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CONSIDERATION OF SOCIOECONOMIC CONSTRAINTS TO FINANCE HOUSEHOLDS' ADAPTATION TO CLIMATE CHANGE IN THE LEAST DEVELOPED COUNTRIES: THE CASE OF BENIN

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ABSTRACT: *In the Least Developed Countries (LDC), there is an urgent need to finance households' adaptation to climate change, and several socioeconomic constraints may compromise their resilience to climate risks. Based on data from Benin, a Logit model was used to demonstrate that, apart from climate shocks, households are also affected by declining prices of agricultural products and rising prices of foodstuffs and inputs. The influence of these shocks is independent of the areas of residence. In addition to these variables of interest, the article also highlights the significative influence of other variables. In order to avoid these main constraints from changing the business climate to become disincentivised for household adaptation, their management should be integrated into climate change adaptation planning. Adaptation should be considered within broader development processes, including non-structural policy and institutional frameworks, rather than as an isolated policy that is supported by climate variables alone. This will allow for a better use of the insufficient public funding dedicated to adaptation to climate change.*

KEYWORDS: Adaptation, climate, least developed countries, sustainable, finance, households, Benin.

JEL Codes: O21, Q54, Q58

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INTRODUCTION

Global warming and its corollary climate change pose a serious threat to the environment of the entire planet. Simultaneously, it is also an economic development issue, as the poorest countries, whose adaptive capacity is lowest and whose populations are therefore most vulnerable, are estimated to suffer the most adverse effects.

The vulnerability has both an external aspect reflecting the risk of exposure to danger and an internal aspect referring to difficulties in coping with or recovering from a shock (Bohle, 2001; Wisner, 2002). Climate change poses major risks; as in many developing countries, it increases the probability of climate variability and extreme weather events and will do so increasingly in the future.

Households in the Least Developed Countries (LDCs) often face multiple socioeconomic problems related to their livelihoods. According to Abeygunawardena et al. (2010), these problems majorly depend on constraints such as volatile agricultural prices, limited access to inputs or seeds, problems of local or national political governance, limited access to basic health or education services, poor infrastructure, and food security problems. These are problems that affect their well-being. According to the Organisation for Economic Co-operation and Development (OECD) (2011), for the most vulnerable African households, whose food budget sometimes reaches three-quarters of their total expenditure, inflation leads to the consumption of substitute foods with low nutritional value, to reduce daily quantities, to sell means of production, and to abandon some health and education expenditures. Higher product prices benefit agricultural producers only when they can produce in excess.

Other shocks include illness and death of household members that may result in the sale of assets. A similar situation may ensue in the case of animal and crop diseases. This is especially true in the absence of standard social protection systems. For the majority of poor households in developing countries, credit markets are inadequate, and the assets accumulated by households are never sufficient in times of crisis. Income diversification is a challenge for these populations, as households lack the skills, information and capital to undertake another activity (Abeygunawardena et al., 2010). These aspects of the business environment are likely to increase their vulnerability to climate change.

Changes in living conditions or the behaviour of populations are therefore multifactorial. Environmental hazards are thus only part of the multiple constraints that populations must encounter. Moreover, some studies have noted that an environmental hazard can trigger a crisis (agricultural, economic, political, social) often when there is a prior vulnerability to this hazard. For the proponents of this thesis, the more populations have access to public services (education, health), banking services (credit), and agricultural advice, the more they are protected by the fluctuations or uncertainties introduced by agricultural price regulation bodies, the more they are organised, etc., the less vulnerable they are and the more they are able to cope with a shock or hazard. The adverse effects of climate change on farmers who have become wage workers across the rural-urban divide can be due to their precariousness (Natarajan et al., 2019). Perhaps the best way to address the effects of climate change on the poor is not to isolate adaptation measures from development planning.

The situation in Benin, which serves as a framework for analysis in this study, is not exempt from the adverse consequences of climate change and its socio-environmental effects (IFAD,

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2008). Moreover, the main hazards that emerged from the farmers' surveys, namely the decline in the duration of the main rainy season for crops, the increase in rainfall in August that causes flooding and the rise in temperatures, are confirmed by the rainfall and climate data (Baudouin, 2010). Global warming is critical for Benin's economy, which is heavily reliant on agriculture (IUCN, 2011). The damage associated with other socioeconomic shocks requires government responses to support the adaptation of vulnerable households.

Benin's National Climate Change Adaptation Plan (2022) reflects the country's ambition to manage the adverse effects of climate change based on a multi-sectoral approach in order to meet sustainable development objectives. However, socioeconomic constraints or shocks are not linked to climate variables in the formulation of responses. These linkages are important for the successful integration of adaptation into planning and budgeting.

In addition, insufficient international public funding for adaptation leads to adaptation funding gaps in LDCs, which suggests a rational use of available resources. According to calculations, the average annual gap for Benin is estimated at USD 303.84 million. Indeed, the financing need is estimated at USD 4 240 million for the period 2021-2030 in the National Adaptation Plan compared to an average annual international allocation of USD 120.16 million for the period 2011-2019 based on OECD data. It is evident that a cross-sectoral approach to climate change adaptation has become a priority to ensure the long-term effectiveness of investments in improving household livelihoods and sustainable development.

