

## Risk perception and management strategies in farming systems of southern Mali

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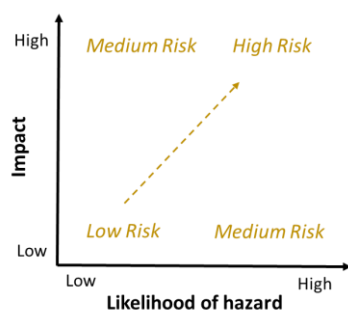
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### 1 – Introduction

Tailoring agricultural options and technologies to the local context in southern Mali can help farmers to increase their production and income in a sustainable way. Understanding how households perceive and cope with risks is important in this tailoring process (e.g. Douchamps et al., 2016). Market and production risks play a role in farmers' decision making and influence why farmers (do, or do not) adopt and adapt certain technologies. The first objective of this study is to analyse which risks farmers perceive as strongest and how this perception differs between and within households. The latter is often not included in risk assessments but is relevant since in this region households are large and complex entities. Secondly, we assess how farmers respond to and prepare for risks.

### 2 – Materials and methods

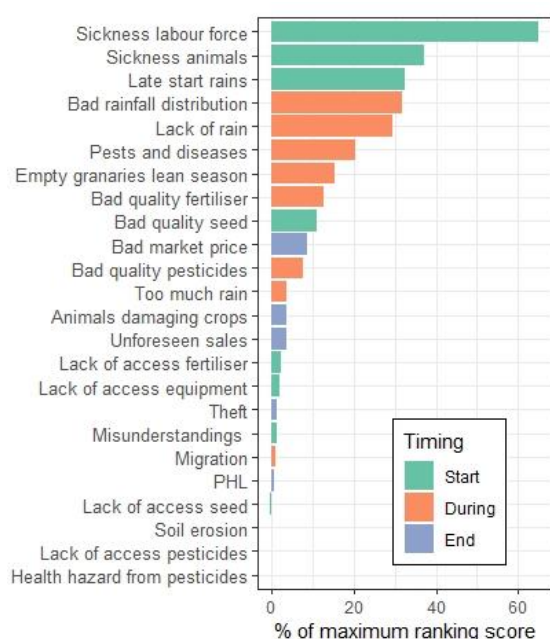


**Figure 1.** Conceptual framework for risk analysis

Agricultural risk is defined as “a combination of the likelihood of a hazardous event or exposure(s) and the severity of the losses that can be caused by the event or exposure(s)” (World Bank, 2016) (Figure 1).

A focus group discussion was organised in four villages in the region of Koutiala to create a list of hazards that farmers relate to a high risk. Next, farmers ranked the five most important hazards from this list individually. During this survey, they also gave a score on a Likert-type scale to each hazard expressing their concern for the related risk (“no”, “little”, “medium” or “high” concern). The 58 farms surveyed were classified in four types based on resource endowment (based on Falconnier et al., 2015). For every household at least a decision maker (the household head or field work manager), another male and female farmer, and a youth (age 15-25) were included, bringing the total to 250 people interviewed. The difference in perception between gender, responsibility in the household and farm type was tested using a Kruskal-Wallis test (Bonferroni-corrected  $\alpha=0.002$ ). Finally, the decision makers expressed how they responded to their three most important hazards the last time this event affected farm income or production.

