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A comparative analysis of the four dimensions food security framework from the lens of West African smallholder farmers

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The Food and Agriculture Organisation's definition of food security has inspired the dominant Four Dimensions Food Security Framework (availability, accessibility, utilisation and stability). Whereas some scholars see the framework as a useful tool for assessing food security others see it as inadequate in certain contexts. In order to broaden the evidence base, a comprehensive literature search was conducted to understand the evolution of food security and its frameworks. This was followed by a qualitative study to assess the influence of food security policy on sustainable food systems from the perspective of smallholder farmers in Anglophone and Francophone West Africa using the four dimensions food security framework for the analysis. From the findings smallholder farmers in Ghana and Burkina Faso admit that availability of, and accessibility to food have significantly improved. However, food utilisation has stagnated as diets have deteriorated, and food stability is problematic. In addition, smallholder farmers say they are more concerned about sustaining their food production systems than merely meeting the four dimensions of food security. Sensitivity of food production systems to ecological balance is therefore an underlying driver of food security, which can neither be taken for granted nor subsumed under any of the four dimensions. The study concludes that the four dimensions food security framework is not adequate for assessing the food security of smallholder farmers in the West African Savannah. These findings imply recalibrating the processes for formulating food security policy, implementation, and evaluation of impact. Interested researchers should test the proposed 5-Star (five-dimensions) food security framework in other settings similar to or different from the fragile West African ecological zone to aid theory building.

Key words: Food security, availability, ecological sensitivity, smallholder farmers, West Africa

INTRODUCTION

Food security has been the primary goal of nations to solve the problem of hunger (Ghana Zero Strategic Review, 2017). But there are as many different ways of defining food security as there are in measuring it. The Food and Agriculture Organisation's (FAO's) Global Food Summit of 1996 adopted the definition that, food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. The four pillars of food security are availability, access, utilization

and stability (emphasis added) (FAO, 1996 as cited in HLPE, 2017, p. 6).

According to the Nova Scotia Nutrition Council (2005), food security means being able to get all the healthy food you need and to enjoy it with friends and family. Food security also includes being able to make a living by growing and producing food in ways that protect and support both the land, sea and the food producers, and that ensure that there will be healthy food for our children's children (Nova Scotia Nutrition Council [NSNC], p.1).

The Nova Scotia Nutrition Council's definition, including the definitions it has inspired, look at food security from a food systems perspective, which it defines as "a way of producing and distributing food that protects the environment and ensures that our land, air and water

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will be able to continue producing food in the future” (NSNC, 2005). The United Nations Environment Programme (UNEP) shares the Nova Scotia perspective on food systems, noting its preference for “a food system that delivers food security and nutrition for all in such a way that the economic, social, and environmental bases to generate food security and nutrition for future generations are not compromised” (UNEP, 2019, p. 5).

Whereas the Nova Scotia Nutrition Council’s (2005) definition of food security is more forward-looking, the most widely used framework for assessing the food and nutrition status of individuals and households is the Four Dimensions Food Security Framework based on the FAO definition, which includes food availability, accessibility, utilisation, and stability (FAO 2008). This framework follows a Malthusian argument “that hunger is due to a gap between food production and human population growth” (Altieri & Nicholls, 2005, p. 39). From this perspective, emerged the paradigm of increased food production through the use of Green Revolution Technologies (chemical fertilizers, synthetic pesticides and weedicides, mechanization and extension delivery) as a quick means to raise food production to address hunger (Todaro & Smith, 2012), as the world looked for more sustainable means to produce food (Powell & Williams, 1993). But, as Altieri and Nicholls (2005) have argued, it is the global fight for market share – not the pursuit of food security – that is leading companies to pursue chemical based agriculture. Their call for more agro-ecological alternatives that can solve the agricultural and food security problems in a much more socially equitable manner is based on solid scientific evidence that today, global food production meets the needs to feed everyone on the planet an adequate diet, but food insecurity persists, and food systems are threatened (Ulimwengu, Collins, Yeboah & Traub, 2016). Why food security continues to pose a challenge to the global community, despite huge investments in food security interventions, remains an issue deserving thorough investigation. It could well be that the way food security is defined and assessed compromises the ability to deal effectively with hunger and food insecurity. But there is no certainty around this either. So this paper focuses on answering three questions: 1) What do food security frameworks share in common and what tells them apart? 2) What are the major strengths and weaknesses of the four dimensions food security framework? 3) How does smallholder farmer food security measure up against the four of dimensions food security? In this paper, we explore these questions under the guiding light of Nova Scotia Nutrition Council’s position that sustainable food systems and, food security and nutrition, are a direct function of how food is produced today (Nova Scotia Nutrition Council, 2005), and Swaminathan’s (2017) conclusion that the future of food systems is in a plate right now sitting on the dinner table.