Under these conditions, the following question arises: What are the socioeconomic constraints that should also be taken into account in financing adaptation support for households to ensure effective resilience to climate shocks? The answers will help to better understand the contours of public sector support for adaptation in the context of households.

The aim of the study is to determine the socioeconomic constraints that should also be taken into account in financing adaptation for households for their effective resilience to climate shocks. Consequently, the research hypothesis is formulated as follows: situations of declining agricultural commodity prices and rising food and agricultural input prices constitute socioeconomic constraints that should also be taken into account in financing household adaptation for effective resilience to climate shocks.

LITERATURE REVIEW

Household Livelihoods and Climate Change

Several studies have focused on the links between the socio-demographic characteristics of populations and the climate variable. For example, the rural poor, given their tendency to depend mainly on natural resources for their livelihoods, are also seen as particularly sensitive to climatic shocks and stresses on resource productivity (Bebbington, 1999). This is because the sensitivity of the resources on which the poor depend, their low asset endowment and their disenfranchisement critically limit their adaptive capacity (Olsson et al., 2014).

Poverty is the most important condition shaping climate-related vulnerability (Prowse, 2003). The poor lack the capacity to protect themselves from stress and recover from it. They often live in urban or rural environments exposed to drought and lack of food. Indeed, their daily

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living conditions are challenging even in the absence of climate stress. Climatic stresses push these populations beyond a low threshold into insecurity and poverty that violate their basic human rights (Moser & Norton, 2001).

A higher frequency of drought will increase food insecurity in areas where livelihoods are already precarious. According to Mendelsohn (2008), the most important known economic impact of climate change is on agriculture, particularly because farms in low-latitude countries are already experiencing excessively hot climates.

When the environment (including climate) is situated within a social framework, it may appear to be marginalised and seen as a factor among others affecting and in turn affected by production, demography and development (Brooks, 2003). But this does not lessen the importance of environmental variability and change. In fact, it further strengthens the environmental arguments by making clear their importance for social well-being.

Climate change could also increase the volatility of agricultural production and prices, leading to increased risks for producers, consumers, and governments (Li et al., 2017). Still, it should be noted that a rise in food prices improves the welfare of net producers while reducing the welfare of households whose consumption exceeds their production (Hertel & Rosch, 2010). Changes in food prices induce effects depending on the structure of the economy and the nature of the products whose prices change (Demeke & Rashid, 2012).

An analysis of the chains of factors that produce domestic crises reveals a wide range of causes. This social model of how climatic events can result in a food crisis replaces ecocentric models of natural hazards and environmental change (Watts, 1983).

Loss and damage are very serious consequences of insufficient capacity to adapt to climate change (Huq et al., 2013). These undermine the measures of sustainable development and can impede progress in improving human well-being. It is also recognised that some loss and damage are unavoidable and should be addressed by a separate set of policy actions (social protection, safety nets, resettlement, etc.).

In view of their complexity, the damage associated with climate events is more a result of conditions on the ground than climate variability or change. Climate events induce differentiated outcomes through the social structure. Individuals from different social categories such as men, women, urban households, rural households, etc. experience risks differently in the face of the same climate event (Mearns & Norton, 2010). These different outcomes are the result of location-specific social, political, and economic circumstances. The inability to manage climate stress stems from social inequality on the ground, unequal access to resources, poverty, poor infrastructure, lack of representation and inadequate social safety nets, early warning and planning systems.

Opportunities exist for impoverished and vulnerable households to respond effectively to some level of climate variability and other types of resources in an autonomous way: strategies for risk pooling or income diversification. But these strategies may come at the expense of investing in their future through human capital formation (education) or physical and financial capital accumulation (infrastructure and savings) (Eakin et al., 2014). Policies to reduce vulnerability need to be based on a sound understanding of what motivates and constrains human adaptive capacity (Ford et al., 2008).

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Support for Household Adaptation

The authors' discussion of the relative contours of the various constraints indicates that it is clear that these constraints may still remain upon the adoption of climate change adaptation strategies. This idea is shared by Lemos et al. (2017) for whom the development of specific adaptive capacities alone will have only limited success in reducing overall vulnerability, and concomitant investments need to be made in more general adaptive capacities to promote more successful adaptations. In addition, by increasing the overall adaptive capacity of households, poverty alleviation programs (particularly those coupled with education programmes) can positively influence their ability to take better advantage of risk management mechanisms.

Research focusing on anti-poverty programs (particularly cash transfers) shows that for these interventions to have a longer-term impact, they need to be carefully designed and include specific actions to maximise outcomes. For example, a recent study using a longitudinal experimental design with a sample of over 10,000 poor households in six countries by Banerjee et al. (2015) robustly shows that anti-poverty programmes are significantly more effective if deployed with training and support, including life skills coaching, spending support, access to savings and health information and services.

In addition, strengthening adaptation efforts is sometimes required by progress in areas such as good governance, human resources, institutional structures, public finance and natural resource management. Such progress builds the resilience of countries, communities and households to all types of shocks, including the impacts of climate change. Strategies to address current climate variability provide a good starting point for addressing adaptation needs in the context of poverty reduction. Lessons learned will ensure that sustainable development efforts are not underutilised and that adaptation is not inadequate. Such approaches should guide allocations to support household adaptation.

