QARESS Symposium
QuAntitative Resilience-based managEment and Sustainability for Socio-ecological Systems

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Food System Resilience

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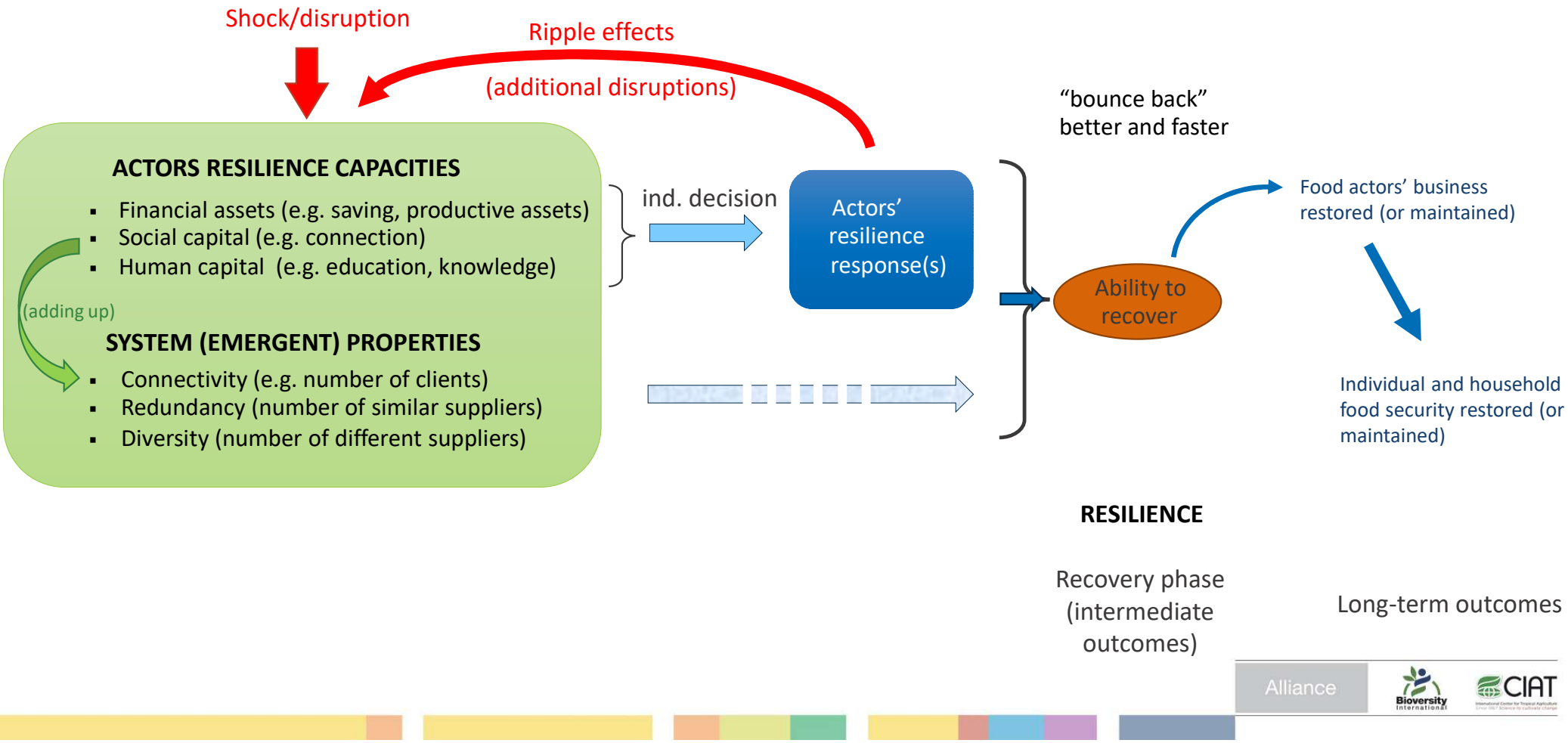
Resilience: the way I understand it…

- Resilience is about *shocks / stressors (adverse events)*
  - In the absence of shock, we can't say anything about resilience
- Resilience is about the way *systems' actors* deal with those adverse events
  - actors = individual, household, community, society, international markets, institutions, etc.
- Resilience (management) is about influencing the types of *responses* of those actors
  - Anticipation (ex-ante) or responses (ex-post)
  - Avoiding the "bad" responses (costs, LT implications)
  - Encouraging the "good" responses

"Normative" element of management

Resilience impact pathway (in a [food] system of actors)



What have we learned (so far) about food system Resilience?

