

Dynamics of Formal and Informal Responses to Shocks. Empirical Evidence from Cameroon

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Abstract

Increasing upsurge of extreme natural shocks jeopardizes the capacity of traditional social protection mechanisms to effectively manage risks and associated shocks. This paper analyzes the differentiated dynamics of formal and informal response mechanisms to shocks of surviving households of the 1986 Lake Nyos natural disaster in North West Cameroon. Two hypotheses are tested: (1) Informal response mechanisms to covariate shocks are important. (2) The co-functioning of state, market and informal arrangements can provide an appropriate mix of instruments for reducing shock impacts and supporting economic development of vulnerable households.

The three key messages are: (1) Informal response mechanisms in managing idiosyncratic and covariate shocks are vitally important. (2) Through learning and experience, households adopted innovative, complex combinations of formal and informal response mechanisms to manage shocks. (3) High levels of trust in formal and informal institutions provide incentive for cross level adaptive, collaborative long term risk management.

Key words: Risks and shocks, formal and informal responses, Lake Nyos, Cameroon

1. Introduction

Seemingly, the increased occurrence of natural shocks is straining traditional, often informal social protection instruments to their limits. Sudden extreme events are often accompanied by welfare losses that increase the vulnerability, especially of the poor and the near poor to poverty (Zimmerman and Carter 2003; Carter et al. 2007; Günther and Harttgen 2009). Frequent occurrence of covariate shocks can potentially overwhelm formal (public and market-based) management capacities. This is particularly true for developing countries where appropriate state and market institutions are either missing or ineffective, and governments do not have the financial capacity to afford an encompassing social protection (Holzmann and Jorgensen 1999; 2000; Skoufias 2003).

Apparently, the position of the economic literature on natural shocks is clear on the differential capacities of formal and informal response mechanisms to idiosyncratic and covariate shocks. In the event of covariate shocks, informal mechanisms that are effective in managing idiosyncratic shocks are hypothesized to become ineffective or break down completely. Subsequently, the presumably more resilient formal mechanisms become important in the management of covariate shocks (Alwang et al. 2001; Holzmann et al. 2003; Skoufias 2003). For instance, local group-based insurance that *ceteris paribus* may buffer household individual shocks might collapse in the wake of a covariate shock (Skoufias 2003). Meanwhile, it is generally agreed in the literature that informal (individual and community based) safety-net mechanisms are still the most important form of risk management mechanisms for the poor in developing countries (Holzmann and Jorgensen 1999; 2000; Conning and Kevane 2002; Holzmann et al. 2003). Nevertheless, as briefly mentioned above, risk-managing state and market institutions often fail or operate sub-optimally in developing countries. Yet, well-functioning institutions would provide a favorable environment for the proliferation of informal risk management mechanisms. Depending on the nature of the shock, households may apply various forms of formal and informal mechanisms in isolation or in combination, with differential outcomes.

Many crucial questions arise that require further analysis. For example, how do households behave when covariate shocks strike in the absence of effective state and market institutions, considering that the poor still massively depend on informal risk management instruments? Are formal and informal institutions and their accompanying

arrangements empirically separable? What factors account for the fact that some (formal and informal) institutions persist and are very efficient in certain environments, and not in others? Are informal response mechanisms dynamic enough to evolve from coping with shocks towards long term risk management?

Over the years, efforts have been expended by economist, sociologists and political scientists to answer these and many other critical questions. For instance third sector economists have explained the emergence of nonprofit non-governmental organizations as an institutional response to state and market failures (Hansmann 1980; 1987; Weisbrod 1988), a medium for the procreation of altruistic and ideological motives (Steinberg 2006; Jegers 2008), or as a quasi automatic integration of both objectives (Valentinov 2008; 2009). Behavioral and social economists have increasingly stressed the important dynamism that abounds informal institutional responses to aggregate shocks in the presence, and especially in the absence of fully functioning states and markets (Campbell 1999; Agrawal 2008; Balgah and Buchenrieder 2010). Campbell (1999) for instance demonstrates how rural communities were able to dynamically respond to recurrent droughts by combining innovative local processes and institutions with sub-optimal national and international assistance to combat the risk of drought-related food insecurity in eastern Kenya. A complex interaction among diverse formal and informal institutions “provide[d] a wide range of opportunities for people to reduce their vulnerability to future food shortages” (Campbell 1999: 405). This example supports recent contentions regarding the underestimated role of informal risk management mechanisms to covariate shocks in the current literature (see for example Balgah and Buchenrieder 2010).

