UNIVERSITÀ DEGLI STUDI FIRENZE

DISEI
Dipartimento di scienze per l'economia e l'impresa

Price Shocks, Vulnerability and Food and Nutrition Security among Rural and Urban Households in Tanzania

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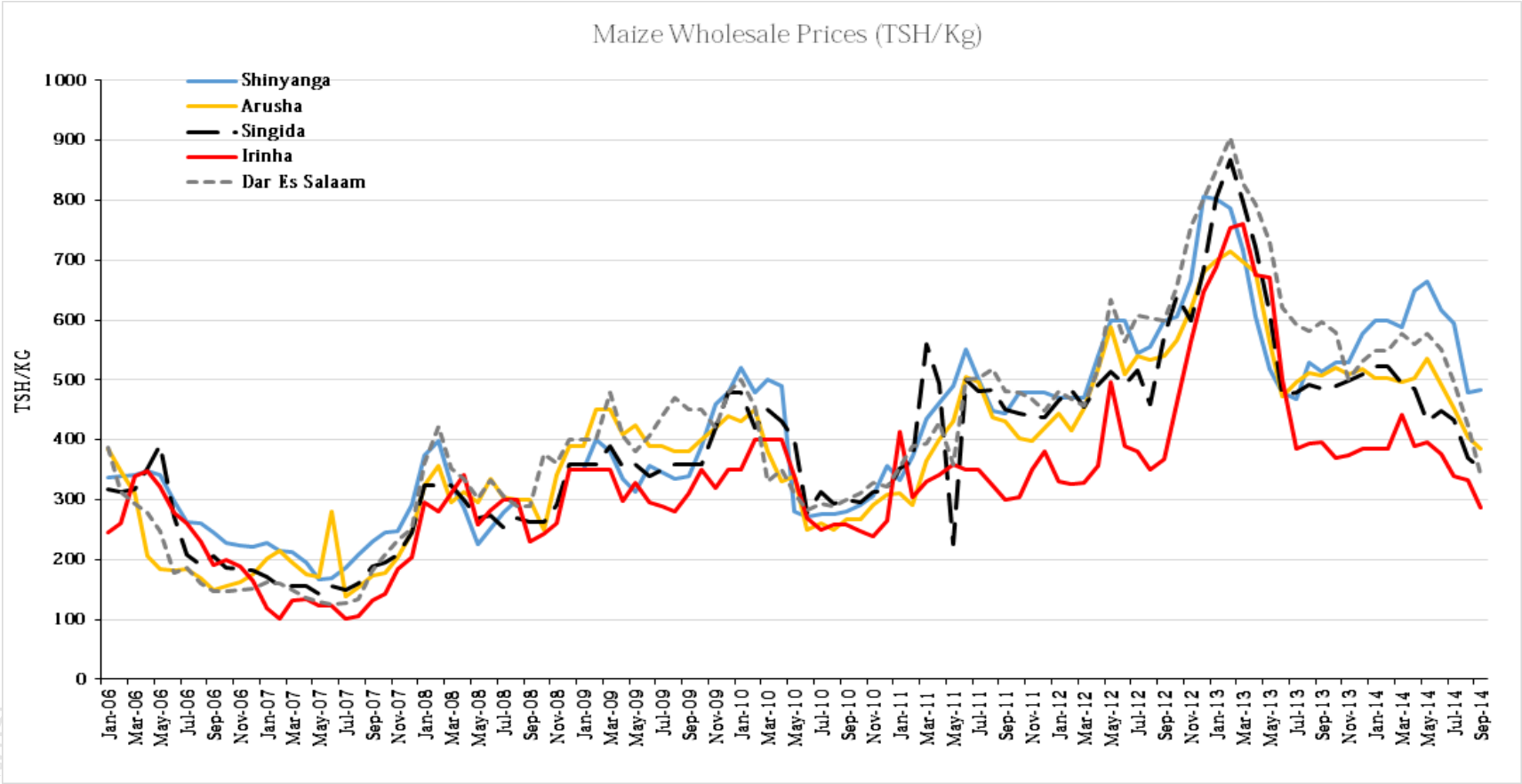
The starting point

The price crisis: same pattern across districts



Source: WFP-VAM (2014)