- Analysis of food systems during COVID-19
  - national to global
- Analysis of (local) food systems affected by armed conflicts
  - provincial

- Resilience (of the system) = *intermediate* outcomes
- Food security (of the population) = *final* outcomes

Food systems resilience during COVID-19

CGIAR
COVID-19 Hub

- English, Spanish, French and Portuguese
- 12 months (Jan-Dec 2020)
- 337 documents
- 62 countries

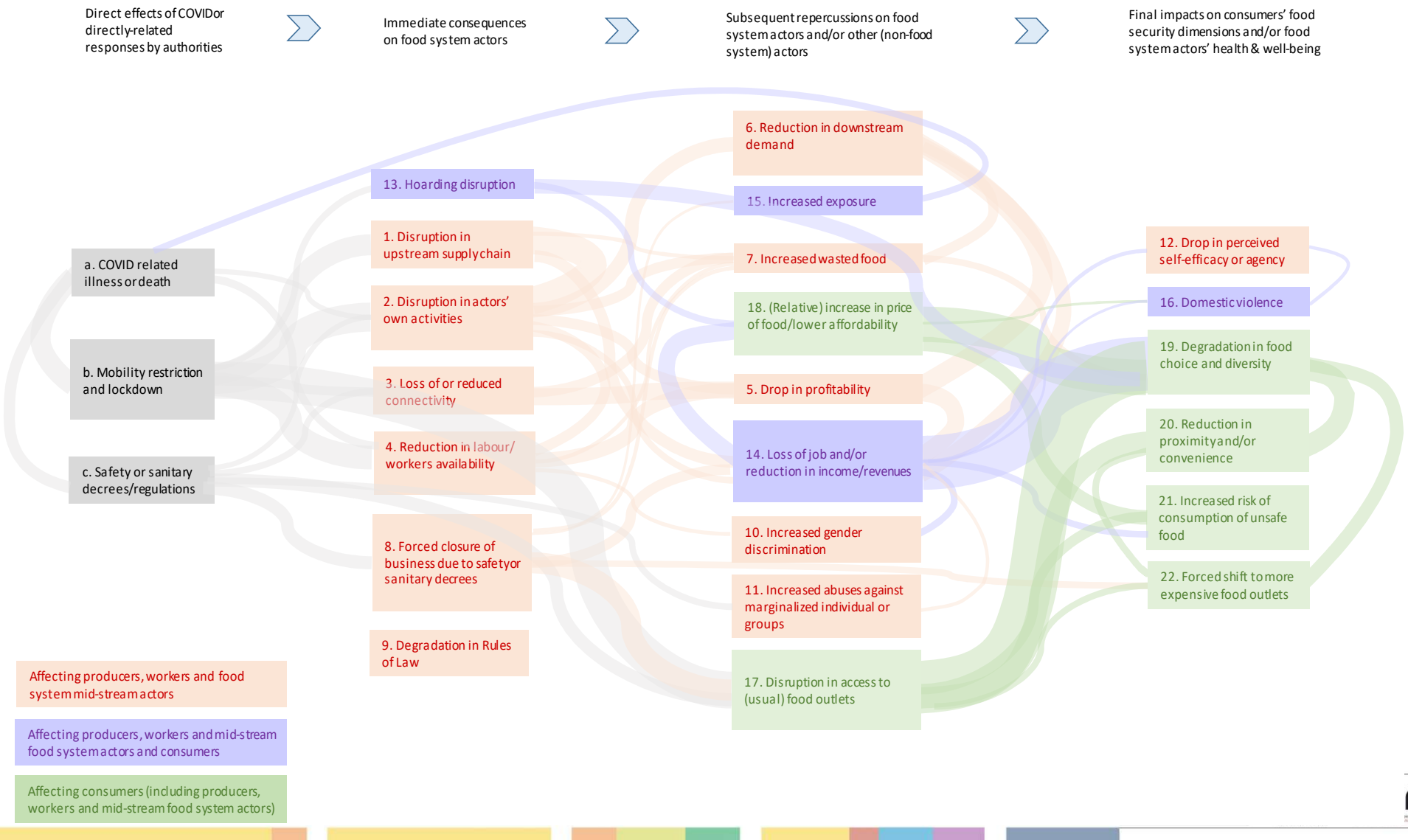
Food systems resilience during COVID-19

Descriptive (static) analysis

The main issues affecting the food system actors as reported in documents

Group of actors affected and main issues reported [(a)]	Documents[(b)]
Consumers	
▪ degradation in choice and/or diversity of food items available	56%
▪ increase in (relative) food prices/lower affordability	50%
▪ disruption in accessing food supply	44%
▪ loss or reduction of income and associated purchasing power	44%
Primary producers	
▪ disruption in upstream input supply chains	67%
▪ decline in business profitability / revenues, incomes	60%
▪ reduction in laborer/workers availability	40%
▪ reduction in demand for farm products	40%
▪ loss of or reduced connectivity with established business partners	33%
Mid-stream food system actors	
▪ disruption of business practices	39%
▪ forced closure of business	37%
▪ loss of connectivity with their established business partners	31%
▪ disruption in upstream input supply chains	31%
▪ reduction in downstream demand for products	30%

Note: (a) as reported in the documents reviewed with the full-fledged framework; (b) percentage of document reporting these issues. Only issues reported by 30% or more documents are listed.


