

## Food governance institutions perception of climate change impact on food security in Burkina Faso

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### Abstract

**Background:** Food security governance institution plays a key role in the management of food crises caused by climate change. This paper therefore aims to understand the perceptions of decision-makers on the phenomenon of climate change in relation to food security to better help develop strategies for resilience to the adverse effects of climate.

**Materials and Methods:** Surveys were conducted among sixteen (16) main institutions in charge of governance of food and nutrition security in Burkina Faso using questionnaire focused on 3 component of food security such as: (i) national production, (ii) state financing of food security, and (iii) governance of the food security sector. The criterion for the choice of institution in this study was based on their dynamism and involvement in food security management, their size/scope (sub-regional, regional, and international, bilateral, multilateral) or their membership of the national food crisis management committee. Among the sixteen (16) institutions five (5) of them were international and eleven (11) of them were national institutions.

**Results:** The results revealed that the adverse effects of droughts and floods respectively account for 34.04% of the deterioration in food security, compared to 23.40% of the consequences attributed to pest attacks. Other hazards (grain-eating birds, diseases, and winds) account for 8.52% of the respondents' responses. In terms of the impacts felt, 65% of the structures index the drop in agricultural production, 20% mentions soil degradation and 15% crop destruction, with repercussions such as the increase in food insecurity in the foreground (50%) followed by inflation in agricultural commodities (35.71%) and migration flows (14.29%). The proposed solutions are limited to water management (34.78%) and the strengthening of skills and the popularization of adaptation measures (21.74%). The use of climate services, agricultural mechanization and climate change adaptation measures received 13.04%, 8.7% and 21.74% of the solutions proposed by the respondents respectively.

**Conclusion:** The results corroborate the work of several authors, who have analyzed the situation in countries whose agriculture is essentially based on rainwater like ours. However, the implementation of these recommendations is not yet sufficiently effective to curb the food insecurity curve in Burkina Faso.

**Key Word:** Perception, governance structures, climate change, Burkina Faso.

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Date of Submission: 10-10-2020

Date of Acceptance: 26-10-2020

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### I. Introduction

Climate change is among the world's major development challenges (Pachauri, 2014; Paris, 2015; Neya et al., 2018). As such, it has a direct impact on food production by modifying agro-ecological conditions and has indirect effects on growth and income distribution and thus on demand for agricultural products (UNFCCC, 2010). According to Frank Sperling et al (2003), the appearance of climate change and disruption phenomena through floods and droughts have serious negative consequences on food security in general and for agriculture in Sahelian developing countries in particular. For some, in the future, these phenomena will have a greater impact on food security everywhere in the world through the resurgence of food crises (Kurukulasuriya et al. 2006; Messner and Briintrup, 2007; Agossou et al., 2012; FAO, 2015). In most of the scenarios of the Special Report on Greenhouse Gas Emissions (SRES) and Climate Change, it was found that sub-Saharan Africa will account for 40-50% of global hunger by 2080, compared to 24% to nowadays (Fischer et al., 2002; Parry and 2005; Fischer et al., 2005) and in some simulations, sub-Saharan Africa will even account for 70-75 % of global malnourishment by 2080 (Josef et al., 2007). However, it has been shown that it is the poorest communities that will be the most affected, due to their low adaptive capacities and high dependence on climate-sensitive

resources such as water resources and predominantly rain-fed agricultural production systems (IPCC 2001; IPCC, 2008).

Burkina Faso is a landlocked developing country. Located in the heart of West Africa with an estimated population of 17 million, of which more than 70% live in rural areas (INSD, 2006), the country would not be exempt from these challenges. With a population growth of 3.1% per annum, the population projections for 2007-2020 gave a population of 19,034,397 inhabitants in 2016 and would reach 21,510,181 in 2020. In addition to the demographic weight, the country is not immune to climate threats either. Indeed, the many periods of food crises following periods of drought, which have marked the history of Burkina Faso over the last thirty years (particularly in its northern and central parts), remind us, the degree of vulnerability of the West African region to climate variability and change. This is particularly the case for the years 1973, 1985, 1996, 1998, 2001, 2005, 2010, which were years of drought and also years of food crises or famine in some areas in the Sahel in general, and in Burkina Faso in particular in the periods of: 1987, 1999, 2002, 2004, 2007 and 2009 (CILSS, 2004; Janin, 2010). Moreover, in Burkina Faso, the local economy is intimately based on rain-fed agriculture, which makes the country's food security more vulnerable to the effects of climate change (MEFR, 2015; Neya et al., 2019).