METHODS

The study area consists of contiguous Kasem-speaking communities in the Kasena-Nankana West District and Navrongo Municipality in the Upper East Region of northern Ghana; and Gurunshi-speaking communities in the Commune Urbaine de Pô and Commune de Tiébélé of the Nahouri Province in the Centre-Sud region of southern Burkina Faso. Kasena and Gurunshi are the same people with a common ancestry and language (Awedoba, 2011). Whereas the Mossi, the main ethnic group in Burkina Faso, call the Gurunshi “*tampiiriga*” (slave), the Gurunshi call themselves “*Clan des sages*” (Clan of philosophers). Farming is not just a means of subsistence among the Kasena and Gurunshi but it is also who they are - an identity. Ancestral veneration is a common practice that undergirds their agronomic and extension practices. The names Kasena and Gurunshi will be used interchangeably throughout this study.

The methodological approach consisted of a literature survey and a qualitative study. The literature survey of food security frameworks was to understand the evolution of thinking around food security. The emerging issues were then examined in a qualitative study, using scientific and indigenous methodologies to assess the suitability of the FAO inspired four dimensions food security framework from the lens of smallholder farmers in the West African Savannah. The use of indigenous methodologies is justified because the analysis of Kasem (Kasena/Gurunshi) proverbs, expressions and songs give insights into the deeper meanings of cultural concepts and images, which inform their daily practices (Cassiman, 2006). Whereas indigenous methodologies included gathering of wise sayings, proverbs, poems, songs, and riddles, scientific methodologies included key informant interviews and focus group discussions. The Appreciative Inquiry technique of data collection was used, as it builds on the strengths of the existing system and also emphasizes the practical use of the results of research (Wilson, 2008). The paper adopted the Case Study approach, which lends itself to a variety of research designs, data collection, analysis, and reporting techniques, and has application to a wide range of disciplines (Merriam, 1998, as cited in Yazan, 2015). Though a purely qualitative study, data was analysed quantitatively to generate descriptive statistics such as tables to assess the distribution of opinion on key variables while verbatim quotations were used to support the quantitative information.

Privacy of participants and confidentiality of information was protected at all times during and after the research. To further protect the confidentiality and also obviate the need for documentation of names of study participants, the study opted for verbal informed consent and assent instead of written. Verbal consent was obtained from participants before interviews were conducted. Identification numbers were assigned to transcripts for organizational purposes only; to indicate the data

source category and date. Any potential research participants who chose not to participate, or withdrew their participation during the interview, were cordially thanked for their time and excused.

Review of Food Security Frameworks

Since the 1943 Conference of Food and Agriculture drew global attention to food security, the concept has undergone several redefinitions, and so have the way food security has been assessed. Different frameworks have emerged for assessing food security. The purpose of the literature survey was to examine the various food security frameworks so as to determine their major characteristics, strengths and weaknesses.

UNICEF Conceptual Framework of Malnutrition

In 1990, UNICEF presented a conceptual framework for the analysis of food and nutrition security. The framework's various determinants are grouped on different causality levels in which malnutrition is a result of "immediate", "underlying" and "basic" causes. Under this framework the "basic causes" of malnutrition do not include how the food is produced which is a major determinant of sustainable food systems.

WHO three Pillars of Food Security

The World Health Organisation (WHO) came up with The Three Pillars of Food Security with their respective sub-pillars. According to the WHO Framework, Pillar 1 (**Food Availability**) means sufficient quantities of food available on a consistent basis. Pillar 2 (**Food Access**) is having sufficient resources to obtain appropriate foods for a nutritious diet, and Pillar 3 (**Food use or utilisation**) represents appropriate use of food based on knowledge of basic nutrition and care. These Pillars were implemented after the UN stated rules about the minimum dietary requirements of an individual to live a substantial life. Conspicuously missing from the WHO Framework, as with the UNICEF framework, is "Food stability" and sensitivity of food production systems to environmental sustainability. Production as a sub-pillar under the Food Availability Pillar concerns itself with Macro level indicators that affect food production levels and not necessarily farming systems. In spite of their shortcomings, the UNICEF and WHO's Frameworks have contributed significantly to the conceptual understanding of food security and how it is defined and measured.