The starting point

Incidence of a single/multiple shock on Tanzanian HHs

	Rural			Urban		
Year	2008	2010	2012	2008	2010	2012
(i) Price Shocks						
Large fall in sale prices for crops	32%	25%	20%	7%	8%	6%
Large rise in agricultural input prices	32%	22%	20%	11%	10%	8%
Large rise in price of food	65%	48%	43%	70%	59%	51%
(ii) Natural Disasters						
Crop disease	31%	25%	18%	6%	7%	5%
Droughts or floods	30%	26%	27%	13%	12%	14%
Fire	2%	3%	1%	1%	1%	1%
Severe water shortage	32%	27%	21%	41%	35%	21%
(iii) Asset Shocks						
Dwelling damaged, destroyed	1%	0%	0%	1%	0%	1%
Livestock died or were stolen	28%	19%	13%	8%	10%	8%
Loss of Land	4%	4%	3%	1%	3%	2%
(iv) Employment Shocks						
Household business failure	3%	4%	3%	9%	8%	8%
Loss of salaried employment	1%	2%	1%	6%	4%	3%
(v) Health Shocks						
Chronic illness/accident of HH member	11%	6%	5%	7%	8%	5%
Death of a member of the HH	16%	9%	9%	11%	9%	7%
Death of other family member	37%	31%	23%	46%	45%	37%
(vi) Crime and Safety Shocks						
Hijacking/Robbery/burglary/assault	9%	6%	5%	13%	16%	7%
(vii) Household break-up						
Break-up of the HH	5%	6%	7%	6%	8%	8%
Jailed	1%	1%	1%	0%	0%	0%

Values expressed as percentage of rural (urban) households over total rural (urban) households
Note: the numbers in the columns do not add up to 100% since households indicated multiple shocks.

Source: TNPS

Literature on the topic

- The effects of prices on poverty are commodity-specific, country-specific and household-specific (Ravallion and Lokshin, 2004; Hertel and Winters, 2006, Aksoy and Izik-Dimelik, 2008; Ivanic and Martin, 2008; Polaski, 2008; Wodon et al., 2008; Sarris and Rapsomanikis, 2009; Wodon and Zaman, 2010; Ivanic et al., 2012)
- Effect of price surges on caloric and macro/micro-nutrients intake (Jensen and Miller, 2008; Brinkman et al., 2010; Harttgen and Klasen, 2012; Alem and Sodebrom, 2012; Zaki et al. 2014; D'Souza and Jolliffe, 2014)
- Relevant contributions for Tanzania, but before the most recent food price spikes (Christiansen et al., 2006; Sarris and Karfakis, 2007)

Research questions

- **overall obj.**: effects of recent food price shocks (and other covariate and idiosyncratic shocks) on food consumption across Tanzanian HHs in urban and rural areas
- **vulnerability as uninsured exposure to risk (VER)**:
  - impact of price shocks both on household food **caloric intake** (quantity) and **dietary diversity** (quality)
  - why certain **types of HHs** are **more vulnerable** than others, controlling also for the severity of the event
  - **macro** and **micro-nutrients**' deficiencies among regions: role played by **financial deepening** in a context of domestic price volatility

Data

- HH data from the 2008/09, 2010/11 and 2012/13 Tanzania National Panel Survey (part of LSMS - ISA)
  - TZNPS Y1: 3,265 households and 16,709 individuals
  - TZNPS Y2: 3,924 households and 20,559 individuals
  - TZNPS Y3: 5,010 households and 25,412 individuals
- multi-stage, stratified, random sampling of Tanzanian HHs
- representative at the national, urban/rural, and agro-ecological level
- final sample: 58,022 units

Food caloric intake: fixed effect

Specification

$$y_{ijt} = \beta_0 + \beta_1 P_{jt} + \beta_2 S_{jt} + \beta_3 X_{it} + \beta_4 Z_{jt} + \gamma_{ij} + \eta_t + \epsilon_{ijt}$$

y_{ijt} *ln*(food caloric intake)