However, climate simulations and projections on agricultural yields predict a 50% decline in rain-fed farming areas in Africa by 2020 (IPCC, 2008; Path et al., 2008), threatening between 40 and 170 million additional people (Path et al., 2008; Oxfam 2009). This situation has generated enthusiasm among stakeholders for finding sustainable solutions to the problem. Thus, in order to better understand the notion of food security and resilience to the adverse effects of climate change, several research studies on the determinants of adaptation to climate change have been carried out (Agossou et al., 2012; FAO, 2015). Indeed, most of this work focused exclusively on the study of the demographic and socio-economic characteristics of producers. However, according to Maddison (2007) and Gbetibou (2009), food security adaptation is the combined result of reading the perception that populations have of climate change and their demographic and socio-economic characteristics.

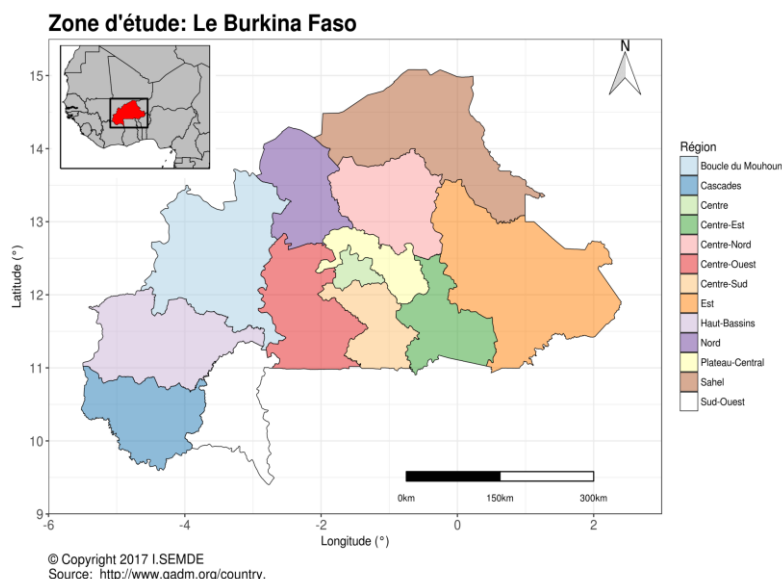
However, few studies or works have been carried out on the perception of food security governance institutions in Burkina Faso with a view to ensuring coherence in decision-making at the national level. For Maddison (2007), and Gbetibou (2009), perception is a prerequisite for adaptation. Thus, research must also consider the perceptions of national institutions in charge of food and nutrition security governance on the drastic effects of climate change to come up with appropriate solutions. In line with the latter authors, this paper aims to describe simultaneously the perception of food governance's institutions on the impact of climate change and the adaptation strategies to be developed to improve existing resilience measures.

## **II. Material and Methods**

### **2.1 Study area**

#### **2.1.1 Geographical position /Location**

The study area is Burkina Faso, one of the Sahelian West African countries located between 9°20' and 15°05' North latitude, and 5°20' West longitude and 2°03' East longitude. The country, vast of 274 200 km<sup>2</sup>, is landlocked and bordered by six countries (Benin, Ivory Coast, Ghana, Mali, Niger, Togo). Nevertheless, it remains a crossroads for trade in the sub-region and a transit country between the Sahelian countries (Mali, Niger) and the coastal countries (Côte d'Ivoire, Ghana, Togo, Benin). Its capital, Ouagadougou, is the main location of management institution for the governance of food security. Figure 1 shows their location.