Integrative frameworks consider that household vulnerability depends on both biophysical and human factors. One of them considers vulnerability as having an external dimension, which is represented by the exposure of a system to climatic variations, as well as an internal dimension, which includes its sensitivity and adaptive capacity to these stressors (Füssel & Klein, 2006). These notions of internal and external aspects of vulnerability, however, depend entirely on how one draws the boundaries of the system under analysis.

It should be noted that the analysis of causes can help direct funding towards projects and policies to reduce vulnerability. There are multiple mechanisms linking the situation of economic agents and economic policy initiatives. Deere and de Janvry (1979) identified mechanisms by which the wider economy systematically drains the income and assets of agricultural households. These mechanisms include taxation in cash, payment in kind and labour, labour exploitation and unequal terms of trade. These processes make people vulnerable because the wealth they produce from their land and labour is confiscated with the systematic support of social, economic and environmental policies.

Ultimately, several intervention approaches have been developed by the authors to address the vulnerability in relation to climate risk. In this perspective, coping or adaptation analysis focuses on finding the causes of vulnerability, while rights-based and livelihood approaches analyse the causal structure of vulnerability in order to identify a wider range of coping and adaptation options (Yohe & Tol, 2002). Adaptation approaches, as well as many project-based

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interventions, focus on the means of adaptation as well as the causes of adaptation and adaptive capacity. The vulnerability approach seeks to identify the causes of vulnerability, i.e., the causes of the risks to which people must adapt.

Therefore, the overall benefits that accrue from a given set of vulnerability reduction measures are also very important in deciding how to allocate funds for development or climate-related vulnerability reduction.

METHODOLOGY

Modeling Approach Used

The dichotomous nature of the individual's status (having been affected by a shock), which represents the dependent variable, led to the use of an appropriate and adapted analysis model. In this perspective, Hurlin (2003) points out that the dichotomous Logit and Probit models admit as the dependent variable, not a quantitative coding associated with the realization of an event (as in the case of the linear specification), but the probability of the occurrence of this event, dependent on the exogenous variables.

The adoption of the Logit model is motivated by the ease of manipulating the results (Hurlin, 2003). The fundamental principle of the Logit model is based on the probability of an individual choosing an option offered to him (Varian, 2006). The parameters of this Logit model are estimated by the maximum likelihood method (Nkamleu & Kielland, 2006). The response choice made by the respondent depends on the opportunities and is therefore random and cannot be the subject of linear regression, but of a multiple regression which can be of the exponential type (Greene, 1991).

The equation for the representative household with index i can be modeled as follows:

$$Y_i^* = \alpha + X_i \ \beta + \varepsilon_i$$

Y_i^* represents the respondent's status while X_i is a variable that can influence the perception of the status. The β vector includes the coefficients associated with the various model variables and ε_i the error associated with the explanatory variable for the individual i. The variable Y_i^* is not observable and is replaced by an observable variable expressing it as y = 1, if the observation is true and y = 0 if otherwise. According to Hurlin (2003), the regression of the Logit model characterizing the choice by a sample of statistical units is specified as follows:

$$P_i \ (y = 1 | \ X1, X2, \ldots, Xk) = E(Y_i^*) = F(\alpha + X_i \ \beta) = \frac{1}{1 + e^{-(\alpha + X_i \ \beta)}}$$

P is the conditional probability for y=1.

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Variables of the Empirical Model

In the context of the empirical model development, the relevant variables have been drawn from the literature and are complemented by the socioeconomic characteristics of the respondents.

The dependent variable is:

Affected by a shock

The shock condition indicates that the respondent has acknowledged being affected by a negative event. It is a generated binary variable that takes the value "1" if it is achieved and "0" if otherwise.

The independent variables include the socioeconomic characteristics of the respondents and the business climate constraints that may affect them. They are presented as follows:

No education

This variable measures the level of education. It is a generated binary variable that takes the value “1” if it is true, i.e., when the observation indicates no basic level of education, and "0" when otherwise. The expected sign is positive.

Agriculture

This variable reflects the branch of agricultural activity. It is a generated binary variable that takes the value "1" if the household practices agriculture as its main activity and "0" if otherwise. The expected sign is positive.

Sex

This variable provides information on the sex of the head of the household. It is a generated binary variable that takes the value "1" for the male sex and "0" otherwise. The expected sign is negative due to a lower perception of shock by men.

Age

This is a variable that captures age in years. It is measured as an integer value. The expected sign is negative due to greater experience of risk management by older people.

Serious illness of a household member

This variable provides information on the occurrence of illness for a household member. It is a generated binary variable that takes the value "1" in case of a disease event for a household member and "0" otherwise. The expected sign is positive.

Death of a household member

This variable provides information on death shocks. It is a generated binary variable that takes the value "1" in case of the death of a household member and "0" otherwise. The expected sign is positive.

Divorce or separation

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The variable informs about the occurrence of divorce. It is a generated binary variable that takes the value "1" in case of divorce occurrence and "0" otherwise. The expected sign is positive.

