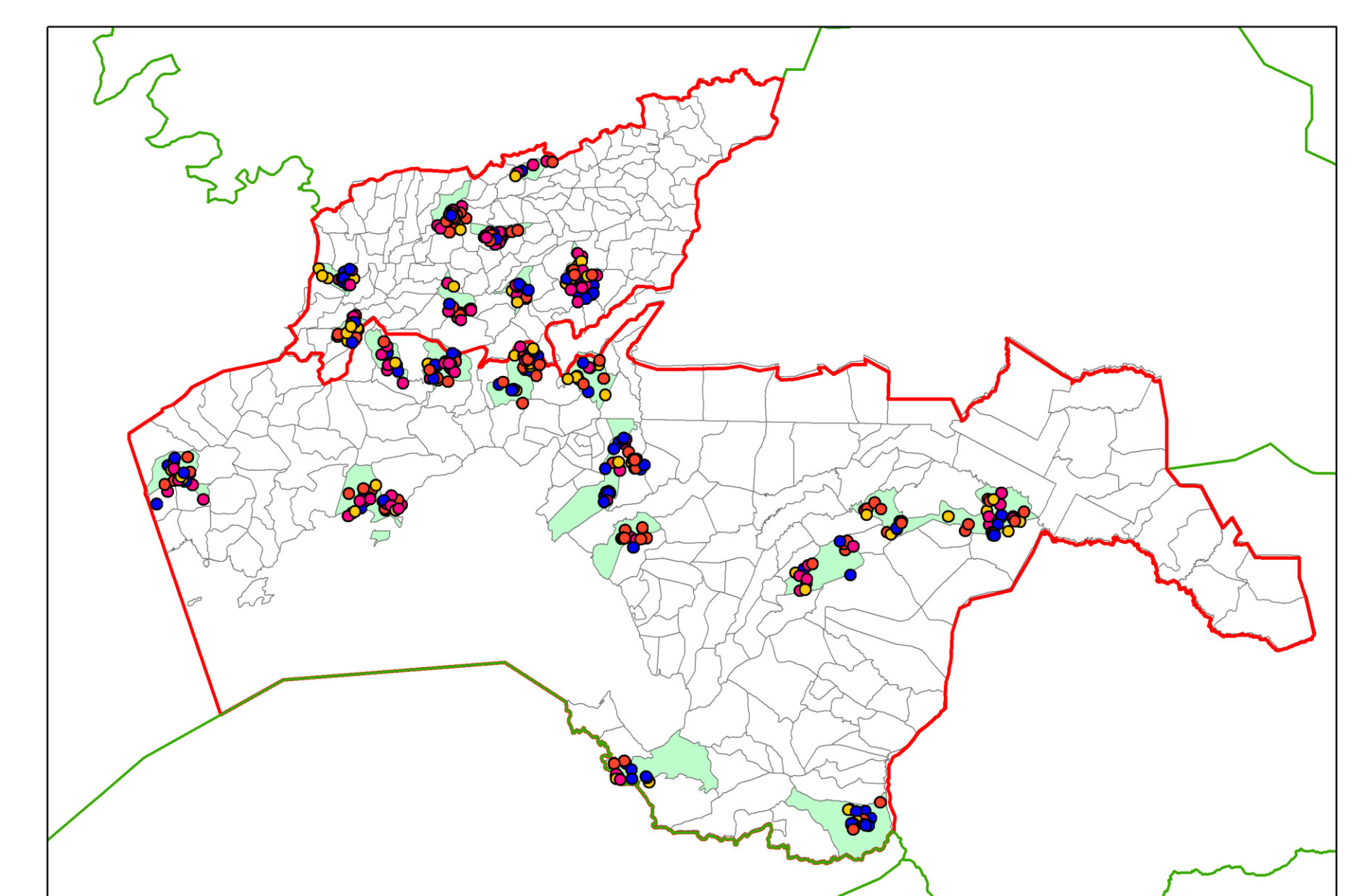
cluster 1 • 2 • 3 • 4 • 5 •

Productivity & commercialisation



cluster 1 • 2 • 3 • 4 • 5 • 6 •

Nutrition



cluster 1 • 2 • 3 • 4 •

## Discussion

The income & wealth classification shows that the poorest households (ca 40%) have the poorest nutrition and low productivity, though not as low as the richest households.

In the productivity & commercialisation classification however the lowest crop productivity is linked to the smallest farm size while lowest livestock productivity and market integration are linked to those households who are the poorest in every aspect except land. These households also show the poorest nutrition.

Classification by nutrition identifies a class with 18% of households showing considerably poorer nutrition than in the other classes. This class also shows very low values on all other considered variables. **Thus, nutrition status seems to offer an efficient approach to identifying relevant households for various development**

**goals.**  
References:  
Douxchamps, S., Wijk, M. T. Van, Silvestri, S. et al. (2014) Linking agricultural adaptation strategies and food security: evidence from West Africa. Tropentag, Prague.  
Njuki, J., Poole, J., Johnson, N., et al. (2011) Gender, livestock and livelihood indicators. ILRI, Nairobi.  
Silvestri, S., Douxchamps, S., Kristjanson, P. et al. (2014) Exploring gender differences in household food security and implications for climate change adaptation in East Africa. Tropentag, Prague.  
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