**Figure 1:** Study area

### 2.1.2. Biophysical and socio-economic characteristics

As a Sahelian country with an essentially semi-arid climate, Burkina Faso faces relatively agro-ecological difficulties due to climatic deterioration and increasing anthropogenic pressure (Roudier et al., 2011; Samandoulgou et al., 2019). The climate is Sudano-Sahelian type with rainfall that is irregular, with a downward trend in recent years. Rainfall is poorly distributed over the country, with average annual rainfall that is progressive from north to south (SP/CNDD, 2016). Rainfall is less than 600 mm per year over around 25% of the territory, between 600 and 900 mm per year over half of the territory and between 900 and 1,000 mm per year for the last quarter of the territory. This situation, as illustrated by Figures 2 and 3, showing an exacerbation of climate and environmental constraints on national economy, particularly for rain-fed agricultural production, with a view to ensuring food security. Burkina Faso is particularly anxious by the phenomenon of desertification and land degradation (Sigué et al., 2018; Belem et al., 2018). The risk of land degradation is very prominent due to the effects of climate and anthropogenic pressures, and the possibilities of finding productive land are diminishing over time (Clavel et al., 2008; World Bank, 2013; Bamba et al. 2013; Binam et al., 2015). In Burkina Faso, the administrative regions where land is most degraded are the Sahel (57%), the North (29%) and the Centre-North (29%), which also matches to regions with a structural deficit in food availability. The risk of degradation is high on about 37% of the country's land (SWAC and CILSS, 2008).

### 2.2 Choice of food security governance institutions

The criterion for the choice of institution in this study was based on their dynamism and involvement in food security management, their size/scope (sub-regional, regional, and international, bilateral, multilateral) or their membership of the national food crisis management committee. A total of sixteen (16) institutions were chosen, with five (5) international and eleven (11) national institutions (Table 1).

**Table 1:** List of Food governance institution surveyed

Number	surveyed Institutions	Scope
1	West African Economic and Monetary Union (WAEMU)	Regional
2	JapanEmbassy	International
3	National Institution for Crisis and Vulnerability of Livestock Management	International
4	Permanent Secretariat of World Food Programme (SP/WFP)	International
5	NGO Action Against Hunger (ACF)	International
6	Ministry of Agriculture /Food and Nutritional Security Information and Alert Service	National
7	National Company for Food Security Stocks Management (SONAGESS)	National
8	Permanent Secretariat of Non-Governmental Organisations (SPONG)	National
9	Economic and Social Council (ESC)	National
10	Permanent Secretariat of National Council for Sustainable Development (SP/CNDD)	National
11	Permanent Secretariat of the National Emergency Rescue and Rehabilitation Committee (SP/CONASUR)	National
12	Faso peasant confederation (CPF)	National
13	Executive Secretariat of the National Food Security Council (SE/CNSA)	National
14	General Directorate of Green Economy and Climate Change (DGEVCC)	National

15	Permanent Secretariat of Sectorial Agricultural Policies Coordination of (SP/CPSA)	National
16	National Office of the Regional Chambers of Agriculture (CRA)	National

**2.3 Surveys**

To assess the level of understanding or knowledge of food security governance institutions on climate change, three dimensions of food security were considered: (i) national production, (ii) state financing of food security, and (iii) governance of the food security sector. A qualitative approach was used, based on focused interviews according to the method of Krueger and Casey (2015). A questionnaire focusing mainly on the main aspects of food security, on significant and recurrent climate and disaster risks affecting the food security sector, on the impacts of these risks, on the factors of vulnerability of agricultural production and on the resilience options to be promoted, was used.

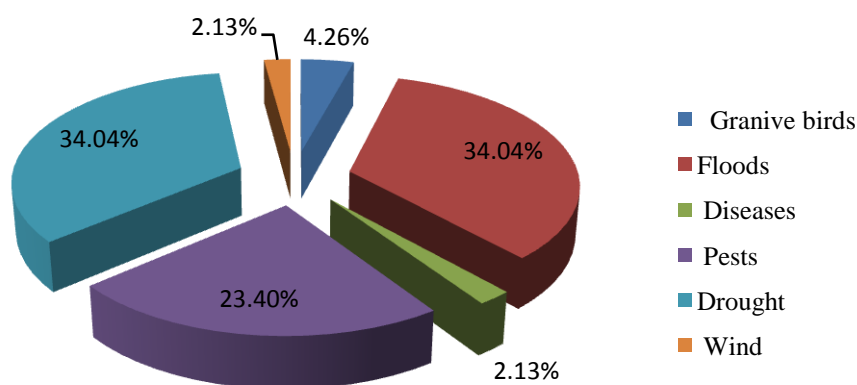
**2.4. Data analysis**

The Excel spread sheet was used to process and analyse the information collected and Minitab version 17.