Drought or erratic rainfall

The variable is related to the drought or erratic rainfall. It is a generated binary variable that takes the value "1" in case of the drought or erratic rainfall and "0" otherwise. The expected sign is positive.

Flooding

The variable reflects the occurrence of flooding. It is a generated binary variable which takes the value "1" in case of flood occurrence and "0" otherwise. The expected sign is positive.

High rate of crop diseases

The variable is related to crop diseases. It is a generated binary variable that takes the value "1" if it is achieved and "0" if otherwise. The expected sign is positive.

High prevalence of animal diseases

The variable informs about the occurrence of animal diseases. It is a generated binary variable that takes the value "1" if it occurs and "0" if otherwise. The expected sign is positive.

Significant fall in commodity prices

The variable relates to the price situation. It is a generated binary variable which takes the value "1" if it is achieved and "0" if otherwise. The expected sign is positive.

High agricultural input prices

The variable is related to input prices. It is a generated binary variable which takes the value "1" if it is achieved and "0" if otherwise. The expected sign is positive.

High food prices

The variable refers to the situation of rising food prices. It is a generated binary variable that takes the value "1" if it is achieved and "0" if otherwise. The expected sign is positive.

End of regular transfers from other sources

The variable is related to receiving a gift. It is a generated binary variable that takes the value "1" if it is achieved and "0" if otherwise. The expected sign is positive.

Loss of salaried employment by a family member

The variable refers to the situation of loss of paid employment. It is a generated binary variable that takes the value "1" if it is achieved and "0" if otherwise. The expected sign is positive.

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Theft of money, goods, crops, or equipment

The variable refers to the occurrence of theft events. It is a generated binary variable that takes the value "1" in case of theft and "0" otherwise. The expected sign is positive.

Conflict between farmers and herders

The variable relates to conflicts between farmers and herders. It is a generated binary variable that takes the value "1" if it is achieved and "0" if otherwise. The expected sign is positive.

Data

The data used in this study come from the micro-data of the Harmonised Survey on Living Conditions of Households (EHCVM) 2018/19 led by the National Institute of Statistics and Economic Analysis (INSAE), currently the National Institute of Statistics and Demography (INSTAD), with the technical and financial support of the World Bank and the West African Economic and Monetary Union (WAEMU) Commission. These data were obtained upon request from the micro-data library of the World Bank Group website. They are also accessible from the WAEMU website.

The data covers over 8,000 households across the geopolitical zones. Both urban and rural areas of residence were covered. The database is divided into several sections: Education, General Health, Shocks and Coping Strategies, Safety Nets, and Relative Poverty. The information on shocks includes tragic events, natural disasters, and agricultural activities, among others.

The availability of question modalities on the database as row information explains the considerable size of the number of observations. Therefore, the number of observations may vary depending on the variables selected.

Most of the variables used, apart from age, were in the form of categorical variables and could not be manipulated as such. Thus, a generation of dummy variables was required to operationalize the specifications of the logit model.

RESULTS

The main results of the study are presented with a focus on the influences of socioeconomic characteristics and business climate constraints on households. A disaggregation by residence allows for capturing the situation of agricultural households or farms.

Influences of Socioeconomic Shocks on Household Livelihoods

The results of the estimation of affection by a shock revealed that a multitude of factors has the capacity to increase the probability of rendering shocks. Except for sex, age, and loss of paid employment, which have insignificant or weakly significant coefficients, the other variables all have highly significant coefficients (probability less than 1%). For the latter, the odds ratio values of above 1 indicate that individuals confronted with each of these events are more likely to feel negatively affected by a shock than others. It is therefore evident that, in addition to

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climatic risks (floods, droughts or irregular rainfall), variables of interest such as the fall in the price of agricultural products, the rise in the price of foodstuffs and the increase in the price of inputs constitute socioeconomic constraints that remarkably increase the risk of a deterioration in household well-being. This is consistent with the idea of the negative influence of prices on household welfare supported also by Li et al. (2017). In addition to these shocks, illness and death of household members, plant and animal diseases, interruption of income transfers, loss of salaried employment by a household member, theft of household assets and conflicts between farmers and herders also increase the probability.

For a farm household, the fall in the price of agricultural products and the rise in the price of agricultural inputs lead to a lower margin from the sale of crops. This results in a reduction in overall household income. As a result, their level of utility will fall, causing a decline in the well-being of the members of the given households in question. Similarly, the rise in food prices reduces the indirect utility of households.

The occurrence of plant and animal diseases is likely to reduce the income of farming and livestock-keeping households. When these diseases are not quickly controlled, income from the sale of agricultural and livestock activities is expected to collapse, further resulting in lower utility levels.

The occurrence of illnesses among household members primarily involves health care expenditure, often for curative purposes. When these illnesses are severe, treatment can be a significant burden on the household budget. The death of a household member reduces the productive capacity of the household, which further degrades its well-being.

