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The Food Security-Energy-Water Nexus in Mozambique – Insights from analyzing improved cook stoves and small-scale irrigation

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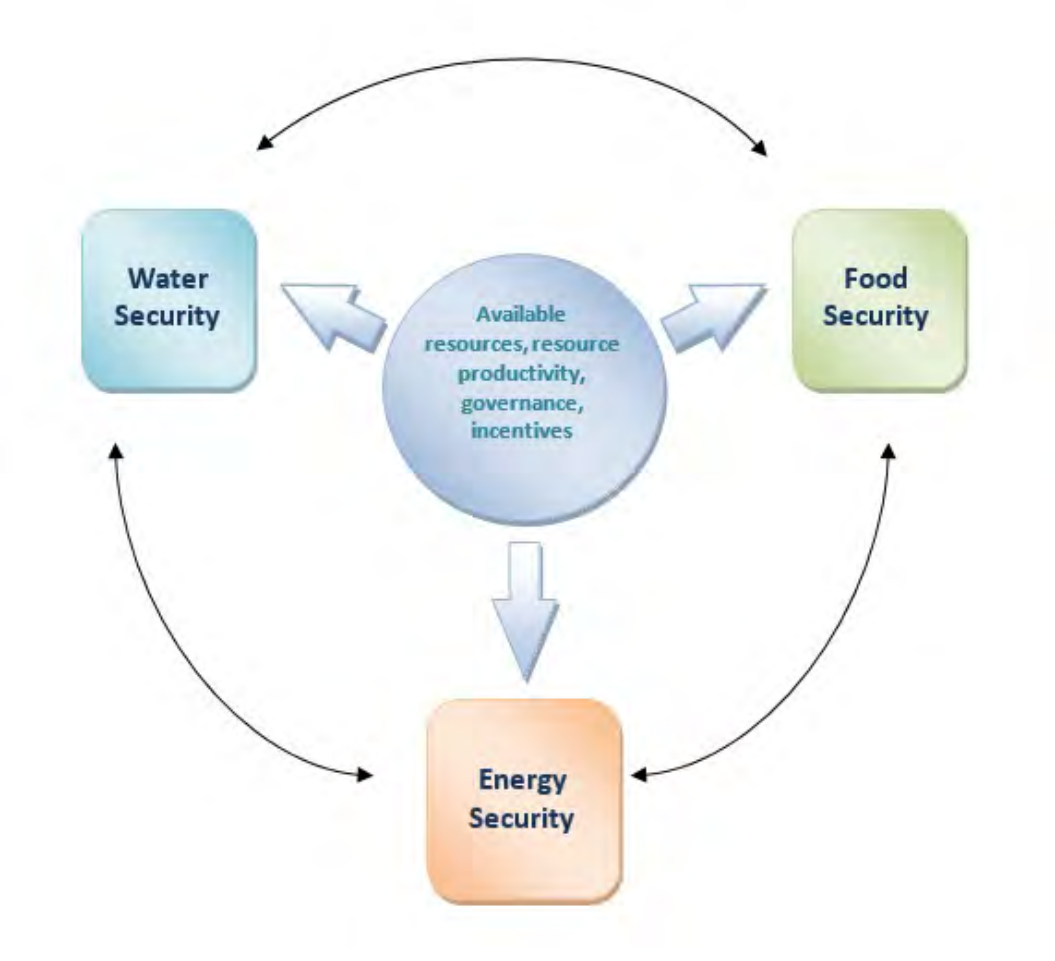
Overview

I. Concept of the Food Security-Energy-Water (FEW) Nexus
II. Details of the HH Survey
III. Overview of the study area – Food, Water and Energy
IV. Analyzing the drivers of WTP for improved cook stoves and WTC for small-scale irrigation

Concept of the FEW Nexus I



Concept of the FEW Nexus II

Definition of the FEW Nexus:

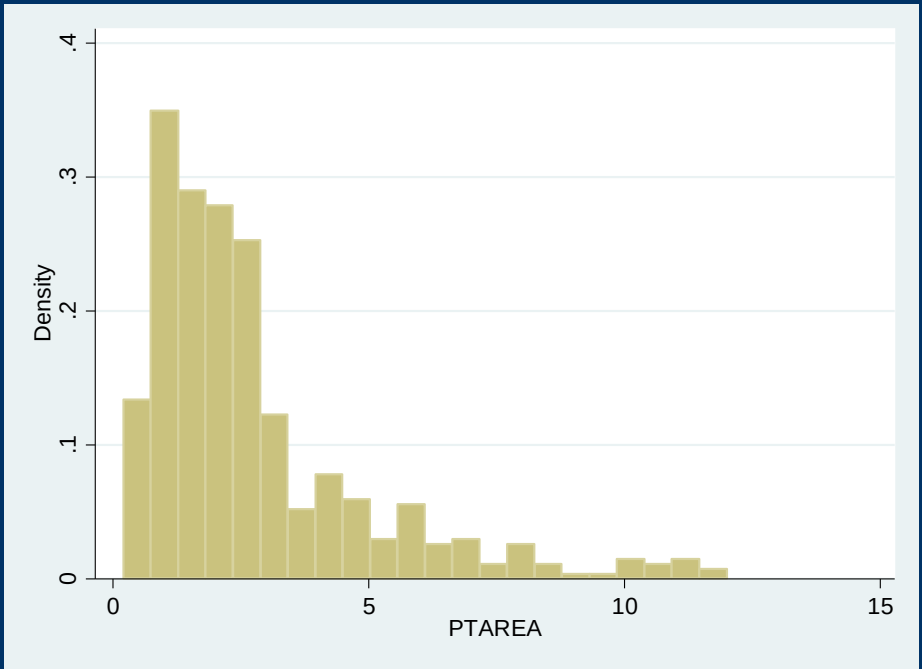
The FEW nexus encompasses synergies and trade-offs between food, energy, and water security which are impacted by endogenous and exogenous drivers and cannot be captured if these sectors are analyzed in isolation.