P_{jt} vector of price shock variables

S_{jt} vector of non-price shock variables

X_{it} vector of variables of individual characteristics

Z_{jt} vector of household characteristics

γ_{ij} individual time-invariant fixed effects

η_t year effects

Effect of shocks on food caloric intake

	Overall		Rural		Urban	
	log(Caloric Intake)		log(Caloric Intake)		log(Caloric Intake)	
Head is female	0.045**	(2.69)	0.021	(1.01)	0.074*	(2.39)
Age of head	-0.013	(-0.63)	-0.054*	(-2.15)	0.119*	(2.49)
Educ of Head	0.038**	(3.12)	0.068***	(4.71)	0.040	(1.75)
HH size	-0.250***	(-8.72)	-0.264***	(-6.78)	-0.211***	(-4.94)
Number of Children	-0.021	(-0.76)	0.020	(0.53)	-0.115**	(-2.89)
Sex Ratio	0.002	(0.20)	0.007	(0.61)	-0.002	(-0.08)
Dependency Ratio	-0.064***	(-4.60)	-0.080***	(-4.72)	0.009	(0.37)
Primary education	0.015	(1.41)	0.003	(0.24)	0.044*	(1.97)
Secondary education	-0.014	(-1.04)	-0.025	(-1.77)	0.027	(0.91)
University education	0.010	(0.98)	-0.003	(-0.24)	0.042*	(2.18)
Head works in Agri/Livestock	0.003	(0.32)	0.012	(1.12)	0.010	(0.50)
Ind works in Agri/Livestock	-0.009	(-0.83)	-0.012	(-0.91)	0.011	(0.58)
Income Diversity	0.027**	(3.11)	0.039***	(3.63)	0.027	(1.67)
Acres of land	0.035***	(4.39)	0.042**	(2.95)	0.024*	(2.44)
Asset Sofisticated Index	0.030***	(3.80)	0.030**	(2.86)		
Animal index	0.126***	(13.90)	0.125***	(11.72)		
Asset base index	-0.007	(-1.03)	-0.004	(-0.38)		
Housing quality index	0.067***	(6.70)	0.063***	(5.33)	0.077***	(5.58)
Quality/access to services index	-0.036***	(-4.82)	-0.053***	(-6.73)	0.007	(0.47)
Consumer durable index	0.104***	(9.88)	0.105***	(8.82)	0.138***	(6.99)
Cash crop seller	-0.003	(-0.39)	0.013	(1.41)	-0.060***	(-4.44)
Staple Food Buyer	0.134***	(17.56)	0.119***	(15.05)	0.209***	(9.03)
Shock illness	-0.007	(-1.09)	0.015	(1.91)	-0.040***	(-3.64)
Shock drought/flood	0.030***	(4.91)	0.022**	(3.01)	0.036**	(2.83)
Shock P fall	-0.000	(-0.07)	-0.005	(-0.81)	0.019*	(2.45)
Shock P rise	-0.007	(-1.20)	0.010	(1.48)	-0.021	(-1.74)
Shock P input rise	-0.022*	(2.40)	0.010	(1.67)	-0.026**	(-2.58)
Observations	58022		40015		18007	
R^2	0.053		0.055		0.085	
F	44.92		31.70		20.16	