The importance of adaptive informal management responses to covariate shocks for collaborative risk management has been reiterated and empirically emphasized. Recent empirical examples include Trosper (2002) for Indians in the North West Coast of America, Tompkins and Adger (2004) for flood risk in Trinidad and Tobago; Tompkins (2005) in relation to hurricane preparedness in the Cayman Islands, and Agrawal (2008) in his comprehensive analysis of over 100 case studies from different continents. These studies emphasize the relevance of social learning, and the essence of local (informal)

institutions and processes in adaptive, collaborative and integrated management of covariate shocks.

This article sets out to contribute to this literature by testing two important hypotheses: (1) Informal response mechanisms to shocks are more important than currently mentioned in the topical literature. (2) The co-functioning of state, market and informal arrangements can provide an appropriate institutional combination for reducing shock impacts. The second hypothesis is based on the premise that each risk management mechanism has its comparative advantage, and capacities can be harnessed to accommodate risks (Holzmann et al. 2003).

The article will continue as follows. Key terminologies used in this article are shortly reviewed in section 2, while the research region and methodological issues are elaborated in section 3. Section 4 presents and analyzes the results. Section 5 concludes with a discussion and the implications of findings for research and policy.

2. Risk and shocks: a concise review of terminology

To improve assimilation, it seems necessary to at least briefly, review key terminology from the natural shocks literature that will be frequently applied in this article.

Natural shocks calibrate sudden events of natural origin, with welfare-reducing capacities. They include events whose source is natural such as volcanoes, floods, droughts and Tsunamis. These must be differentiated from man-made shocks emanating from human activities. Examples of the latter include inflation, wars, unemployment and financial crises (Holzmann 2001). But shocks are outcomes of risks. The notion of *risk* refers to uncertain (i.e. stochastic) events and outcomes with known or unknown probabilistic distributions. Put differently, a shock is the actual manifestation of risk (Heitzmann et al. 2001; IFPRI 2002; Fafchamps and Lund 2003).

Health shocks consist of unfavorable health-related events such as illness of household members and epidemics, while life cycle shocks comprise life events such as birth and death of household member. Environmental shocks denote shocks such as deforestation and pest incidence (Holzmann and Jorgensen 1999 and 2000; Holzmann 2001; Heitzmann et al. 2001; Holzmann et al. 2003). The validity of this categorization for empirical analysis remains questionable, considering that some categories may

actually depend on, or be the root cause of others. For instance, the death of a household member is a life cycle shock that might be the outcome of floods, epidemics, or even economic shocks such as unemployment. Consequently, a more frequently used and seemingly more appropriate classification of shocks based on impacts (idiosyncratic/individual and covariate/mass) is popular in the literature (e.g. Heitzmann et al. 2001, Holzmann et al. 2003). They describe shocks that affect only individual or a few households and those that impact a wider population irrespective of their origin, respectively.

Risk management arrangements include all formal and informal actions that have historically evolved for the purpose of providing some social protection for households in the event of a shock (Holzmann and Jorgensen 2000; Heitzmann et al. 2001; Holzmann et al. 2003; Skoufias 2003). Broadly speaking, they can be split into formal (market and public based) and informal mechanisms, ex-ante or ex-post. Formal mechanisms include for example insurance, formal savings, social assistance, relocation and government transfers, while informal mechanisms comprise strategic marriages, collective action and solidarity, migration, sale of assets, informal savings, and membership in groups and networks. Membership in groups and networks are fundamental to social capital, an important component of risk management.

Although social capital is contentious and a generalized definition remains problematic, it most often relates to membership in groups and networks (Putnam 1993; Portes 1998), but also to the resources accessed in these networks (Bourdieu 1986; Dufhues and Buchenrieder 2006). To these dimensions, Grootaert et al. (2004) append trust and solidarity, collective action, access to information and political empowerment as additional dimensions of social capital. This article combines membership in groups and networks, and trust in institutions to approximate differential importance of formal and informal response mechanisms within the sample.