From the different mechanisms described, it is clear that the occurrence of these events increases the risk of the household being affected. Climatic factors also influence the risk of poor well-being in the household. For example, both drought and floods have the capacity to increase the risk of households being affected by a shock. For an agricultural household, the occurrence of flooding results in damage to seedlings or even plants, which compromises the harvest. Flooding may also cause the household to move to prevent the negative effects of flood water. All these situations are likely to compromise their well-being. Socio-demographic factors, such as lack of education and working in agriculture, increase the risk of the household being negatively affected by a shock.

Ultimately, there is a significant probability that situations of falling agricultural commodity prices, rising food prices and rising input prices will affect household welfare. Thus, these situations constitute socioeconomic constraints that should also be taken into account in the financing of adaptation in favour of households for effective resilience to climate shocks. Consequently, the hypothesis is verified. The results of the estimation are presented in the following table:

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Table 1: Results of the estimation of household affection by a shock

	Logistic regression Number of obs = 43,979 LR chi2(18) = 2844.52 Prob > chi2 = 0.0000 Log likelihood = -9546.6016 Pseudo R2 = 0.1297				
Affected by a shock	Odds Ratio	Z	Std. Err.	P>|z|	
No education	1.138609	2.89	.0511499	0.004	***
Agriculture	1.68955	12.25	.0723249	0.000	***
Sex	.9131624	-1.86	.0446367	0.063	*
Age	.9977758	-1.51	.0014702	0.131	
Serious illness of a household member	19.74293	39.11	1.505714	0.000	***
Death of a household member	9.430082	26.56	.7967835	0.000	***
Divorce, separation	2.299569	6.75	.2835937	0.000	***
Drought or erratic rainfall	7.898807	23.65	.6903253	0.000	***
Flooding	6.260624	19.92	.5765266	0.000	***
High rate of crop diseases	2.916482	9.41	.3317884	0.000	***
High rate of animal diseases	3.99018	13.34	.4139975	0.000	***
Significant drop in prices of agricultural products	3.871775	13.03	.4023562	0.000	***
High agricultural input prices	2.711731	8.54	.3169162	0.000	***
High food prices	12.90644	31.90	1.034839	0.000	***
End of regular transfers from other sources	1.518363	2.88	.2204838	0.004	***
Loss of salaried employment by a member	1.090673	0.52	.1813645	0.602	
Theft of money, goods, crops, or equipment	5.469671	17.82	.5216539	0.000	***
Conflict between farmers and herders	1.475053	2.66	.215684	0.008	***
Constance	.0174665	-41.40	.0017075	0.000	***

*** Significance at 1%, ** Significance at 5%, * Significance at 10%.

Source: *Author's work using data from Benin's EHCVM 2018/19*

Consideration of Households' Residence in the Adaptation Support Issues

An in-depth examination of the results by the area of residence was required to understand the behavior of the independent variables. Indeed, rural areas concentrate more on agricultural households or farms. Disaggregation by residence provides more information on this category of households.

The disaggregated results confirm that regardless of the area of residence, in addition to the usual climatic shocks (floods, drought or erratic rainfall), other factors in the business environment are likely to affect household welfare. Some differences in the influence of these factors can be observed between the different areas of residence considered.

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In view of the results, priority should be given to rural areas where the odds ratio ranks for droughts/irregular rains and floods are 2 and 5 respectively compared to 6 and 5 in urban areas. In rural areas, the three variables of interest, namely high food prices, a significant decline in agricultural commodity prices, and high agricultural input prices, are among the top 10 variables according to the Odds Ratio values, whereas in urban areas, only high food prices are included among the top 10 variables. Similarly, socioeconomic shocks such as the serious illness of a household member and the death of a household member are critical variables in both settings. Indeed, the serious illness of a household member is the primary variable that affects households similarly in both rural and urban areas. The death of a household member ranks third in rural areas compared to fourth in urban areas. These findings on the coexistence of multiple shocks in rural areas are consistent with those of Ansah et al. (2021) who found evidence of the effects of the interaction of multiple shocks on households.

Financing household adaptation will need to take these two variables into account as well as high food prices, regardless of where people live. In rural areas, the other two variables of interest will need to be added, namely the significant decline in agricultural commodity prices and the high prices of agricultural inputs. Depending on the ambitions of policymakers, other important variables of the business environment facing households can be taken into account.

The results of the estimation are presented in the following table:

Table 2: Results of the estimation of household shock burden by area of residence

	Urban Logistic regression Number of obs = 22,176 LR chi2(18) = 1271.96 Prob > chi2 = 0.0000 Log likelihood = -4359.8681 Pseudo R2 = 0.1273					Rural Logistic regression Number of obs = 21,803 LR chi2(18) = 1702.70 Prob > chi2 = 0.0000 Log likelihood = -5093.2599 Pseudo R2 = 0.1432				
Affected by a shock	Odds Ratio	Z	Std. Err.	P>|z|		Odds Ratio	Z	Std. Err.	P>|z|	
No education	1.148122	2.04	.0778387	0.042	**	1.084674	1.32	.0667154	0.186	
Agriculture	1.743613	7.49	.1293376	0.000	***	1.565376	7.89	.0888794	0.000	***
Sex	.9188412	-1.16	.0669256	0.245		.9046599	-1.50	.0602345	0.132	
Age	.9999866	-0.01	.0022786	0.995		.9963762	-1.86	.0019417	0.062	*
Serious illness of a household member	15.90679	26.19	1.680114	0.000	***	24.57123	28.88	2.72363	0.000	***
Death of a household member	7.559119	16.93	.9033225	0.000	***	11.81589	20.47	1.42522	0.000	***
Divorce, separation	2.211453	4.72	.3718073	0.000	***	2.423366	4.88	.4397231	0.000	***
Drought/irregular rainfall	3.706214	9.18	.5290105	0.000	***	13.82172	22.26	1.631012	0.000	***
Flooding	4.024035	10.00	.5604673	0.000	***	9.222657	17.58	1.165385	0.000	***
High rate of crop diseases	1.304811	1.29	.2696296	0.198		5.027789	11.21	.7244146	0.000	***