Standardized beta coefficients; t statistics in parentheses

Effect of shocks on food caloric intake

	(3) log(Caloric Intake) Rural		(6) log(Caloric Intake) Urban	
Head is female	0.042*	(1.98)	0.081**	(2.64)
Age of head	0.006	(0.23)	0.146**	(3.00)
Educ of Head	0.066***	(4.62)	0.047*	(2.05)
HH size	-0.247***	(-6.48)	-0.234***	(-5.54)
Number of Children	-0.000	(-0.00)	-0.093*	(-2.35)
Sex Ratio	0.006	(0.52)	-0.003	(-0.13)
Dependency Ratio	-0.081***	(-4.84)	-0.007	(-0.31)
Primary education	0.036**	(2.75)	0.052*	(2.33)
Secondary education	0.015	(1.06)	0.044	(1.46)
University education	0.010	(0.80)	0.049*	(2.57)
Head works in Agri/Livestock	0.000	(0.02)	0.008	(0.42)
Ind works in Agri/Livestock	-0.004	(-0.31)	0.016	(0.84)
Income Diversity	0.020	(1.92)	0.020	(1.19)
Acres of land	0.040**	(2.82)	0.023*	(2.30)
Asset Sofisticated Index	0.031**	(3.06)		
Animal index	0.099***	(9.14)		
Asset base index	-0.010	(-1.01)		
Housing quality index	0.089***	(7.29)	0.082***	(5.83)
Quality/access to services index	-0.027**	(-3.02)	-0.004	(-0.30)
Consumer durable index	0.114***	(9.59)	0.131***	(6.68)
Cash crop seller	0.026**	(2.58)	-0.050***	(-3.83)
Staple Food Buyer	0.093***	(9.33)	0.273***	(9.75)
Shock illness	0.005	(0.61)	-0.041***	(-3.72)
Shock drought/flood	0.041**	(2.88)	0.408***	(6.82)
Shock P fall	0.003	(0.28)	0.018	(0.97)
Shock P rise	-0.003	(-0.45)	-0.029*	(-2.11)
Shock P input rise	-0.013	(-1.53)	-0.025*	(-2.26)
Drought/flood * Staple Food Buyer	-0.015	(-1.14)	-0.395***	(-6.75)
Drought/flood * Cash Crop Seller	-0.008	(-0.83)	-0.005	(-0.43)
P fall * Staple Food Buyer	-0.014	(-1.44)	-0.006	(-0.34)
P rise * Staple Food Buyer	-0.043***	(-5.88)	-0.007	(-0.73)
P input rise * Cash Crop Seller	-0.034***	(-4.49)	-0.015*	(-2.35)
Severity P fall * Staple Food Buyer	0.004	(0.68)	-0.005	(-0.69)
Severity P rise * Staple Food Buyer	-0.021**	(-3.22)	-0.001	(-0.09)
Severity P input rise * Cash Crop Seller	-0.003	(-0.46)	-0.027*	(-2.55)
Observations	40013		18005	
R^2	0.070		0.100	
F	32.73		15.65	

Standardized beta coefficients; t statistics in parentheses

Market participation: net-sellers vs. net-buyers

Food Consumption Score

$$FCS = a_{staple}\,x_{staple} + a_{pulses}\,x_{pulses} + a_{vegetables}\,x_{vegetables} + a_{fruit}\,x_{fruit} + a_{animal}\,x_{animal} + a_{sugar}\,x_{sugar} + a_{dairy}\,x_{dairy} + a_{oil}\,x_{oil}$$

x_i frequencies of food consumption = number of days for which each food group was consumed over the past 7 days

a_i weight of each food group

Food Consumption Score: estimates

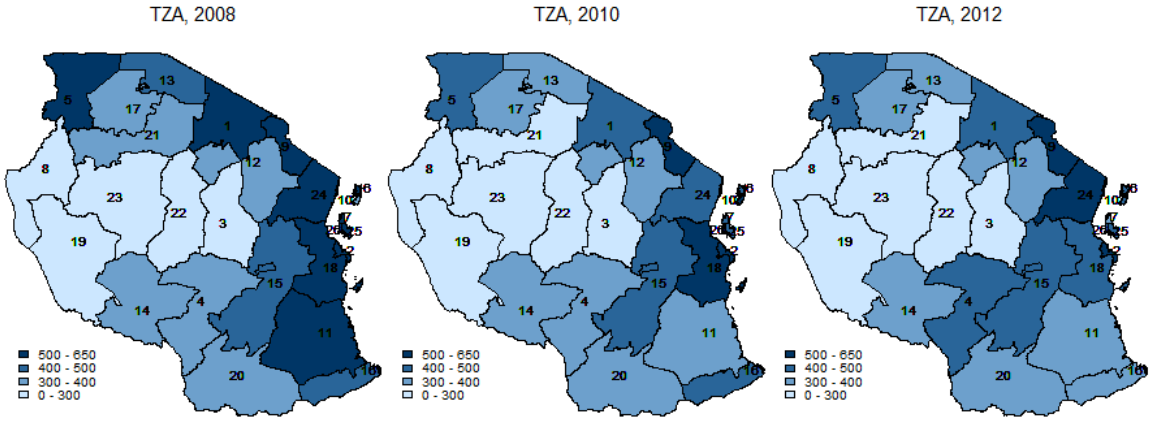
	2010					
	Overall Log(FCS)		Rural Log(FCS)		Urban Log(FCS)	
Individual Controls	(Yes)		(Yes)		(Yes)	
Household Controls	(Yes)		(Yes)		(Yes)	
Shock illness	-0.033***	(-5.45)	-0.036***	(-5.07)	-0.027**	(-2.60)
Shock drought/flood	0.029*	(2.50)	-0.030*	(-2.41)	0.336***	(7.56)
Drought/flood * Staple Food Buyer	-0.064***	(-5.66)	-0.034**	(-2.70)	-0.300***	(-6.90)
Drought/flood * Cash Crop Seller	0.035***	(4.04)	0.065***	(6.19)	-0.008	(-0.65)
Shock P fall	-0.011	(-1.30)	-0.014	(-1.47)	-0.034	(-1.38)
Shock P rise	-0.080***	(-4.26)	0.021	(1.36)	-0.447***	(-7.01)
Shock P input rise	0.063***	(7.99)	-0.055***	(-6.73)	-0.027	(-1.68)
P fall * Staple Food Buyer	0.009	(1.12)	0.032***	(3.47)	-0.020	(-0.92)
P rise * Staple Food Buyer	-0.108***	(-5.55)	-0.012	(-0.73)	-0.466***	(-7.26)
P input rise * Cash Crop Seller	-0.022***	(-4.20)	-0.072***	(-9.37)	-0.029	(-1.73)
Observations	19562		13864		5698	
R^2	0.262		0.278		0.278	
F	225.9		173.4		65.58	