Lastly, risk management strategies typically encompass timing of application of instruments. Preventive, reductive and mitigation measures are implemented prior to shocks. Coping measures are implemented after the shocks strike. Therefore, risk management mechanisms include the portfolio of actions effectively applied in anticipation, during or after a shock. In other words, risk management (or response)

mechanisms describe the effective combination of risk management arrangements and strategies aimed at attaining predefined household outcomes from past, current or anticipated shocks. With this brief review of terminology, it is appropriate to move to more specific issues related to the case study that is the basis of this article.

3. Materials and Methods

This section briefly summarizes the research objective and presents the research background and area, and concludes with issues on sampling and data collection.

3.1. Problem background and the research area

Cameroon's geological setting and tectonic history makes her one of the most exposed countries to rapid onset natural shocks in Africa. Frequent geophysical and hydro-meteorological hazards along the Cameroon Volcanic Line (CVL) affect livelihood assets in the country (Bang 2008). Cameroon is exposed to natural shocks such as volcanic eruptions, toxic gas emissions, earth tremors, landslides and floods which often translate into disasters with severe impacts on the poor.

One of the most devastating natural shocks occurred on August 21st 1986 and its negative effects on the region have not been yet fully remedied. A violent volcanic eruption at Lake Nyos in North West Region of Cameroon emitted natural Carbon dioxide and minimal amounts of Hydrogen sulphide that asphyxiated over 1,700 inhabitants and almost all livestock in three affected villages (Nyos, Cha, Subum), located within a diameter of about 25 kilometers around the lake. Subsequent scientific investigations on Lake Nyos confirmed huge amounts of CO₂ (300 million m³) in the deeper layers, with a high probability of further release in the future. While initial scientific interest was naturally tilted towards analyzing and understanding the cause of this natural shock, a high level conference on the Lake Nyos disaster held in Yaoundé Cameroon in March 1987 proposed that surviving victims should be resettled immediately (Sigvaldson 1989). To this end, seven resettlement camps were established in Kimbi, Buabua, Yemngeh, Ipalim, Kumfutu, Esu and Upkwa between 1987 and 1988. Most households were moved immediately after construction from the affected villages into the camps where a majority still live today.

The shock-affected villages were declared disaster zone by the government and rehabilitation was legally prohibited. Nevertheless, in the last decade, a natural experiment has been taking place. A substantial number of households from the resettlement camps have been stubbornly moving back into these villages, in spite of government restriction. Bang (2008) suggests that a major motive for moving back is the deficiency of state-led shock management to jointly address physical, structural and social risk mitigation, and increasing distrust in government due to unfulfilled original promises. Self-relocation is taking place in the backdrop of the possibility of a covariate shock with potentially negative impacts on recipient villages.

This paper comparatively analyzes the dynamics of formal and informal responses to covariate and idiosyncratic shocks for surviving households in three resettlement camps (Kimbi, Buabua and Yemngeh) located closest to the official disaster zone and three villages with households that illegally moved back into the disaster zone. The choice of the resettlement camps is based on the fact that they are the main sources of households moving back to the potential disaster zone. The analysis is based on the assumption that households were originally the same after the disaster (Bang 2008). Illegal rehabilitation is the major differentiating event. It is assumed that for households to move back to the disaster zone, they must have developed robust formal and/or informal shock management mechanisms that they assume to be resilient to current and future shocks.

3.2. Methodology and sampling procedures

The sampling unit was the household. Unique primary data were collected with a standardized questionnaire. The census included 100% of all those former Lake Nyos disaster households that, meanwhile, had illegally returned into the potential disaster zone and over 80% of all those households that, for now, had chosen to stay in the three resettlement camps. A total of 208 households (71 illegally resettled and 137 in camps) were surveyed. The questionnaire included modules for risk management analysis based on the World Bank's Social Risk Management (SRM)¹ framework (Holzmann and

¹ The Social risk management (SRM) framework was developed by the World Bank's Social Protection Department in the late 20th and early 21st century. Following the Asian financial crisis of the 1990s, it

Jorgensen 2000; Heitzmann et al. 2001; Holzmann et al. 2003). Three key factors of SRM framework are used to analyze shock dynamics: (1) the total number of shocks, (2) sources of shocks, and (3) risk management arrangements and strategies (or response mechanisms) implemented at the household level.