This enabled the FAO to reach a broader definition of food security as a situation "when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO, 1996, par. 1).

G20 Food Security and Nutrition Framework

In 2013, the Declaration by Leaders of the Group of Twenty Industrialised Countries (G20) recognized "the importance of boosting agricultural productivity, investment and trade to strengthen the global food system to promote economic growth and job creation" (G20 Food Security and Nutrition Framework [FSN], 2014, p. 6). The G20 developed its Food Security and Nutrition Framework (the FSN Framework) with priority objectives to: Increase responsible investment in food systems, Increase incomes and quality employment in food systems, and Increase productivity sustainably to expand the food supply. The idea of sustainability primarily refers to "opportunities to enhance the efficiency and resilience of agricultural production, processing and distribution in food value chains to expand and diversify the food supply..." (p. 7). However, the FSN Framework has a large dose of market economics; it treats agriculture as a tradable commodity, but this is not only problematic for true food security but also inimical to sustainable food systems.

Analysis of FAO Food Security Framework

The FAO Food Security Framework has been subjected to various modifications to emphasise one aspect or another of the multi-dimensional concept of food security. In their modified version of the FAO Framework, WOCATpedia (n.d.) added as underlying drivers of food security other measures such as insurance against drought and crop failure, protection of the environment and the sustainable use of natural resources like land, soil and water. The strength of this framework is that it duly recognises stability and environmental sustainability as influencing the three dimensions of availability, accessibility and utilisation. Its weakness lies in the position of these critical elements in the framework which does not enable them to be directly assessed in food security measurements, and can easily be taken for granted.

Modified UNICEF Framework of Malnutrition

Later, Ecker and Breisinger (2012) superimposed the four dimensions of food security on the UNICEF Framework. Whereas the authors view food "Use" and food "Utilisation" as separate dimensions of food security, other frameworks use these two terms together or interchangeably. It is however not clear why Ecker and Breisinger (2012) depict "Stability" as both crosscutting and a stand-alone cause of malnutrition, without adequate explanation except to clarify that *Stability* refers to the temporal determinant of food security and nutrition and affects all three physical elements. Significantly however, their caution to not differentiate between food security and nutrition, but to define food security in a broader sense to mean more than purely availability and access to food, resonates with earlier observations by Dittoh, Abizari and Akuriba (2007) who have always argued that nutrition has consi-

stently been neglected in food security discourses. Ecker and Breisinger's (2012) work however downplay the importance of sustainable food systems to food security and nutrition.

The Food and Nutrition System

Ecker and Breisinger (2012) also developed a "Diagrammatic Overview of the Food and Nutrition System" framework for the International Food Policy Research Institute (IFPRI) that highlights Macro level determinants of food security and nutrition to include macroeconomic stability, economic growth, public spending, and governance. The authors pander to market economics by concluding that "in most cases, limited access [to food and nutrition] is due to limited financial resources which perpetuate the vicious cycle of poverty, malnutrition, and illness" (p. 6). They however make an interesting observation that three overlapping paradigm shifts in thinking about food security can be identified in the evolution of the concept: (1) from the global and the national level to the household and the individual level, (2) from objective indicators to subjective perception and, (3) from a food first perspective to a livelihood perspective (Food First, 2013). There is the need to introduce a fourth paradigm that moves food security from a livelihood perspective to a human welfare or happiness perspective, which is the First Cause or the ultimate objective of human existence (Jancar, 1966). Food security encompasses the entire value chain of food; from how food is produced, processed, stored, prepared, eaten, and nourishes the body, all of which must reflect not only sustainability but human happiness.

The 2020 Vision for Food, Agriculture, and the Environment of the IFPRI seeks "to generate and promote a shared vision and consensus for action for

meeting food needs while reducing poverty and protecting the environment" (International Food Policy Research Institute [IFPRI], 2012, as cited in Ecker & Breisinger, 2012, pp. 1-2). By highlighting the need for food production systems to be sensitive to the ecology, IFPRI Vision 2020 stops short of calling for a fifth dimension to the current four-dimensions food security framework.