Direct effects of COVIDor directly-related responses by authorities
Immediate consequences on food system actors
Subsequent repercussions on food system actors and/or other (non-food system) actors
Final impacts on consumers' food security dimensions and/or food system actors' health & well-being
a. COVID related illness or death
b. Mobility restriction and lockdown
c. Safety or sanitary decrees/regulations
13. Hoarding disruption
1. Disruption in upstream supply chain
2. Disruption in actors' own activities
3. Loss of or reduced connectivity
4. Reduction in labour/ workers availability
8. Forced closure of business due to safetyor sanitary decrees
9. Degradation in Rules of Law
6. Reduction in downstream demand
15. Increased exposure
7. Increased wasted food
18. (Relative) increase in price of food/lower affordability
5. Drop in profitability
14. Loss of job and/or reduction in income/revenues
10. Increased gender discrimination
11. Increased abuses against marginalized individual or groups
17. Disruption in access to (usual) food outlets
12. Drop in perceived self-efficacy or agency
16. Domestic violence
19. Degradation in food choice and diversity
20. Reduction in proximity and/or convenience
21. Increased risk of consumption of unsafe food
22. Forced shift to more expensive food outlets
Affecting producers, workers and food system mid-stream actors
Affecting producers, workers and mid-stream food system actors and consumers
Affecting consumers (including producers, workers and mid-stream food system actors)