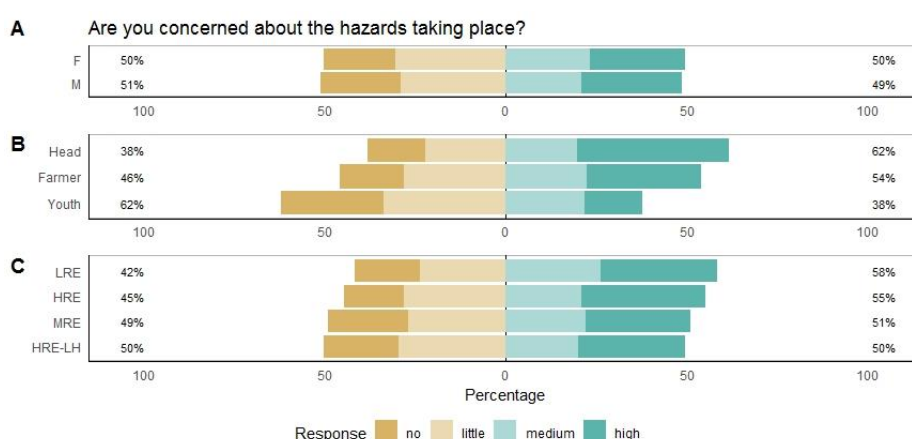
### 3 – Results – Discussion



**Figure 2.** The 24 hazards that farmers related to a high risk during the focus group discussions, ranked according to importance given by farmers in surveys. The ranking score is the percentage of the actual score out of the maximum score one hazard could reach if all farmers would score it as most important. The colouring represents the timing in the growing season when the hazard is most likely to occur.

The most important risks were related to labour and weather and occurred at the beginning of the growing season. Family members falling ill was a major concern. Also sick cattle scored high because cattle are highly valued and are crucial as draught power during land preparation. Other risks mentioned related to pests and diseases, an exhausted granary during the lean season, bad quality inputs and lack of timely access to inputs. Market risks were mentioned but were perceived as relatively less important (Figure 2).

The perception of risks differed within and between farms. Men and women (excluding decision makers) did not perceive risk differently ( $P=0.5$ ), but members with different positions in the household did ( $P<1e^{-15}$ ). The decision maker expressed the greatest general concern, while young people the least. Also farmers from different farm types perceived risks differently ( $P < 1e^{-5}$ ) (Figure 3).



**Figure 3.** The proportion of answers on the Likert-type scale given by farmers when asked for their concern, for all the hazards together. The respondents are classified in different groups, first according to (A) gender (M: male (excluding heads) (n=82), F: female (n=96)), then according to (B) position in the household (Head: decision maker (n=72), Farmers: male or female adult member involved in farming (n=125), and youth: member between 15 and 25 (n=53)), and finally according to (C) farm type (LRE: low resource endowed (n=19), MRE: medium resource endowed (n=96), HRE: high resource endowed (n=90) and HRE-LH: high resource endowed with a lot of livestock (n=45)).

When hazards occurred in the past, farmers responded in various ways to reduce losses (Table 1), but in about 25% of the cases farmers did not see a solution (ex-post or ex-ante) and accepted the loss. Risk avoidance, i.e. exclusion of farming practices that are prone to that risk, and risk transfer, i.e. transferring the consequences of a risk to others through insurances or getting credit, were rarely mentioned as a strategy. In some cases farmers mentioned selling collectively, or getting credit (informal) as a strategy.

**Table 1.** Examples of reactive and preventive risk management actions mentioned by farmers for all hazards grouped together. The number represents the times a type of action was mentioned by a farmer. In total 171 hazardous events were discussed with the farm heads (top 3 of hazards per head).

Type of action	Reactive risk management (ex-post)		Preventive risk management (ex-ante)	
	Nr	Examples	Nr	Examples
Nothing	40	/	51	/
Field	33	Change variety; re-sow; harvest early	15	Early maturing varieties; spread sowing dates; germination test
Medical	31	Traditional or modern medical treatment	25	Traditional or modern preventive treatment
Social	27	Remittances; borrow oxen, seeds or food in the village; get credit	27	Sell in group; associate with cooperatives; keep family reunions
Inputs	22	Increase dose of fertiliser; buy other product; change targeted crops	13	Increase production of organic fertiliser
Animal	21	Sell animal; stall feeding; buy or loan ox	18	Buy animals; store more fodder
Consumption	18	Buy or sell more cereals; consume lower diversity of food	5	Calculate how much cereal the family needs and store this amount; sell less
Crops	17	Reduce cropped area; change crops	25	Cultivate fodder; reduce cropped area
Labour	14	Work harder; hire labour; off-farm labour	9	Off-farm labour
Other	0	/	13	Build a granary; buy material

## 4 – Conclusions

Farmers perceived various risks as important, and this perception differs among and within households. To take these risks into account when tailoring options to the local context, it is suggested to foresee a range of options that are complementary in being adapted to different weather situations, but that do not increase the labour requirements in the beginning of the season. Improving the feeding regimes for cattle could be beneficial to prevent animals getting weak during the dry season. Farmers used a diversity of actions to deal with risks, but risk avoidance and risk transfer strategies were not implemented regularly.

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