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High rate of animal diseases	2.210896	4.72	.3717628	0.000	***	6.376834	13.50	.8750448	0.000	***
Significant drop in prices of agricultural products	1.679308	2.81	.3095825	0.005	***	6.903307	14.42	.9251835	0.000	***
High agricultural input prices	1.406069	1.70	.2823864	0.090	*	4.414917	9.91	.6615515	0.000	***
High food prices	12.75311	23.51	1.380714	0.000	***	12.99513	21.50	1.5503	0.000	***
End of regular transfers from other sources	1.845142	3.35	.3369271	0.001	***	1.152302	0.59	.2786997	0.558	
Loss of salaried employment by a member	1.525495	2.16	.2984069	0.031	**	.5761264	-1.67	.1897709	0.094	*
Theft of money, goods, crops, or equipment	4.406768	11.01	.5935844	0.000	***	6.817776	14.12	.9265327	0.000	***
Conflict between farmers and herders	.7742931	-1.00	.198604	0.319		2.383062	4.74	.436354	0.000	***
Constance	.019549	-27.91	.0027559	0.000	***	.0161446	-29.60	.0022504	0.000	***

*** Significance at 1%, ** Significance at 5%, * Significance at 10%.

Source: *Author's work using data from Benin's EHCVM 2018/19*

DISCUSSION

The various findings in the study lead to more insights and a discussion. These are structured around the factors to be taken into account in financing support for household adaptation and the holistic consideration of support for household adaptation.

Factors to Consider in Supporting Household Adaptation

The effects of climate change on households are compared to socioeconomic shocks. In particular, the aspects related to agricultural commodity price decline shocks confirm the contributions of other authors such as Li et al. (2017) for whom agricultural price changes affect private actors as well as the public sector.

The results direct that adaptation support should be taken into account, among other things, the beneficiaries, their location, their area of activity, the relative importance of vulnerabilities and the presence of other socioeconomic shocks, and the time horizon of the intervention (before or after the climate shock).

Actions to address high food prices include increasing supply through production support or using the social safety net to compensate the most vulnerable households. However, the approach of subsidies and tax cuts should be avoided to prevent fiscal imbalances and benefits to non-vulnerable households.

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In relation to the significant decline in agricultural commodity prices, public authorities can support prices to preserve household income. Public measures to achieve this include insurance schemes, disaster relief, mutual funds, storage assistance, and improved access to credit for farmers. Households are also likely to adapt to climate change by diversifying income-generating activities (Diiro & Sam 2015). Therefore, support in this direction can be beneficial for risks sharing across different activities and for preserving income.

Measures to address high agricultural input prices include temporary input support, price stabilization mechanisms, access to agricultural credit, promotion of fair competition, and research and development to stimulate agricultural innovation.

In response to the serious illness and death of a household member, the provision of quality social security measures or accessible health care to households can preserve their income and productive capacity. Such measures also enhance and support households for relatively faster recovery from shocks by reducing the potential effects of cumulative shocks.

In the face of flooding, several varied measures are applicable. These include information and early warning systems, adjustments to production systems and capacity building of farming households, building standards and master plans, thus strengthening the adaptive capacities of vulnerable groups (access to production factors, relocation, etc.), and building resilient infrastructures.

Measures to deal with droughts and erratic rainfall include water control (water reservoirs, micro-irrigation, etc.) and extension of farming methods with adapted seeds and capacity building.

Linking socio-economic variables (food, commodity and agricultural inputs price shocks, and death and disease) with actions targeting the vulnerable sectors of the National Climate Change Adaptation Plan (agriculture, water resources, infrastructure and development) allows designing cross-sectoral actions that can effectively contribute to the adaptation of vulnerable households. The use of this cross-sectoral approach has the advantage of enabling public support that can safeguard the well-being of households in the face of climate change. These linkages are important for the successful integration of adaptation into planning and budgeting as aimed by the country's National Climate Change Adaptation Plan.

Holistic Consideration of Household Adaptation Financing

The various findings provide evidence that adaptation needs to be considered within broader development planning, including policy and strategy frameworks, rather than being formulated in isolation. For example, funding to support household adaptation should not be provided in isolation. It should be part of a broader approach to building the resilience and adaptive capacity to climate change that is essential for achieving sustainable development.