Ecosystem contributions to the four dimensions of food security

The International Union for the Conservation of Nature (IUCN, 2013) examined the four dimensions of food security using an ecosystems lens which raises the level of consciousness of the need for food production systems to be sensitive to ecosystem connections: "Stable food security requires food systems that provide sustainable food availability, access and use, resilient to the impacts of social, economic and environmental shocks and stresses" (IUCN, 2013, p. 4). However, though ICUN's explanations broaden the scope of each dimension using an ecosystem lens, it merely hints at the need for additional dimensions.

The Four Dimensions of Food Security

The current four dimensions of food security (Table 1) have been derived from the FAO definition of food security. "Stability", as included in the dimensions of food security, refers to the **temporal determinant** of food security and nutrition and affects all the three physical elements of Availability, Accessibility and Utilisation. Yet how to better manage the dynamic aspects of food production systems to ensure true food security, and how **stability** interacts with **sustainability** and **resilience** remains unresolved.

Table1: The FAO Food Security Framework (FAO, 2008).

Dimension	What it means
Physical AVAILABILITY of food	Food availability addresses the "supply side" of food security and is determined by the level of food production, stock levels and net trade
Economic and physical ACCESS to food	An adequate supply of food at the national or international level does not in itself guarantee household level food security. Concerns about insufficient food access have resulted in a greater policy focus on incomes, expenditure, markets and prices in achieving food security objectives
Food UTILISATION	Utilisation is commonly understood as the way the body makes the most of various nutrients in the food. Sufficient energy and nutrient intake by individuals is the result of good care and feeding practices, food preparation, diversity of the diet and intra-household distribution of food. Combined with good biological utilisation of food consumed, this determines the nutritional status of individuals
STABILITY of the other three dimensions over time	Even if your food intake is adequate today, you are still considered to be food insecure if you have inadequate access to food on a periodic basis, risking a deterioration of your nutritional status. Adverse weather conditions, political instability, or economic factors (unemployment, rising food prices) may have an impact on your food security status

The Inter-American Institute for Cooperation on Agriculture (IICA, 2009) and Klennert (2009) have drawn attention to the need to minimize external risks

such as natural disasters and climate change, price volatility, conflicts or epidemics to improve the resilience of households. Yet, food security conceptual frameworks

have been based on, or largely inspired by, what has now become known as the FAO Food Security Framework, which has dominated intellectual thinking around food security and nutrition programming for decades. For instance, Madzivhandila et al.'s (2016) food security framework, which emphasizes food safety - an umbrella term encompassing handling, preparation and storage of food to prevent foodborne illnesses to humans - is based on the four dimensions of food security.

Pursuing food security through the lens of the FAO-inspired four-dimensions food security framework has huge implications for smallholder farmer food security and the future of farming itself. Amir (2013) has criticized the FAO Food Security Framework saying the threat to food security also lies with factors such as ecosystem degradation, which has already been highlighted by Ecker and Breisinger (2012), and IUCN (2013). The IUCN criticism is arguably the closest anyone has come to admitting that ecological balance is a critical driver of food security that needs to be taken into consideration in food security discourses. Indeed, early on, Riely, Mock, Cogill, Bailey and Kenefick (1999) stopped short of calling for additional dimensions of food security by arguing that food security is a complex problem with specific dimensions that can vary considerably in different contexts.

RESULTS AND DISCUSSIONS

Over all, three Case Studies were followed, 28 key informants interviewed, and 13 focus groups convened in 12 communities in four districts - two in Ghana and two in Burkina Faso. Observation enabled the researchers to study participants and their environment for complementary information. Interviews were conducted in French, English and Kasem, audio recorded, transcribed and translated. Data collection and content analysis of transcripts proceeded simultaneously. One key challenge encountered was that some Key Informant Interviews ended up as group discussions as colleagues of key informants joined the discussions on their own or upon invitation by the key informant. Under those circumstances, the information from the key informant was treated as one-on-one interview whereas contributions from other participants were treated as information obtained from a focus group discussion.

