Farmer-led Research on Agroecology and Nutrition in Malawi and Tanzania

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Malawi context

Causes of food insecurity

Bezner Kerr, R. and R. Patel. 2015. Food Security in Malawi: Disputed Diagnoses, Different Prescriptions. In: *Food Security and Development: Country Cases.* N.Sekhar (ed). London: Earthscan/Routledge, p. 205-229. Bezner Kerr, R. 2005. Food security, entitlements and gender relations in northern Malawi. *Journal of Southern African Studies* 31 (1): 53-74.

Inequalities at Multiple Scales

- Urban vs rural
- Women and men
- Poor and better off farmers
- Young people vs older people
- Those with HIV and other health issues

Sources: MAFFA Baseline survey 2012. Unpublished data; Bezner Kerr, R. 2005. Food security, entitlements and gender relations in northern Malawi. *Journal of Southern African Studies* 31 (1): 53-74. Bezner Kerr, R. 2016. "Gender and Agrarian Inequality at the Local Scale" In: *Agricultural Systems: Agroecology and Rural Innovation*, 2nd Edition, S.S. Snapp and B. Pound (eds). San Diego: Elsevier Press.

Agroecology as approach

Enhancement of biological interactions for mutual benefits.

Resource conservation (Water, forests, energy, biodiversity, soil)

Organic matter accumulation & nutrient cycling

Natural control of disease, insects, weeds; Minimize toxic and non-renewable inputs.

The Soils, Food and Healthy Communities project

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Pigeonpea

Groundnut
(peanut)

Social Issues related to Legume Intercrops

Bezner Kerr, R. 2008. “Gender and Agrarian Inequality at the Local Scale” In: *Agricultural Systems: Agroecology and Rural Innovation*, S.S. Snapp and B. Pound (eds). San Diego: Elsevier Press, p. 279-306.

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Legume Residue Increases Maize Yield

Biodiversity has multiple impacts on ecosystems and livelihoods

Source: S. S., M.J. Blackie, R.A. Gilbert, R. Bezner Kerr, G.Y. Kanyama-Phiri. 2010. 'Biodiversity can support a greener revolution in Africa' *Proceedings of the National Academy of Sciences* 107(48):20840-20845

Satzinger, F, R. Bezner Kerr and L. Shumba. 2009. “Farmers integrate nutrition, social issues and agriculture through knowledge exchange in northern Malawi.” *Ecology of Food and Nutrition* 48 (5): 369-382.

Diversification can improve child growth with participatory approaches, attention to equity

Child growth in first year participating villages, participating households vs non-participating households

Source: Bezner Kerr, R., Berti, P.R. and Shumba, L. (2010) 'Effects of Participatory Agriculture and Nutrition project on Child Growth in Northern Malawi' *Public Health Nutrition* 14(8):1466-1472

Research Project II: Participatory Research on Climate Change Adaptation

Climate Change Perceptions

Climate Change Perceptions

"The rains have changed a lot. Even after harvest the rains would come, called *Chisindirantamba* [second rains]. Then one [rain] used to come in September, we would call it *Chizimalupya* (rain that put out the bush fires). After that there was *Chikukulanyuni*, that washed the ashes away. Then there was the planting rains. These early rains stopped in the late 1980s. Focus group 4, August 2009.

Agroecological Farmer Experiments

- Agroforestry (fruit & leguminous trees)
- Double intercropped legumes (pigeonpea, groundnuts, soya)
- Intensive application of animal manures
- Crop diversification e.g. sorghum, finger millet, cowpea, cassava
- Livelihood diversification: Small-scale irrigated gardens, small livestock, fuel efficient wood stoves

Re-finding lost crops and revaluing indigenous knowledge

Bezner Kerr, R. 2014. Lost and Found Crops: Agrobiodiversity, Indigenous Knowledge, and a Feminist Political Ecology of Sorghum and Finger Millet in Northern Malawi. *Annals of the Association of American Geographers*, 104 (3): 577-593.