	2012					
	Overall Log(FCS)		Rural Log(FCS)		Urban Log(FCS)	
Individual Controls	(Yes)		(Yes)		(Yes)	
Household Controls	(Yes)		(Yes)		(Yes)	
Shock illness	-0.041***	(-7.57)	-0.024***	(-3.91)	-0.072***	(-7.09)
Shock drought/flood	0.013	(1.19)	0.014	(1.13)	0.124**	(3.17)
Drought/flood * Staple Food Buyer	-0.052***	(-4.95)	-0.059***	(-5.02)	-0.173***	(-4.43)
Drought/flood * Cash Crop Seller	0.027**	(3.28)	0.029**	(2.87)	0.030**	(2.67)
Shock P fall	0.006	(0.70)	0.006	(0.63)	0.040	(1.59)
Shock P rise	-0.059***	(-7.82)	-0.069***	(-8.44)	0.008	(0.40)
Shock P input rise	-0.034***	(-5.03)	-0.039***	(-4.87)	-0.030*	(-2.48)
P fall * Staple Food Buyer	-0.000	(-0.04)	0.006	(0.68)	-0.059*	(-2.32)
P rise * Staple Food Buyer	-0.100***	(-11.82)	-0.120***	(-12.76)	-0.040*	(-2.00)
P input rise * Cash Crop Seller	-0.010	(-1.60)	-0.015*	(-2.14)	0.006	(0.47)
Observations	23269		15986		7283	
R^2	0.180		0.203		0.135	
F	148.5		114.1		36.46	

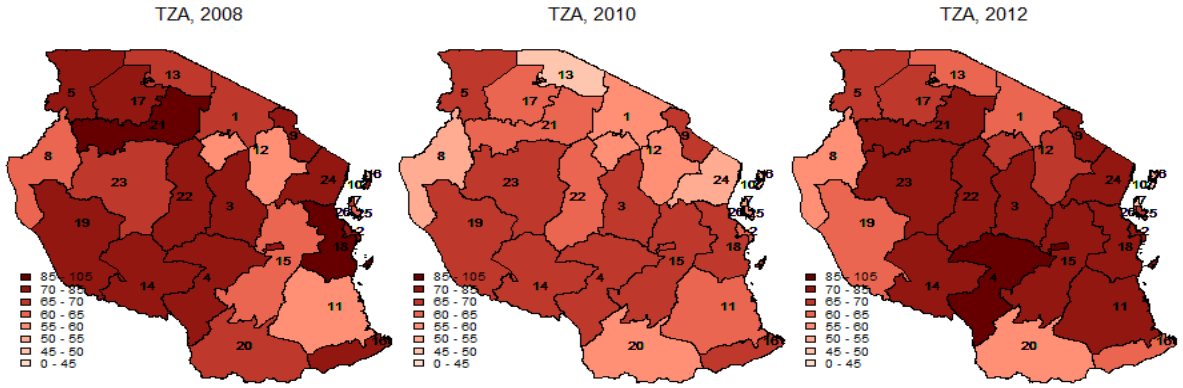
Standardized beta coefficients; t statistics in parentheses