Details of the HH survey

- June to July 2014
- Angonia, Tete
- 507 Households (30 villages)
- Main Agricultural Decision Maker and Spouse
- WTP for improved cook stoves and WTC for small-scale irrigation

Food – Agricultural Production

Histogram of the farmsizes within the sample



Average farmsize: 2.75 ha; Median: 2.01

Food - Shortages

- Food Shortages Experienced in Previous Year

Frequency	Percentage of HH
Not at all	55%
A few days a year	19%
Several days per year	17%
Several days per month	6%
Several days per week	4%

Food – Food consumption

Consumption Rates of Food Groups Among Households (last 24 hours)

Food group	***Frequency***
Cereals	98%
White tubers, roots	35%
Vegetables	75%
Fruit	19%
Meat	11%
Eggs	9%
Fish, seafood	16%
Legumes, nuts, seeds	31%
Milk, dairy products	2%
Oils, fats	45%
Sugar, sweets	16%
Spices, condiments, beverages	15%

Water – Irrigation practices

- 99 of the 507 HHs use irrigation
- Improved irrigation may:
  - increase yields *(food security)*
  - allow for consecutive harvests in one year

Irrigation technologies applied

	Percent
Bucket	84%
Treadle pump	5%
Motorized pump	1%
Canal irrigation (gravity fed)	9%
Bound basin flooding (paddy)	2%

Water – Irrigation practices II

Main reasons for not using an irrigation technology

	Too expensive	Not enough water	Do not need irrigation	Not sufficient organization	Lack of knowledge
Bucket	x	x	x		
Treadle Pump	x	x	x		
Motorized pump	x	x	x		
Canel/gravity fed	x	x	x	x	
Drip irrigation	x	x	x		x
Bound basin flooding	x	x			

Water - Willingness to contribute to hypothetical irrigation schemes

- Farmers become the main stakeholders, take ownership over schemes: construct, maintain, manage
- Some difficulties in management transfer: what exactly are farmers willing to contribute?

Water - Willingness to contribute to hypothetical irrigation schemes

Preferred Technologies for Hypothetical Irrigation Scheme

Technology	Frequency
Bucket/Watering can	76
Treadle pump	172
Motorized pump	242
Canal irrigation	13
Drip irrigation	11
Bound basin flooding	4

Water - Willingness to contribute to hypothetical irrigation schemes

Willingness to Contribute (Median) to Hypothetical Irrigation Scheme

	Construction/Set-up		**Maintenance**		**Management**	
	Temporal	*Monetary*	*Temporal*	*Monetary*	*Temporal*	*Monetary*
Technology	Unpaid labor hours per week	Total (MZN)	Unpaid labor hours per year	Annual (MZN)	Unpaid labor hours per year	Annual (MZN)
Bucket		60	94.5	60	50	50
Treadle pump		200	156	200	104	200
Motorized pump	6	250	160	300	144	200
Canal/gravity fed	6	100	104.5	150	96	100
Drip irrigation	6	100	104	100	96	100
Bound basin/paddy	6	100	195.25	100	208	112.5

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Energy - Fuel sources

Main fuel source of HH:

Frequency	Rainy Season	Dry Season
Firewood	95%	95%
Charcoal	2%	3%
Crop residues	3%	2%

Average walking distance to fuelsource (one way) in minutes

	Rainy Season	**Dry Season**
time	59.49	58.92

Energy – Cookstove ownership

Cookstove ownership (total 507 HH)

Clay Stove	Metal (wood)	Metal (charcoal)
0	1	30

6% own a charcoal metal stove

Reasons for small number of improved cookstoves ownership

Cannot afford an improved cookstove	Not interested/ satisfied with traditional stove	Did not know about improved cookstoves	Not available in the village
37%	2%	38%	22%