Crop Diversity

- Increased number of crops grown – from 3 to 4.4 crops/farm Increase in the % of farmers growing **pigeonpea**, **sorghum** & **cowpea**, and a significant decrease in tobacco production
- More farmers intercropped – from 29% to **96%**.
- Increase in proportion of fields under legumes.
- Increased diversity in dry season vegetable gardens.

'If you have little or lots of rain, you have something. If the maize fails, you have cassava or sweet potatoes, unlike if you plant only maize'

Positive impact on Household Food Security & Dietary Diversity

	Food Secure*	Mildly Food Insecure*	Moderately Food Insecure*	Severely Food Insecure*
2011	31.50%	10%	18%	39.50%
2013	41%	26%	19.50%	11.50%

** Significant percentage change @ p<0.05*

Community organizing

Models show that **legume intercrops, number of crops cultivated** and **discussing farming with a spouse** are significant predictors of food security and dietary diversity after holding other factors constant.

Table 8. Multivariate Results on the Determinants of Improved Food Security

	Model 1	Model 2	Model 3	Model 4
	OR (Std.Err)	OR (Std.Err)	OR (Std.Err)	OR (Std.Err)
Independent Variables				
Practice Crop Residue Incorporation				
No	1.000	1.000	1.000	1.000
Yes	0.789 (0.094)**	0.801(0.096)*	0.837 (0.105)	0.819(0.105)
Total Number of Crops	1.158(0.037)**	1.196(0.051)***	1.123(0.050)***	1.067(0.048)
Percentage of Land Area Under Legumes	1.002(0.002)	1.005(0.003)	1.002(0.003)	1.002(0.003)
Crop Diversity				
Sole Maize (Ref.)		1.000	1.000	1.000
Maize+ Legume		0.768(0.161)	0.726(0.161)	0.735(0.165)
Maize +Double Legume		0.832(0.229)	0.835(0.239)	0.961(0.277)
2 or more legumes + 2 or more cereals		1.991(0.018)**	2.515(0.827)***	2.236(0.704)**
Number of Fields Planted				
1 (Ref)			1.000	1.000
2			1.482(0.267)**	1.362(0.254)*
3+			1.818(0.294)***	1.517(0.259)**
Stored Crop in Past Year				
No (Ref)			1.000	1.000
Yes			1.836(0.261)***	1.924(0.265)***
Discuss Farming with Spouse				
No (Ref)			1.000	1.000
Yes			1.340(0.172)**	1.245(0.163)*
Use Information Learnt from the Climate Change Project				
No (Ref)			1.000	1.000
Yes			1.117(0.214)	1.263(0.261)
Use Manure for Soil Fertility				
No (Ref)			1.000	1.000
Yes			1.095(0.123)	1.116(0.127)
Education				
None (Ref)				1.000
Primary				0.993(0.189)
Secondary +				1.829(0.471)**
Income Levels				
< 10,000K (Ref)				1.000
10001 - 30000K				1.550(0.277)***
30001 - 50000K				1.179(0.209)

*OR = Odds Ratio ; (Ref.) =Reference Categories; *p≤ 0.1, **p≤ 0.05, ***p≤ 0.01; SE in parenthesis*

You can admire my crops grown with legume residue AND my husband holding the baby!

Research Project III: Malawi Farmer-to-Farmer Agroecology

Transformative Agroecology: Explicit efforts to highlight & address equity

Patel, R., R. Bezner Kerr, L. Shumba and L. Dakishoni. Cook, eat, man woman: Understanding the New Alliance for Food Security and Nutrition in Malawi, and its alternatives. 2014. *Journal of Peasant Studies* DOI: 10.1080/03066150.2014.971767. Bezner Kerr, R. 2016. "Gender and Agrarian Inequality at the Local Scale" In: *Agricultural Systems: Agroecology and Rural Innovation*, 2nd Edition, S.S. Snapp and B. Pound (eds)..