General key-findings

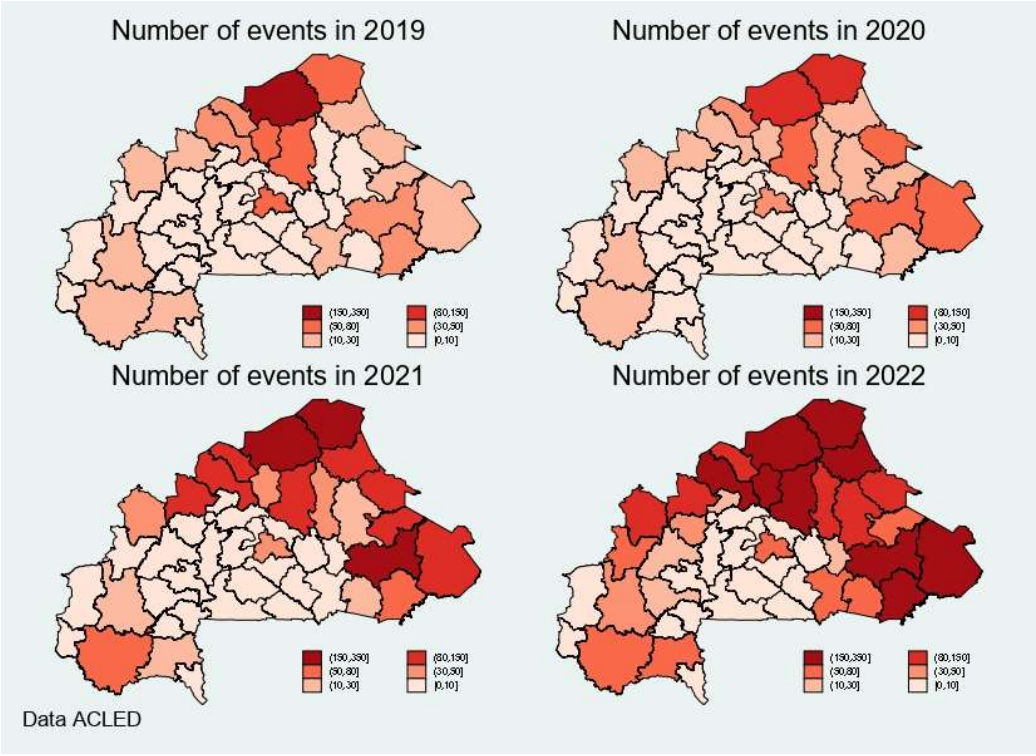
- Degradation in food insecurity due to world economy slowdown
- System ‘resisted’ – several interpretations
  - System’s actors resilient, or
  - Protected as “essential services”
- Long-term effects still poorly quantified or documented
  - Role and ability of different actors (to respond)
  - Importance of the emergent properties

Resilience lessons

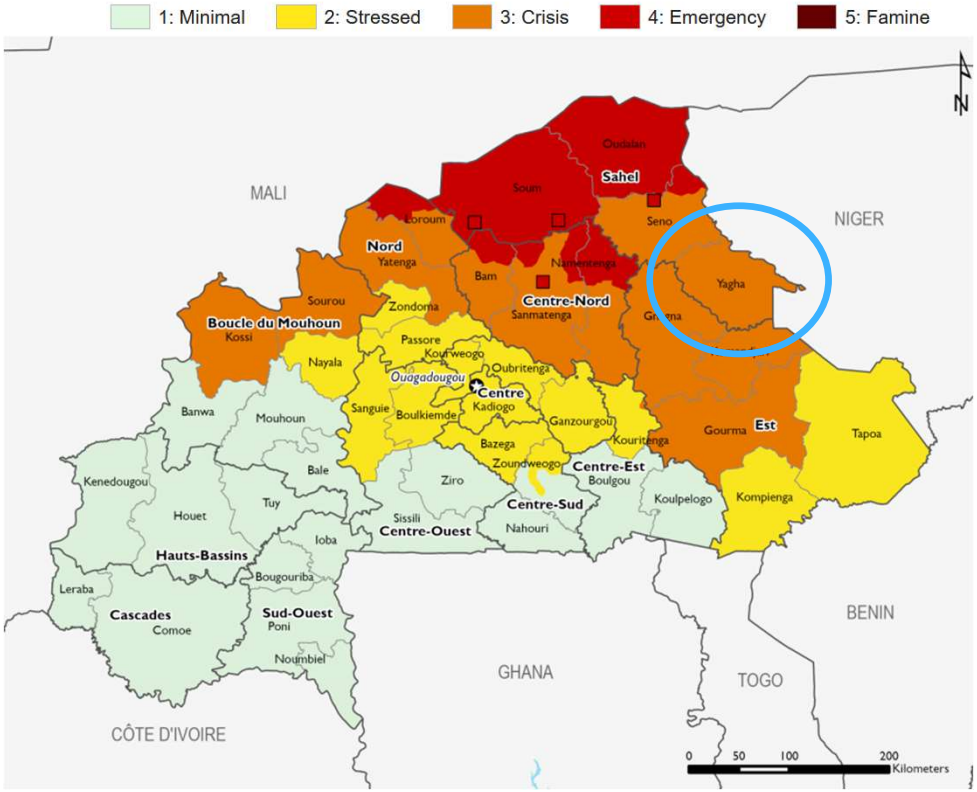
- Important gaps in our knowledge about resilience of food systems
  - used often rhetorically in food system policies
  - too theoretically in the academic communities
- Where to start….
  - Identifying actors' and value chains' vulnerabilities - technical, social, etc.
  - Understanding better resilience capacities
  - Documenting actors' responses to shocks – "ripple effects"
  - Exploring the role of emergent properties