To assess the importance of formal and informal instruments in generating social capital, an asset assumed to be crucial for risk management, some indicators based on Grootaert et al. (2004) were included in the questionnaire. The quantitative survey was complemented with participatory methods like participant observation, and focused group discussions. Field data collection took place between November 2009 and February 2010.

We employ the t-test for equality of means and relate the results to theory because we think this straight-forward statistical approach suits best the complexity of the topic with regard to interpreting power. Within the t-test for equality of means, we compare households who chose to stay in the resettlement camps and those who decided to illegally move back to the disaster zone.

4. Managing shocks in the eye of a volcano: Results of an empirical survey

This section summarizes the empirical results. The socioeconomic characteristics of the two household types will be presented first. A differentiated analysis of social capital is based on membership in formal and informal groups and networks will follow. After analyzing trust levels in formal and informal institutions as a proxy for their importance in managing idiosyncratic and covariate shocks, the results of the shock dynamics will be analyzed. The sources of shocks and the response mechanisms for all households will conclude this section.

became evident that economic growth alone is not a sufficient condition for long term poverty reduction. SRM emerged as the first comprehensive framework including social dimensions in risk management. It effectively links social protection to the broader agenda of poverty reduction by shifting the focus from risk coping to assessing risk reduction and vulnerability, therefore raising more interest on the potential role of informal instruments in managing risks. For a comprehensive overview of the framework, see for instance Holzmann and Jorgensen 1999, 2000, Heitzmann et al. 2001, Holzmann 2001, Holzmann et al. 2003).

4.1. Socioeconomic characteristics of households

The literacy rate in the research region (58.3%) is ten percentage points lower than the national average for Cameroon (UNICEF 2010). A greater proportion of the sample (40%) is self employed in agriculture, while only 35% are students or pupils. Literacy rate is even lower amongst household heads: 46.6% and 40% for household heads who had chosen to illegally rehabilitate disaster zone villages and household heads remaining in the state-supported resettlement camps, respectively. This partly explains why 83% of all household heads are self-employed in subsistence agriculture, as illiteracy is a major handicap to access more specialized labor markets (Holzmann and Jorgensen 2000).

Subsistence agriculture however seems to enhance household short term food security: an average of 2.5 meals a day was reported by both household types. Nevertheless, moving back to the potential disaster zone arguably enhances long term food security – probably because population pressure is not yet as high and the natural resources are still very abundant. In fact, only 21.4% of the households in the potential disaster zone as compared to 31.3% of the households in the resettlement camps reported long term food insecurity. In this context, long term food insecurity is defined as household inability to have enough food all times over a 12-month period (Henry et al. 2003). This suggests that the movement to the potential disaster zone has enhanced food security, most likely due to access to more abundant and fertile land, since population density is naturally lower. This conjecture is supported by other descriptive statistics in Table I below. For instance, the number of farm plots per capita for households in the potential disaster zone is significantly higher than for those in the resettlement camps. The agricultural expenses of the former are also higher, even if they are not statistically significant. Table I presents additional socioeconomic characteristics of the two household types.

With the exception of household size, households that had moved back have presently significantly higher monthly consumption as well as annual clothing and footwear expenditures. Self-relocated household also have consistently higher values of assets (such as cash available per capita) compared to households in the resettlement camps. Thus, based on Bang's (2008) assumption that the disaster affected households were originally more or less the same after the disaster (which is logical as households

had lost almost all of their assets to the disaster, and the resettlement process was identical for all households), then moving back culminates in asset accumulation.

The fact that the mobile households lost significantly higher livestock assets in the 1986 disaster might suggest that even before the disaster, these households were better off, and crucially could have, based on their stronger agency and risk taking abilities recovered faster from the shock. In this light, it will be the wealthier households that take the risk of moving back to the disaster zone. This conclusion is supported by other scholars, e.g. Binswanger (1980), Fellner and Maciejovsky (2007), and Van den Berg et al. (2009). They state that wealth is negatively correlated with risk aversion. This however contradicts Fisher's (1930) suggestion that poorer households are more likely to take risks, since their present conditions of poverty increase impatience and their preference for current over future wealth. However, because wealth itself is a multidimensional phenomenon, we proceed to assess other wealth-influencing factors, particularly social capital that affects shock management, to improve our understanding of the underlying factors accounting for observed differences in our sample.