Agroecology can improve nutrition with participatory approaches, attention to equity

Source: Nyantakyi-Frimpong, H., J. Kangmennaang, R. Bezner Kerr, I. Luginaah, L. Dakishoni, E. Lupafya, L. Shumba, M. Katundu. Agroecology, improved food security and human health in semi-humid tropical Africa: participatory research with vulnerable households in Malawi. *Acta Tropica* Accepted for publication October 24, 2016 Bezner Kerr, R., Berti, P.R. and Shumba, L. (2010) 'Effects of Participatory Agriculture and Nutrition project on Child Growth in Northern Malawi' *Public Health Nutrition* 14(8):1466-1472

Household Food Security

Household Food Security Status of those involved in the Malawi Farmer-to-farmer Agroecology project (MAFFA) vs those not in MAFFA, 2016 (n=1185 respondents)

Food Security Status (using Household Food Insecurity Access Scale or HFIAS Category)

★ ★ *Significant percentage change @ p<0.05*

Social inequalities and power dynamics key

- Attention to social inequalities at different scales key to address hunger;

e.g. Households who lack adequate land, where the the husband drinks heavily and doesn’t contribute labor, communities with livestock conflicts, or who lack water access still struggle with food insecurity.

Research Project IV: Farmer-led Curriculum on Agroecology, Climate Change, Nutrition & Social Equity

Atkinson Center for a Sustainable Future

- 500 households in Malawi
- 400 households in Tanzania
- Test for change in nutrition, food security, equity, farmer knowledge & sustainable land management

Research Project V: Singida Nutrition and Agroecology Project (SNAP)

Can a participatory, agroecological peer farmer education intervention improve legume production, food security, and infant and young child feeding in Singida District, Tanzania?

- 588 households, 20 villages
- 4 year project
- Collaboration w/ Action Aid Tz
- Nelson Mandela Institute for Science and Technology.

Tanzania context

- High food insecurity (70%)
- Low dietary diversity, 34% child stunting
- Singida District: semi-arid region, most households rely on farming for livelihoods;
- High levels of gender inequality in decision-making and division of labor.
- Low soil fertility, limited legume production and limited use of agroecological methods to improve soil fertility.

Crop Diversity after 1 Year

* Indicates significant difference p<0.01) between 2016 and 2017

Soil Enhancement Methods Used

Time allocation

Significant relationship between Household Food Insecurity, Gender Inequity & Depression

	Multivariate, all β (p=)
Household Food Insecurity Access Scale	0.62 (0.00)***
Experience with domestic violence	4.09 (0.00)***
Husband help score (0-7)	-0.67 (0.01)**
Satisfaction with leisure time (-2 - +2)	-3.03 (0.00)***
Social support score (0-40)	-2.97 (0.07)*

Blacker, L., M.V. Santoso, L. Harnett, N. Kassim, C. Mollay, H. Martin, E. Mtinda, E. Kalonga, K. Mtei, J. Kalonga, R. Bezner Kerr, S. L Young. Household food insecurity and gender inequity are associated with high prevalence of depression amongst female farmers with young children in rural Tanzania. Presented at *Experimental Biology annual meeting*, Chicago, April 2017.

Evidence of change in division of labor

Caution I: Social Equity Challenges

MONSANTO AFRICA

New Alliance
FOR FOOD SECURITY AND NUTRITION

Cautions II: Climate Change Impacts

Estimated 2.8 million people affected by drought and floods in Malawi in 2015, over 1 million affected by drought in 2016.

Source: www.fews.net/southern-africa/malawi

Caution and Opportunities: Building Economic Alliances in Urban Areas

Conclusions

- Agroecology can be used to improve food security when combined with farmer-led experimentation, local knowledge and attention to social inequalities.
- Key method: crop diversity, especially legumes, & use of organic material to improve soil fertility;
- Use of flexible, participatory approaches for farmers to test different strategies that fit their situation;
- Need to dialogue with multiple methods e.g. dramas, meetings, small discussion groups.
- To sustain food transitions, need to address broader social inequalities e.g. land access, right to save seed, climate change and building local economies.

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