**III. Results**

**3.1. Perception of climate risks**

A total of six (06) climate risks have been identified by the food and nutrition security governance institutions (Figure2).

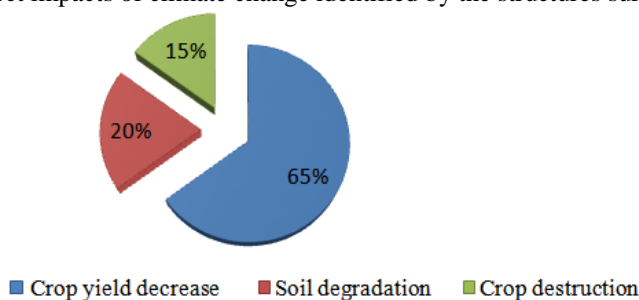


**Figure 2:** Climate risks identified by food and nutrition security governance institutions in Burkina Faso. Among, identified risks, droughts and floods are considered to be the main climatic risks that significantly affect food and nutrition security in Burkina Faso (68.08%), compared to pests’ attacks (23.40%) and violent and other winds (8.52%).

**3.2. Impacts of climate risks on food security**

**3.2.1 Direct impacts of climate risks on food security**

Figure 3 illustrates the direct impacts of climate change identified by the structures surveyed.

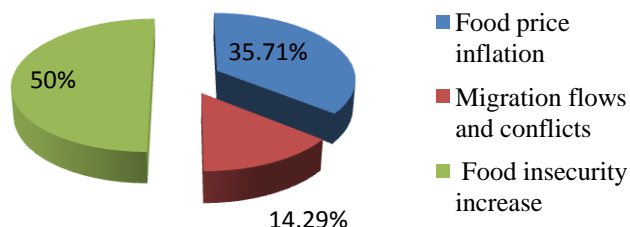


**Figure 3:** Direct impacts of climate risks identified in Burkina Faso by food and nutrition security governance institutions.

The decline in agricultural production is one of the main direct impacts of climate change on food and nutrition security, compared to soil degradation and crop destruction according to surveyed institutions.

### 3.2.2 Indirect impacts of climate risks on food security

A total of three (03) indirect impacts were cited by food security governance institutions (Figure 4).

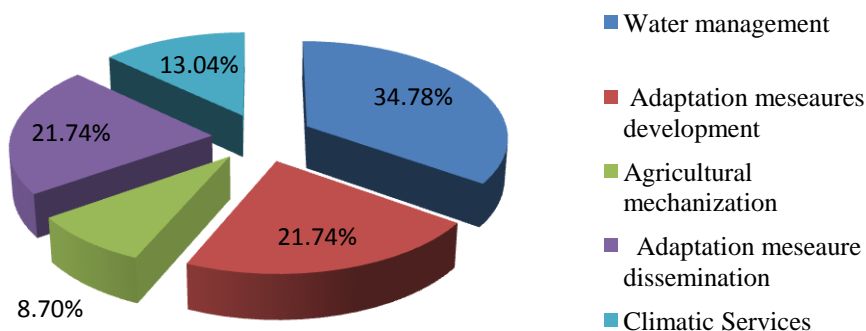


**Figure 4:** Indirect impacts of climate risks identified in Burkina Faso by food and nutrition security governance structures.

Among these indirect impacts, the increase in food insecurity come first (50%), followed by agricultural inflation (35.71%) and migration flows (14.29%).

### 2.3. Challenges related to climate risk management

For the challenges related to climate risk management, a total of five (05) major challenges have been identified by food security governance institutions (Figure 5).



**Figure 5:** Climate risk management challenges identified in Burkina Faso by food and nutrition security governance institution.

Among these challenges, water management was cited as the major challenge to be addressed in order to effectively adverse impacts of climate change on food and nutrition security in Burkina Faso.

## IV. Discussion

The study found that food security governance institutions have good knowledge of climate risks. The droughts and floods that are most cited could be explained by their physical observable characteristics (Picture 1 and 2).