Table I Socioeconomic characteristics of sampled households

	Household type	N	Mean	Std. deviation	P
Monthly consumption expenditures per capita	Camp	134	22725	18490	.000
	Disaster zone	69	40320	39565	
Annual clothing expenditure per capita	Camp	132	15770	9565	.000
	Disaster zone	70	22270	10840	
Assets per capita	Camp	134	66590	2.82135E5	.571
	Disaster zone	70	88190	2.04383E5	
Cash available per capita	Camp	134	9545	17335	.116
	Disaster zone	70	16015	41090	
Agric. expenses per capita	Camp	134	8825	10195	.140
	Disaster zone	70	12740	27140	
Number of farming plots per capita	Camp	134	.40	.63720	.000
	Disaster zone	70	.90	1.03936	
Value of Livestock lost in 1986 disaster per capita	Camp	132	105570	3.99752E5	.046
	Disaster zone	70	241420	5.50074E5	
Human lives lost in 1986 disaster per household	Camp	132	13	16	.115
	Disaster zone	68	17	22	
Rooms per capita	Camp	134	.78	.78	.618
	Disaster zone	70	.84	.87	
Household size	Camp	134	8	5	.002
	Disaster zone	70	6	4	

Notes: 1. Mean currency values (in FCFA) and human lives have been rounded to the next whole currency values and numbers respectively

4.2. Social capital

Social capital was assessed in three ways: as membership in groups and networks; specific membership in formal and informal networks and trust in these networks and institutions. Table II presents the results of the first part of the analysis. As demonstrated, a high percentage of all households contain members with membership in groups and networks. However, the mean number of membership is significantly higher for households in resettlement camps than for households who moved back to the disaster zone. This finding invokes several suggestions. First, as moving back to the Lake Nyos disaster zone is legally prohibited, there ought to be fewer institutions because social life there is just developing again. Second, if these networks help households to manage shocks and enhance well-being, the well-connected households are less likely to move

back to the disaster zone. Thirdly, because illegal rehabilitation is a recent phenomenon occurring in the last 5-10 years (compared to the 23-year old resettlement), our conjecture is that initial informal networks created as part of coping strategies have evolved over time, to stabilize the livelihoods of stationary victims, making them more resilient to further shocks, and less interested in moving. Especially the last two issues, we strongly argue, have not been well understood in the literature, and the deficiency is responsible for the underestimation of the capacity of informal responses to shocks, and their impacts on long term adaptation. Our results support previous findings on the importance of social capital on household risk reduction, as exemplified for instance by its positive impacts on household poverty risk reduction in Burkina Faso (Grootaert et al. 2002).

Table III presents a more detailed analysis of the membership dynamics. Households were asked to report all formal and informal institutions in which they are active. Here, the major two formal and/or informal institutional networks are assessed. Over 80% of all membership is in informal networks. Nevertheless, a significantly higher percentage of stationary households access formal networks, compared to those who moved back to the former disaster zone. The limited access of mobile households to formal networks is logical, as their relocation remains illegal. Access to formal networks and the development of informal mechanisms may be important for long term risk management for mobile households. This suggestion aligns with Agrawal’s (2008) ideological supposition that strategic institutional coordination across scales (that is formal with informal) is an essential prerequisite for successful adaptive, collaborative long term risk management.

Successful coordination of formal and informal risk response mechanisms to attain long term risk management requires a proper understanding of the differentiated dynamics, institutional processes and capacities of both institutional response types. To attempt an understanding of the relative importance of these response mechanisms at the household level, we assess the current level of trust by the two household types in local, community-based (informal) institutions, as well as in public (formal) institutions.

Table II Household membership in groups and networks

Household type	N	No (%)	Yes (%)	Mean	Std. Deviation	P
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Camp	134	11.9	88.1	2.39	1.79	.000
Disaster zone	70	15.7	84.3	1.37	.97	

Table IV presents the level of trust in local institutions. While the mean level of trust is reasonably higher than the median score for both household types, trust in these institutions is generally higher for households that had moved back to the potential disaster zone. This trend is consistent with the context and the phenomenon of illegal rehabilitation in the Lake Nyos disaster zone. In fact, because it is illegal, it is principally governed by local level governance institutions, and higher demonstrated trust by those law-breaking households is a rational choice. The most important institution remains the local traditional council, which plays a key role in land allocation and distribution; closely followed by local elites and non-governmental organizations (NGOs) who probably are essential community links to external resources.