Manifestations of hunger and food insecurity

In the past, hunger harvested a crop of hapless victims: "Hunger was terrible in the past. It killed people. It was so harsh that people took their wives and children and exchanged for food to feed the rest of the family ... But now things have much improved. If you feel hungry here in Burkina, when you enter Ghana you will eat. When things are hard in Navrongo [Ghana] they come to Pô here [Burkina Faso]" - male key informant,

Commune Urbaine de Pô, Burkina Faso.

Even if one had food today, the looming possibility that at a point in time there will not be enough food to eat made people suffer the pangs of hunger long before it actually set in. A poor harvest was hunger in advance: "In the past they harvested groundnuts and put it in a pot. How much groundnuts is that? Then they fetched a little and put it in our hands, and even then not everyone got some" - male key informant, Commune de Tiébélé, Burkina Faso. "When we were children when they prepared millet flour drink, they rolled the flour into balls and put it in our hands, then they put in more water for the grown ups to drink and the remaining flour was given to the youngest children" - male focus group discussant, Tambolo, Commune Urbaine de Pô, Burkina Faso. "My father was a soothsayer, and there were seven of us children. He didn't get much from soothsaying and yet he didn't have time to farm. In those days hunger and extreme food scarcity were the order of the day. When we have not had a meal for days, my mother would set fire in the hearth at about seven in the evening and place a big pot on it. As we sat around her listening to tall tales, we took turns to stoke the fire. Occasionally, she would go open the pot, inspect the contents and add some water. This went on till we fell asleep, one after the other. We woke up the following morning expecting to find food but there was none. The stones took too long to cook and the whole idea was to buy time for us to fall asleep. But we had just made it through another night on an empty stomach" (K. Kaporu, personal communication, February 24, 2016). "I can say there is hunger in our community but there is no longer famine as it used to be in the past" (laughter among discussants) - male focus group discussant, Kayoro, Kasena-Nankana West District, Ghana.

The lyrics of a song composed and sang by Ayechage Adoa, a famed composer from Chiana-Asunia, in Kasena-Nankana West, Ghana, speaks volumes about some of the extreme manifestations of hunger: "Because of hunger I beat up my wife, drove her away and now I cook for myself" (B. Atedechira, personal communication, July 27, 2019). However, all study participants have acknowledged that food security policy has made a huge dent on hunger as indicated in Table 2. Thus the level of hunger that was being experienced in the past more than justified the need for food security interventions. The need for indicators for assessing food security, such as the four dimensions of food security, was a step in the right direction.

Food Availability

The Food Availability Dimension addresses the "supply side" of food security and is determined by the level of food production and stock levels. Food availability has significantly improved as a result of increased food production mainly as a result of the use of modern agricultural technology: "In the past we planted on the

Table 2: Participants' opinion about the incidence of hunger

What can you say about the incidence of hunger?	BURKINA FASO						GHANA					
	Pô		Tiébélé		TT		KNW		NM		TT	
	KII	FGD	KII	FGD		%	KII	FGD	KII	FGD		%
It has increased	0	0	0	0	0	0	0	0	0	0	0	0
It has reduced	6	2	5	2	15	100	12	6	3	2	23	100
Total	6	2	5	2	15	100	12	6	3	2	23	100

Table 3: Participants' views about quantity of meals in the past and now

Between meals eaten in the past and meals eaten now, which are bigger in size?	BURKINA FASO						GHANA					
	Pô		Tiébélé				KNW		NM			
	KII	FGD	KII	FGD	TT	%	KII	FGD	KII	FGD	TT	%
Meals eaten in the past	0	0	0	0	0	0	0	0	0	0	0	0
Meals eaten nowadays	7	2	5	2	16	100	12	6	4	3	25	100
Total	6	2	6	2	16	100	13	6	4	3	25	100

soil like that [without ploughing first] and we weeded with the hoe. It was tough to plant, weed and weed again... and the produce was never enough... Now we use bullocks, donkeys, and tractors to plough and the harvest is plentiful" (with emphasis) - female focus group discussant, Manyoro, Navrongo Municipality, Ghana. "In the past we used the hoe but now we use bullocks. When it is time for ploughing you would just here, lugi, lugi, tugi, tugi, tugi, tugi, (sound of the tractor ploughing)" – male key informant, Commune de Tiébélé, Burkina Faso. This increase in food production has translated into more food on the table than it was in the past: "In the past people didn't use to eat the way we eat now; they didn't use to cook in the morning, cook in the afternoon and cook in the evening like we do now" - female focus group discussant, Manyoro, Navrongo Municipality, Ghana. "Now we wake up in the morning we drink tea with a huge loaf of bread; in the afternoon we eat other kinds of food, then in the evening we eat again" - male focus group discussant, Chiana, Kasena-Nankana West District, Ghana.