Without considering these factors and their respective actions, climate change can be a source of aggravating existing pressures. Under these conditions, it can elevate the risk of the vulnerability of households. Hence, support against these existing pressures when integrated into the framework of national adaptation governance provides responses to deal effectively with the effects of climate change.

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As these measures aim to limit the effects of climate change on household welfare, for example, for farm households, support could be provided for the adoption of climate-resilient technologies and capacity building for farmers to engage in smart farming practices, as well as better integration of rural, national and international food markets. Subsidies may be provided for the purchase of inputs better suited to extreme weather conditions, such as heat- or drought-resistant seeds, to increase agricultural productivity.

CONCLUSION

The socioeconomic and business climate constraints faced by households negatively affect their long-term building adaptive capacity. Therefore, the adaptive policy must go hand-in-hand with investment in governance, physical development, and economic and structural reforms.

The paper reports on the main constraints affecting households that may act as disincentives to their adaptation even with government support. Managing these constraints or shocks should be integrated into climate change adaptation planning.

In particular, in the face of climate risks (floods, droughts, or erratic rainfall), public financing of adaptation measures must take into account appropriate responses to factors in the business environment that may undermine adaptation. This is why adaptation must be articulated, among other things, with policies to stabilize agricultural prices, food, and input prices, or accompanying measures to preserve household welfare.

The evidence suggests that adaptation should be considered within broader development processes rather than as an isolated policy that is led by climate variables alone. Identifying a more integrated approach to building resilience and adaptive capacity is essential for sustainable development pathways under climate change.

This study proposes a way forward for household adaptation financing to achieve sustainable results in a context of a large public funding gap for adaptation. On this basis, reflections can be pursued on the evaluation of household adaptation support already implemented.

REFERENCES

Abeygunawardena, P., Vyas, Y., Knill, P., Foy, T., Harrold, M., Steele, P., Tanner, T., et al. 2010. “Poverty and climate change: reducing the vulnerability of the poor through adaptation.” *Washington, D.C.: World Bank Group*. http://documents.worldbank.org/curated/en/534871468155709473/Poverty-and-climatechange-reducing-the-vulnerability-of-the-poor-through-adaptation

Ansah, Isaac Gershon Kodwo, Cornelis Gardebroek, and Rico Ihle. 2021. “Shock interactions, coping strategy choices and household food security.” *Climate and Development*, 13 (5): 414–426. DOI: 10.1080/17565529.2020.1785832 To link to this article: https://doi.org/10.1080/17565529.2020.1785832

Banerjee, Abhijit, Esther Duflo, Nathanael Goldberg, Dean Karlan, Robert Osei, William Parienté, Jeremy Shapiro, Bram Thuysbaert, and Christopher Udry. 2015. “A

Article DOI: 10.52589/AJESD-KUVQBAGD
DOI URL: https://doi.org/10.52589/AJESD-KUVQBAGD

Multifaceted Program Causes Lasting Progress for the Very Poor: Evidence from Six Countries." *Science* 348 (6236): 1260799. https://doi.org/10.1126/science.1260799.

Baudouin, M.-A. 2010. "Climate change adaptation in Southern Benin: A study comparing international policy and local needs." *Geo-Eco-Trop* 34: 155 - 169. https://geoecotrop.be/uploads/publications/pub_341_14.pdf

Bebbington A. 1999. "Capitals and Capabilities: A Framework for Analyzing Peasant Viability, Rural Livelihoods and Poverty." *World Development* 27 (12): 20212044.

Bohle H-G. 2002. "*Land degradation and human security*." In: Plate, E. (Ed.), Environment and Human Security. Contributions to a workshop in Bonn. Bonn.

Brooks N. 2003. "*Vulnerability, Risk and Adaptation: A Conceptual Framework*." Tyndall Centre for Climate Change Research, University of East Anglia, Norwich.

Deere C. D. & de Janvry A. (1979). "A Conceptual Framework for the Empirical Analysis of Peasants." *American Journal of Agricultural Economics* 61 (4): pp. 601611. Published by: on behalf of the Oxford University Press Agricultural & Applied Economics Association, Stable URL: http://www.jstor.org/stable/1239907

Demeke, M. & S. Rashid. 2012. "*Welfare impacts of rising food prices in rural Ethiopia: A quadratic almost ideal demand system approach*." https://EconPapers.repec.org/RePEc:ags:iaae12:124861. DOI: 10.22004/ag.econ.124861

Diiro, Gracious M., and Abdoul G. 2015. "Agricultural technology adoption and nonfarm earnings in Uganda: A Semiparametric analysis." *The Journal of Developing Areas* 49 (2):145-162.

Eakin H.C., M.C. Lemos and Nelson D.R. 2014. "Differentiating capacities as a means to sustainable climate change adaptation." *Global Environmental Change* 27, ISSN 09593780, https://www.sciencedirect.com/science/article/pii/S095937801400079X

IFAD (International Fund for Agricultural Development). 2008. *IFAD and Climate Change*. Consultation on IFAD's Eighth Replenishment, Rome, Italy.