Macro and micro nutrients intake

- carbohydrates intake (g/person/day)

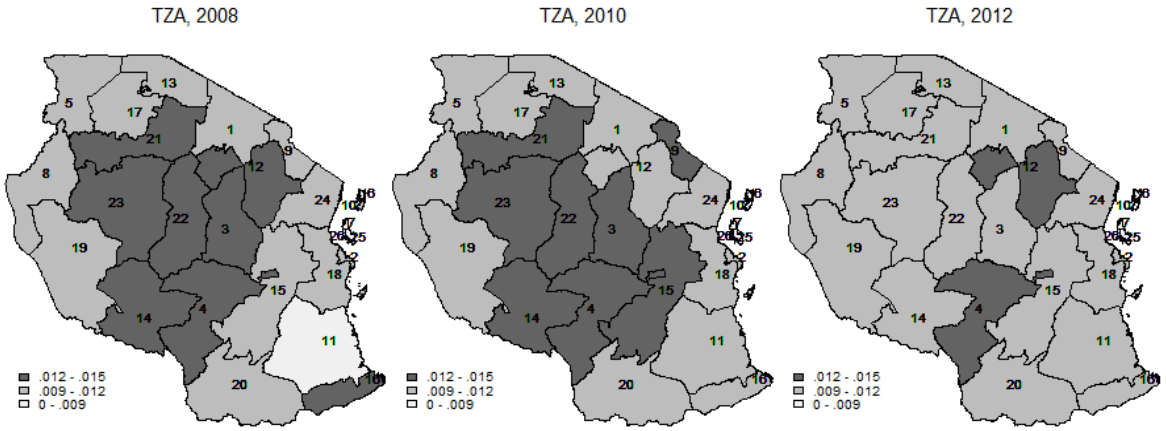


- proteins intake (g/person/day)

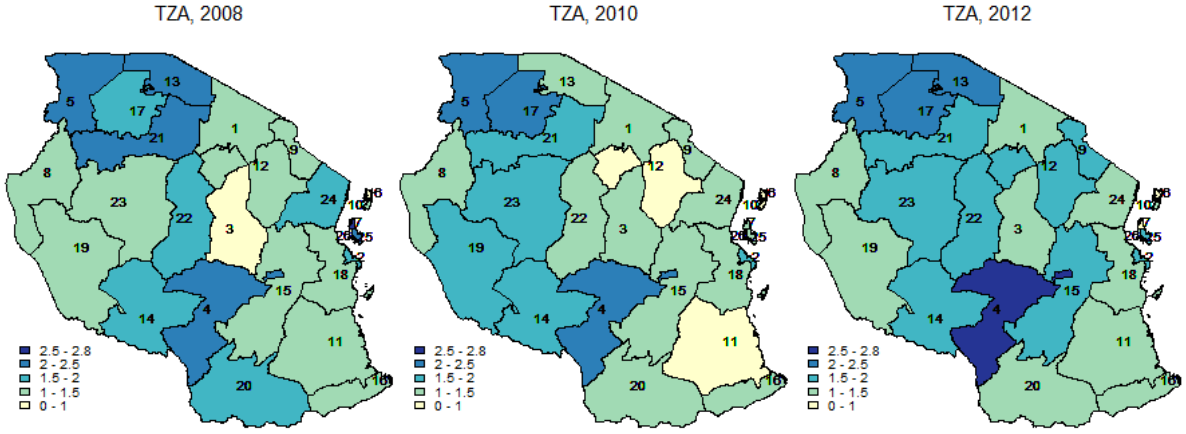


Macro and micro nutrients intake

- zinc intake (g/person/day)



- vitamin A intake (mg/person/day)



Concluding remarks

- price instability together with natural disasters are among the most experienced shocks among Tanzanian households
- the sensitivity of food intake variation to food price shocks is different among rural and urban households
- food price rise and food price fall affect (-) and (+) both quantity and quality of food consumed

Concluding remarks

- a mix of price stabilizing policies and food fortification programs need to be implemented at local level to improve the quality of the diet
- interventions should prioritize that regions exhibiting a deficit in macro/micro nutrients absorption (i.e. fats, calcium and vitamin-A)

Thank you

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