Resilience of food systems affected by armed conflicts

North East of Burkina Faso (2022) – Yagha province -



Violent events in Burkina Faso since 2019



Food insecurity level -IPC system (June 2022, source: FEWSNET)

Findings (vulnerability)

- Exposure and Impact

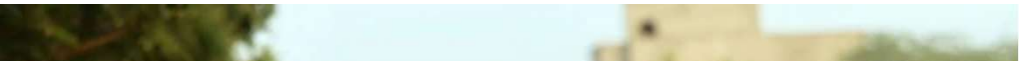
  Q: How are the most exposed /affected in the food system?

  ➢ Highly heterogeneous (transporters most exposed)

Table 5. Direct victim reported and main activity

	Direct victim reported	
	Freq (N)	Percent (%)
Producer	48	36.6
Processor	25	40.3
Transporter	27	47.4
Trader	34	36.6
Total	134	39.1

Pearson chi2(3) = 2.26; Pr = 0.52



(before-after Sohlan attack)

	Indicator change	N	Absolute change	Min	Max	Relative change (%)
Producers	Cultivated areas (ha)	106	-1.8	-9	0	-37%
	Maize production (tons)	73	-1.4	-20	1	-53%
	Millet production (tons)	103	-4.6	-64	0	-45%
	Sorghum production (tons)	102	-2.6	-32	0,1	-42%
	Cattle size (heads)	114	-6.2	-180	0	-29%
	Sheep (heads)	112	-4.1	-30	5	-28%
	Poultry (heads)	87	-8.1	-105	13	-37%
	Working hours per week	114	-18.4	-60	0	-31%
Process	Processed quantities (kgs)	52	-58.8	-1000	0	-48%
	Working hours per week	52	-17.0	-70	26	-40%
	Sales (USD/ week)	52	-41	-255	68	-48%
Transporters	Travelled distances (km/ week)	45	-155.8	-400	0	-58%
	Travels per week	44	-3	-10	0	-56%
	Transported cereal (tons/week)	43	-11.5	-2350	4	-54%
	Working hours per week	45	-22.8	-61	0	-42%
	Sales (USD/ week)	45	-72	-240	15	-56%
Traders	Number of markets	78	-2.1	-5	0	-50%
	Sold cereal (tons/ week)	69	-0.40	-3	12	-30%
	Sales (USD/ week)	78	-381	-4500	105	-49%
	Working hours per week	78	-21.35	-90	0	-32%

Findings (vulnerability)

- Exposure and Impact

  Q: How are the most exposed /affected in the food system?

  - Highly heterogeneous (transporters most exposed)
  - Activity reduced by almost half across the groups

Table 4. Econometric models exploring actors' mitigating responses to impact of insecurity.
Main results on outcomes expressed in relative changes (%).