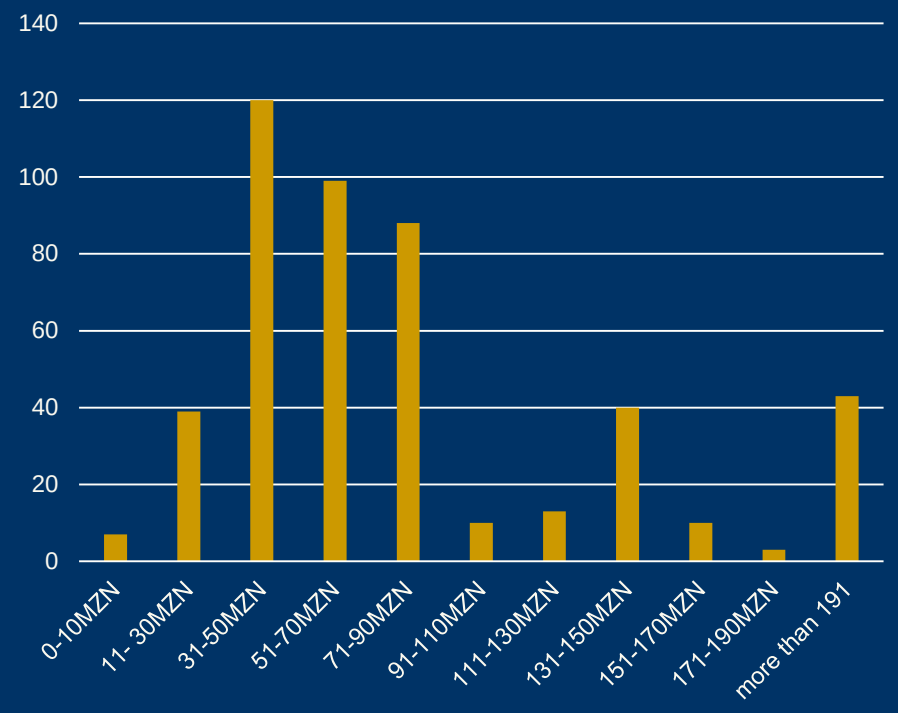
Energy – Cooks toves and health

- Stove related health issues
- People present in the same room as the stove while the fire is active
- Occured at least once within the six months preceeding the survey

Affliction	***Frequency***
Illness with a cough	35%
Cough with short, rapid breaths	19%
Cough affected ability to work	14%
Burns from the stove	8%
Eye infections	14%

Energy – WTP for fuel efficient cook stoves

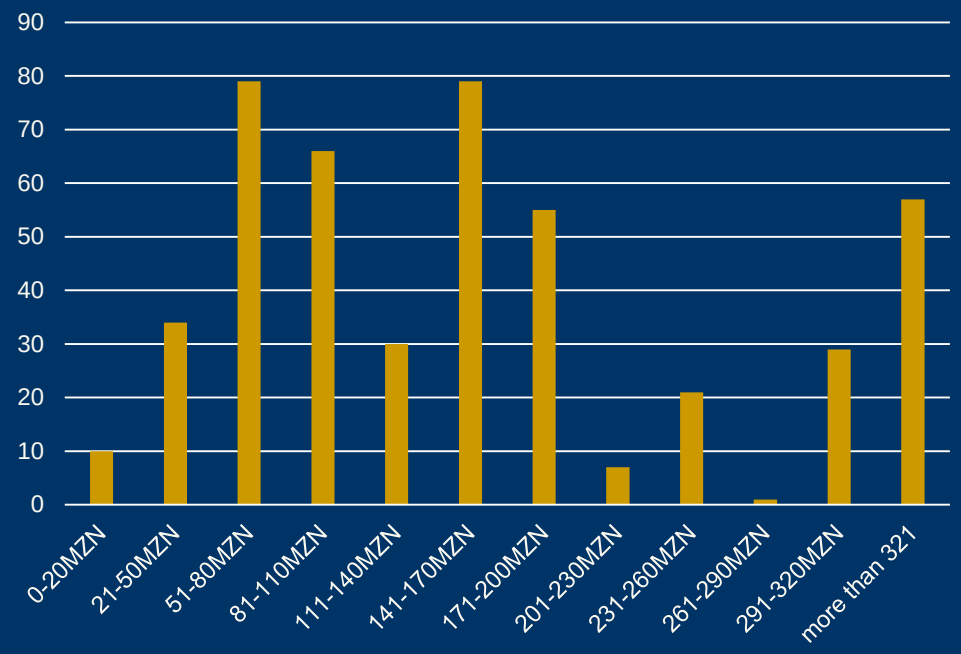
WTP for a clay stove (in MZN)



Mean: 100,91 MZN; Median: 80 MZN
RCT Selling price: 90 MZN

Energy – WTP for fuel efficient cook stoves

WTP for a clay stove (in MZN)



- Mean: 188.08 MZN; Median: 150 MZN
- RCT Selling price: 150 MZN

Analyzing WTC for small-scale irrigation

Analyzing WTP for improved cook stoves

Discussion

Thank you for your attention