**Picture 1:** Effect of drought on a maize field. Source: Neya 2017

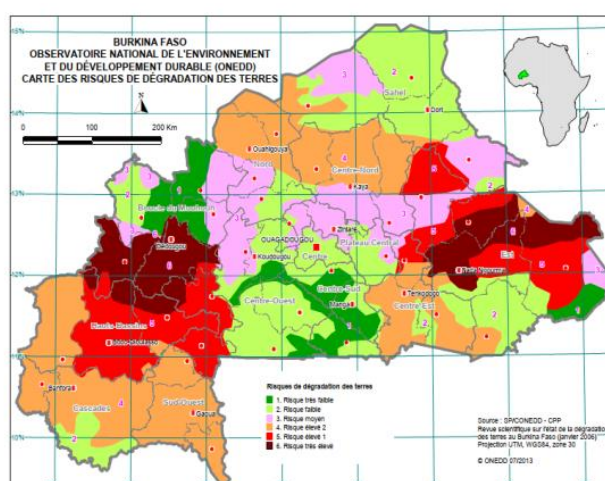


**Picture 2:** Flooding in the city of Ouagadougou. Source: Neya 2019

Indeed, as Palazzo et al (2016) point out, in Burkina Faso, and in the Sahel countries as a whole, climate and disaster risks are one of the main constraints to achieving sustainable food security. The influence of climate on food and nutrition security is mainly the result of a combination of three factors: the predominantly rain-fed nature of agriculture; a rainfall regime characterized by high spatial and temporal variability, recurrent episodes of drought and flooding; and multiple deficits in food crisis prevention and management.

The results are similar to the results of previous investigations into farmers' perceptions. Indeed, these studies had produced similar results in Zimbabwe (Moyo et al., 2012), Zambia (Nyanga et al., 2011), Uganda (Kisauzi et al., 2012), Nigeria (Ugwoke et al., 2012), Ghana (Mac Carthy and Vlek, 2012) and Benin (Yabi and Afouda, 2012). But for some authors, the increase in climatic phenomena such as droughts and floods is perceived by some populations as celestial anger (Yao et al, 2005).

However, the decline in agricultural production cited as the major direct impact could be explained by the fact that the agricultural system is mostly rain-fed and linked to land degradation (Figure 6).



**Figure 6:** Land degradation risks

The results corroborate the work of several authors, who have noted that all countries with a rain-fed agricultural system will be more vulnerable to food insecurity (Fischer et al. 2002; Parry et al. 2005; Josef et al. 2007; IPCC, 2008; Munir et al., 2010). According to the FAO (2015), agriculture in Burkina Faso is dominated by smallholders farming (4 to 5 ha per household) of the rain-fed and food-producing type, which is constantly under the weight of climatic hazards (drought, floods), very often leading to agricultural production decrease and reflecting the high variability of production from one year to another in the different production

zones. Water management and total water control have been cited as one of the main adaptation measures to increase the resilience of agricultural production systems in Burkina Faso, corroborating the results of previous work. For instance, some authors have reported that drip irrigation could be one of the adaptation measures to climate change to enable Sahelian countries to maintain and/or increase agricultural production and cope with climate variability and recurrent droughts (Sampath, 1992; Rosegrant and Cline, 2003; Evenson and Gollin, 2003; Hanjra et al., 2009; Molden et al., 2010).

## V. Conclusion

The major lessons to be drawn from this article on the perceptions of food governance institutions on the impact of climate change on food security in Burkina Faso are multiple and multifaceted. Firstly, the impacts of climate change on food security are twofold; direct impacts related to the food security system and indirect or contextual impacts. In Burkina Faso context, the direct impacts would be linked to the decrease of agricultural productivity and the indirect impacts are linked to the extreme economic brittleness of the population, making food products no affordable or inaccessible. Secondly, it noted that droughts and floods are the main scourges that would threaten food security, requiring water management infrastructures and capacity building in terms of adaptation to climate change. Since the solutions for treating these impacts do not require the same efforts, thorough knowledge of these impacts enables us to make judicious choices in planning food security management. The solutions proposed such as construction of hydraulic infrastructures and agricultural mechanization are remediation of direct climate impacts which, however, are structural type and very difficult to be implemented. It would therefore be more judicious to think about the most easiest solutions that can be implemented to mitigate indirect impacts.

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