	[1] Weekly working hours	[2] Weekly sales	[3] Weekly travelled distances	[4] Cultivated areas	[5] Operating markets
Food system operators					
Producer (1 if yes)	0.04				
Processor (1 if yes)	0.17***	0.13			
Transporter (1 if yes)	0.09**	0.05			
Trader (1 if yes)	omitted	omitted			
Basic characteristics					
Household size (members)	0.01***	0.00	0.01	0.01	0.00
Peulh ethnic group (1 if yes)	-0.07**	-0.05	-0.05	-0.15***	-0.02
Sex (1 if female)	-0.06	-0.15	omitted	-0.01	-0.29***
Age (years)	-0.00	-0.00	-0.01	0.01***	0.00
Literate (1 if yes)	0.06***	-0.03	-0.01	0.04	0.07
Exposure to conflicts					
Frequency of violent events	0.003***	0.008***	0.008***	0.007***	0.009***
Directly affected by Solhan attack (1 if yes)	0.278***	0.473***	0.516***	0.249***	0.418***
Wealth					
Log of value of assets owned (FCFA)	0.00	0.02	-0.03	-0.02	0.00
Social network					
Network size [0]	omitted	omitted	omitted	omitted	omitted
Network size [1-2]	0.01	-0.06	-0.05	-0.26***	0.02
Network size [3-4]	-0.05	-0.18***	-0.04	-0.15	-0.16***
Network size [5-10]	-0.16***	-0.19**	-0.17	-0.35***	-0.10
Network size [11+]	-0.19***	-0.31***	-0.27***	-0.42***	-0.18***
Constant	0.01	0.13	0.56	0.10	0.17
Mean level of outcome variable	0.35	0.50	0.58	0.38	0.50
Observations	287	175	45	106	77
R^2	0.368	0.382	0.630	0.278	0.478

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Findings (resilience)

Q: What factors are important for actors to buffer disruption?

- Hypotheses:
  - Wealth/assets
  - Social capital
- Econometric analysis
- Consistency across the models
  - Exposure to shocks
  - No clear effect of wealth
  - Social capital (size of the network)

Resilience lessons

- Limitation
  - no causal/formal link to HH food insecurity
- Relevance for literature on resilience
  - more than just producers (farmers)
  - financial *versus* social capital
- Implication for (humanitarian) interventions
  - Beyond IGAs and livelihood diversifications
  - Food system resilience analysis to be included in IPC tables?

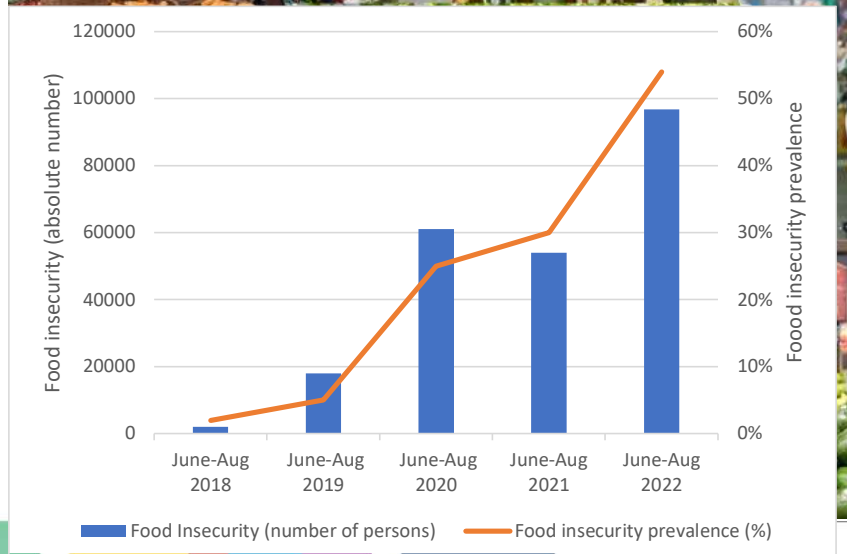
Some final remarks

- The subjective dimension of resilience
  - Self-efficacy, motivations, aspirations, etc.
  - Poorly documented and rarely included in measurement and in interventions

  "*between cash transfers and self-efficacy building, which intervention is more effective at strengthening resilience*?"

- Measuring changes in resilience capacities is not measuring resilience

- The rhetoric of food system resilience *vs* the reality of food system collapse?



Thank you for your attention

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