Table V depicts the level of trust in external public institutions. Compared to local-informal institutions, trust in these institutions is generally lower, but still above the median. The higher levels of trust demonstrated by households in the former disaster zone in these institutions is probably influenced by two recent governmental developments: (1) government involvement in physical risk reduction at the risk source, Lake Nyos (Bang 2008) and (2) government renewed promises to officially support an official relocation process back to the ancestral land within the next two years (Loh 2010). The highly significant difference on the level of trust exhibited by households with regard to independent researchers by illegally-returned villagers in the former disaster zone compared to those in the resettlement camps is attributable to a large degree to the more frequent visits to the rehabilitated areas by the independent researchers, (including our research team), comparatively to state-engaged researchers. Government researchers operating within the legal framework are more likely to restrict research to the physical risk reduction heavily supported by the government at the risk source, or restrict field research visits only to the official resettlements. Also, their allegiance to state institutions might perpetuate unattended promises that have characterized previous government interventions. Nevertheless, the generally acceptable level of trust in government institutions demonstrates the potential for across-level coordination necessary to enhance

long term adaptive risk management strategies in the research region. For adaptation to be successful, a deeper understanding of current shock dynamics at household or community level is inevitable.

Table III Membership dynamics by household type in formal and informal networks

Network no.	Formal		Informal	
	Households in former disaster zone (%)	Households in resettlement camps (%)	Households in former disaster zone (%)	Households in resettlement camps (%)
I	27.1	1.6	72.9	94.8
II	6.1	3.6	93.9	96.4
I&II (mean)	16.6	2.6	83.4	97.4

Notes I & II contain samples of 177 (118 resettled, 59 relocated) and 110 households (82 and 28), respectively.

Table IV Level of trust in community based institutions

Variable	Household type	N	Mean	Std. deviation	P
Local risk management institutions	Camp	132	2.44	1.61	.066
	Disaster zone	68	2.85	1.25	
Local traditional council	Camp	133	3.06	1.07	.050
	Disaster zone	70	3.36	.99	
Municipal council	Camp	131	2.15	1.54	.009
	Disaster zone	70	2.71	1.25	
Local elite	Camp	132	2.93	1.27	.222
	Disaster zone	70	3.14	.94	
Non-governmental organisations	Camp	129	2.84	1.34	.874
	Disaster zone	70	2.81	1.22	

Table V Level of trust in Public institutions

Institution	Household type	N	Mean	Std. Deviation	P
Local level government officials	Camp	130	2.21	1.57	.503
	Disaster zone	70	2.36	1.37	
Government risk management institutions	Camp	130	1.97	1.58	.120
	Disaster zone	70	2.31	1.33	
Central government officials	Camp	129	2.03	1.64	.267
	Disaster zone	70	2.29	1.35	
Government researchers	Camp	128	2.32	1.55	.637
	Disaster zone	70	2.21	1.444	
Independent researchers	Camp	128	2.50	1.495	.000
	Disaster zone	70	3.33	.847	

4.3. Shock dynamics

Three key factors based on the SRM framework are used to analyze the shock dynamics within the sample (Holzmann and Jorgensen 2000; Heitzmann et al 2001; Holzmann et al. 2003). These include the total number of shocks, sources of shocks, and the risk management arrangements and strategies (or response mechanisms) implemented at the household level.

Table VI presents the mean number of shocks for stationary disaster victims in the official resettlement camps and those who moved back illegally into the disaster zone. The latter had witnessed approximately one additional shock as compared to the former. The availability of government and NGO-supported public goods like drinking water and health centers buffer shocks for households in the official resettlement camps. These facilities are conspicuously missing in the disaster zone. However, the fact that households in illegally rehabilitated villages hold more assets and make higher agricultural investments suggests that although they are more risk-exposed, the abundance of capital assets renders them less vulnerable presently and more resilient to shocks than the less-exposed counterparts in the resettlement camps. Thus, for the time being, illegal rehabilitation has a generally positive impact on resilience.