Field, C. B., V. R. Barros, K. J. Mach, M. D. Mastrandrea, M. Van Aalst, W. N. Adger, D. J. Arent, et al. 2014. *Technical Summary. Climate Change 2014:Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects*. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge, United Kingdom and New York, NY, USA, Cambridge University Press, ISBN: 9781107641655. hdl:10013/epic.45153

Ford J. 2008. "Emerging trends in climate change policy: The role of adaptation." *International Public Policy Review* 3(2), 5–16.

Füssel, Hans-Martin, and Richard J. T. Klein. 2006. "Climate change vulnerability assessments: An evolution of conceptual thinking." *Climate Change* 75 (3):301 –329. http://dx.doi.org/10.1007/s10584-0060329-3

Greene W.H. 1991. *Econometric Analysis*, Englewood Cliffs, NJ. Prentice Hall.

Hertel, T.W. & Rosch S. D. 2010. "Climate Change, Agriculture, and Poverty." *Applied Economic Perspectives and Policy* 32, 355-385. http://dx.doi.org/10.1093/aepp/ppq016

Huq, Saleemul, Erin Roberts, and Adrian Fenton. 2013. "A Loss and damage." *Nature Clim Change* 3, 947-949. https://doi.org/10.1038/nclimate2026

Hurlin C. 2003. "Econometrics of qualitative variables." Master's course in econometrics, France Université d'Orléans, 59 p.

Article DOI: 10.52589/AJESD-KUVQBAGD
DOI URL: https://doi.org/10.52589/AJESD-KUVQBAGD

IUCN. 2011. “Synthesis report of the capitalization studies of local knowledge, practices, strategies and technologies for adaptation to climate change in Burkina Faso, Mali and Senegal.” Final version. Project Integrating climate change adaptation into poverty reduction strategies in West Africa, 22 p.

Lemos M. C., Rasmussen L. V. and Kirchhoff C. J. 2017. “Adaptation by stealth: climate information use in the Great Lakes region across scales.” *Climatic Change* 140: 451-465.

Li, N., A. Ker, A. G. Sam and Aradhyula S. 2017. “Modeling regime-dependent agricultural commodity price volatilities.” *Agricultural Economics* 48 (6): 683–691.

Mearns, R. and Norton A. 2010. “Social Dimensions of Climate Change: Equity and Vulnerability in a Warming World.” *New Frontiers of Social Policy*. World Bank. World Bank. https://openknowledge.worldbank.org/handle/10986/2689 License: CC BY 3.0 IGO.

Mendelsohn R. 2008. “The impact of climate change on agriculture in developing countries.” *Journal of Natural Resource Policy Research* 1 (1): 5–19.

Moser, C. and Norton, A. 2001. “To claim our rights: livelihoods security, human rights and sustainable development.” London: Overseas Development Institute (ODI).

Natarajan N., K. Brickell and L. Parsons. 2019. “Climate change adaptation and precarity across the rural-urban divide in Cambodia: Towards a 'climate precarity' approach.” *Environment and Planning*. https://doi.org/10.1177/2514848619858155. DOI: 10.1177/2514848619858155

National Climate Change Adaptation Plan of Benin. 2022. https://unfccc.int/sites/default/files/resource/PNA_BENIN_2022_0.pdf

Nkamleu G.B. and Kielland A. 2006. “Modeling farmers' decisions on child labor and schooling in the cocoa sector: a multinomial Logit analysis in Côte d'Ivoire.” *Agricultural Economics*. 35: 319–333.

OECD. 2011. Agricultural and Food Price Volatility African. Views and Perspectives G20 Outreach Session. OECD Conference Centre, Paris 14 - 15 June 2011

Prowse M. 2003. “Towards a Clearer Understanding of Vulnerability in Relation to Chronic Poverty.” *CPRC Working Paper* 24, 41 Pages Posted: 18 Apr 2011. University of Antwerp, April 1, 2003

The World Bank: Enquête Harmonisée sur le Conditions de Vie des Ménages 2018-2019 [translated title : Harmonized Survey on Households Living Standards 2018-2019]**:** DOI : https://doi.org/10.48529/rn3k-z374 with the term of use availaible on https://data.worldbank.org/summary-terms-of-use.

Varian H.R. 2006. *Microeconomic Analysis* (6th edn). De Boeck: Brussels; 824 pp.

Watts M. 1983. “Hazards and crises: a political economy of drought and famine in northern Nigeria.” *Antipode*, 15 (1): 24-34, First published: April 1983, https://doi.org/10.1111/j.1467-8330.1983.tb00320.x

Wisner B. 2002. “*Who ? What ? Where ? When ? in an emergency: notes on possible indicators of vulnerability and resilience by phase of the disaster management cycle and social actor*, 7 p.” In: Plate E. (Ed.), Environment and Human Security: Contributions to a Workshop in Bonn, 23-25 October 2002, Germany, pp. 12/7-12/14

Yohe G. and Tol R.S.J. 2002. “Indicators for social and economic coping capacity - moving toward a working definition of adaptive capacity.” *Global Environmental Change* 12 (1): 25-40, ISSN 0959-3780, https://doi.org/10.1016/S0959-3780(01)000267., https://www.sciencedirect.com/science/article/pii/S0959378001000267

Article DOI: 10.52589/AJESD-KUVQBAGD
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