Table VII analyzes two main sources of shocks affecting the sampled households over a one-year period. The most important shocks were health shocks. This can be

attributed to sub-optimal conditions of public goods catering to health in the research area, or probably a long term spill over effect of the 1986 disaster. Health shocks often resolved into deaths. With about 50% of all households reporting health shocks, it seems to suggest that the origin of this idiosyncratic shock may be covariate but further research is necessary. The results are similar to those reported by Fischer and Buchenrieder (2010) for households in rural Vietnam, where sickness of household members was a major shock for poor households. The findings support earlier contentions (e.g. Balgah and Buchenrieder 2010) of the thin boundary between individual and mass shocks. At the same time, it suggests that envisaged long term risk management strategies by policy makers must primarily address these short term shocks, if success is expected.

Table VI Assessment of annual shocks for resettled and relocating households

Household type	N	Mean	Std. Deviation	P
Camp	134	1.55	1.15	.000
Disaster zone	70	2.33	1.68	

Table VII Main sources of shocks affecting households in the research region

Natural	Health	Life-cycle	Social	Economic	Environmental
Heavy rainfall: (8; 3)	Illness of HH member: (50.9; 40.6)	Death of HH member (19.4; 12.9)	Theft of fixed asset (1.1; 0)	Unemployment: (0.6; 2)	Harvest failure: (0.6; 1)
Fire: (1.7, 2)	Injury: (1.7; 1)	Exam failure (0; 1)		Increase in input prices: (0.6; 1)	Pest and diseases on field: (5.7; 13.9)
Floods: (1.7; 2)	Disability: (1.1, 1)	Birth: (1.1; 5.9)		Inaccessibility to capital: (0; 3)	Livestock diseases and pests. (0; 2)
Strong winds: (4; 2)	Epidemic: (0; 1)	Maternity: (0; 1)		Marketing difficulties: (0; 1)	
Famine: (0.6; 2)		Old age: (0; 1)			
		Other: (0.6; 0)			

Notes. 1. For first shock, N= 175; for second shock, N=101
2. Figures in brackets represent the percentage of all households affected by reported first and second shocks respectively.
HH = household

4.4. Formal and informal risk response mechanisms

We have mentioned before, that the combination of formal and informal risk management mechanisms may have beneficiary impacts especially on the vulnerable. Table VIII presents the risk management arrangements and strategies employed by the sampled households to manage the above mentioned shocks. Approximately one-third of the sample takes no physical coping action at all against shocks, probably allowing shock outcomes to be determined by theology (Chester 2005). In fact, no action is accompanied by entrusting the future in the hands of God (Bang 2008). This probably explains why approximately one of every three sick persons ends up dead. When action was taken (on average in 65% of all cases), excess food was sold while holding livestock assets constant. Informal borrowing from social networks or money lenders plays an important role in coping with household shocks too. Similar results have been reported elsewhere such as Fischer and Buchenrieder (2010) for northern Vietnam, and Makoka (2008) for rural Malawi La Ferrara (2002) for informal settlements in Nairobi- Kenya and Cichello et al (2005) for post-apartheid South Africa. The results therefore suggest that informal response mechanisms may be important for managing idiosyncratic and covariate shocks at lower levels of development, characterized by weak state and market institutions. Only when shocks were non-transient, did households liquidate livestock assets. Similar risk management behavioral patterns have been reported elsewhere (e.g. Holzmann et al. 2003; Zimmermann and Carter 2003; Carter et al. 2007).

An important innovative revelation in this study is the fact that households increasingly use different informal instruments in isolation, or combine them with formal instruments to cope with present shocks, and mitigate or prevent future risks. For instance, over 6% and almost 10% of the respondents combined different informal response mechanisms to manage the first and second annual shocks respectively. This supports our argument for stronger, relatively unknown dynamic processes within informal response mechanisms in the management of idiosyncratic and covariate shocks, as well as the arbitrary boundary problem between shocks and their differentiated risk management strategies (see also Balgah and Buchenrieder 2010). On the basis of these results, we conclude that through experience and renewed learning processes, informal response mechanisms can potentially adapt to better respond to individual or aggregate shocks, in isolation when formal (state and market) institutions fail, or in combination with formal instruments, when these are available, trusted and function at least partially.

Table VIII Main risk response mechanisms to shocks for sampled households

Strategies	Level of formality			
	Informal	Market-based	Public	Various combinations
Prevention	Crop diversification (1.2, 0)	Use skills acquired through formal trainings (0, 1.1)	Free vaccinations/ medications (0.6, 0)	
Mitigation	Visiting traditional doctor (0.6, 0)	loan Microfinance institution (0, 1.1)		Combinations of different informal instruments only (6.2, 9.7)
Coping	No action taken (34.8, 35.5)			
	Intra-community transfers/ charity (2.5, 2.2)			
	Use of indigenous knowledge (1.2, 2.2)	Selling of livestock (9.9, 9.7)		Combinations of different formal instruments only (0.6, 0)
	Sending children to work (1.9, 0)	Selling of excess food (22.4, 21.5)		
	apply advice of community members (0.6, 2.2)	Selling of family labor (3.1, 2.2)		Combinations of formal and informal instruments (1.2, 5.4)
	Borrowing from neighbors, relatives or friends and local networks (5, 0)			
borrowing from money lender (6.8, 1.1)				
Drawing on stored food (1.2, 6.5)				

Notes N= 161 and 93 for the first and second shocks respectively

Figures in brackets represent corresponding percentage of households applying a particular response mechanism to manage the first and second shocks, respectively.

The category: “various combinations” cross cuts coping, mitigating and prevention strategies.

5. Discussions and conclusions for policy and research

The aim of this article is to empirically demonstrate the dynamic functioning of formal and informal mechanisms in managing shocks. Using for the first time the example of surviving households of the 24-year old Lake Nyos natural disaster in North West Cameroon, it has been shown that informal response mechanisms are vital for managing both idiosyncratic and covariate shocks, especially under imperfect state and market conditions. When states and markets are absent, fail or are dysfunctional, informal institutional arrangements evolve with the prime objective to support household coping. However, through learning and experience, new mechanisms and approaches develop (for example by combining different informal response mechanisms) that enable agents to cope with current shocks and mitigate or prevent future individual and aggregate shocks.

To this end, our example demonstrates a predominance of informal response mechanisms applied at household level in the entire sample and a corresponding higher level of trust in local level institutions and NGOs. This finding supports the importance of nonprofit organizations in local level governance as an institutional response to state and market failures, or as a vehicle for altruistic and ideological goals for the less privileged (Hansmann 1980; Weisbrod 1988; Steinberg 2006). But the acceptable level of household trust demonstrated in government institutions suggests the possibility of across-level coordination for collaborative, integrated, long term, socially-oriented risk management as earmarked by Agrawal (2008) and conceived in the World Bank's SRM framework (Holzmann and Jorgensen 2000; Holzmann et al 2003). This must be preceded by a deeper analysis of local instrumental capacities for effective inclusion in collaborative risk management processes.

The identification of health shocks (that is illness of household members) affecting about 50% of all sampled households raises the issue of shock classification and the probable porous boundary between idiosyncratic and covariate forms of shocks. It seems logical to assume that by affecting about half of the sample, health is a covariate shock in the research region. Even if the impacts are principally idiosyncratic, the root cause might be covariate, and most likely an aftermath of the 1986 lake Nyos disaster.

For policy makers, it seems subsequently advisable to first identify and address short term shocks, if long term adaptation is an envisaged goal. Thus policy prescriptions towards adaptive risk management should not only demonstrate the desire of utilizing and involving appropriate local institutions and nonprofit organizations, but should essentially address currently identified shocks. Our case study clearly demonstrates potential for policy to assimilate informal response mechanisms in the long term management of idiosyncratic and covariate shocks.

The conjecture held in the topical literature that suggesting a greater importance of covariate over idiosyncratic shocks does not emerge in our case study. The most common shocks affect individual households independently such as illness of household member. Because this shock affected about half of the sample, it suggests that its root causes should be covariate. Thus by addressing idiosyncratic shocks, policy makers may directly or indirectly attack the consequences of covariate. In any case, it is advisable for policy to focus on addressing household shocks with greater impacts, irrespective of category.

While supporting the validity of the World Bank's SRM framework in capturing the informal social dimensions of risk management, it is worth mentioning that the current framework constellation does not emphasize the dire need to assess the individual capacities of local and formal institutions as a precondition for appropriate combination. Also, it is crucial to identify and address virulent shocks as soon as possible, irrespective of whether they are idiosyncratic or covariate in origin. This modification will be relevant to improve the framework's capacity to capture and effectively utilize the dynamics occurring within informal response mechanisms. Hopefully, this will support long term risk management especially in developing countries where states and markets are either absent, dysfunctional or operate sub-optimally.

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