According to Table 3 study participants agree that meal sizes have increased. On the basis of the qualitative and quantitative evidence, it can be concluded that the food availability dimension has largely been achieved.

Food accessibility

Food Accessibility is the economic and physical access to food. Farmers' incomes have gone up through improved market access, and this is enabling farmers access food for household consumption. But agriculture is no longer the Ancestor's trade nor just for food. Increasingly, farmers are seeing agriculture as business and politics: "We farm sesame in large quantities for the

purpose of selling to make money. We also cultivate soya beans but we don't eat much of it. We cultivate it just to look for money" (with emphasis) – male focus group discussant, Kayoro, Kasena-Nankana West District, Ghana. "Because of the Planting for Food and Jobs programme those who could not farm up to 5 acres could now do so because of the subsidy" – male key informant (Agro-inputs dealer and award winning farmer), Kasena-Nankana West District, Ghana. "I don't do maize. But the Planting for Food and Jobs programme, that enabled us pay part for inputs and pay up the rest after harvest, helped me last year" – male focus group discussant, Chiana, Kasena-Nankana West District, Ghana.

Planting for Food and Jobs (PFJ) is Ghana government's flagship programme launched in early 2017 to make Ghana more food self-sufficient, whilst creating jobs for the youth. The anecdotal evidence above of the success of the PFJ aligns with a statement by the Ministry of Food and Agriculture; "PFJ [has] been very successful since it was implemented ..." (Kaledery, 2018, p. 29), and that of the German Federal Ministry for Economic Cooperation and Development (BMZ); "in Ghana, the Government's signature Planting for Food and Jobs programme has, in its first year alone, raked in GH¢1.2bn (US\$ 270,276,000) in crop value and created 745,000 jobs" (BMZ & AGRA, 2018, p. 3). Farmers' incomes have appreciated and more young persons have jobs. The case of smallholder farmers in Burkina Faso is no different. "Farming is no longer just for food, it's about money and it is about politics!" – male key informant, Commune Urbaine de Pô, Burkina Faso. "I farm maize, millet and beans. I don't farm groundnuts. When I discovered this kind of livestock rearing (embouche bovine et ovine) abandon-

Table 4: Participants' assessment of healthy foods

Between foods eaten in the past and foods eaten today, which would you say make people healthy and strong?	BURKINA FASO						GHANA					
	Pô		Tiébélé				KNW		NM			
	KI	FGD	KII	FGD	TT	%	KII	FGD	KII	FGD	TT	%
Meals of the past	2	2	4	2	10	66.7	10	6	2	2	20	87
Meals eaten today	0	0	0	0	0	0	0	0	0	0	0	0
Don't know	4	0	1	0	5	33.3	2	0	1	0	3	13
Total	6	2	5	2	15	100	12	6	3	2	23	100

ed groundnut production. Last year when I sold the cattle I was extremely happy... When you do the 'embouche bovine' business well you can make a lot of money and then you eat whatever food you want. Now I am completely relaxed. When I wake up, I just eat and go back to sleep" - male key informant, Tiyolo, Tiébélé, Burkina Faso. "We assessed our own production systems and introduced 'un système de pisculture'. This is a new kind of fish production, which makes fish available all year round. Also, when you compare the wet season farming our fathers did against the new system of pulling water for farming pepper and sweet potatoes in the dry season, we are better off than them because these fetch more money" – male Case Study participant (Président de la Chambre régionale d'agriculture de Tiébélé [CRA]), Commune de Tiébélé, Burkina Faso.

The new livestock breeding system, and dry season fish farming and vegetable production being vigorously promoted in Burkina Faso under food security, are doing more than help put more proteins into diets; they are helping create wealth for smallholder farmers who now see themselves as better off than their forefathers. On the other hand, the food security interventions in Ghana, with specific reference to the PFJ, have raised the overall purchasing power of people, which significantly improves their accessibility to food. Based on the foregoing analyses, it can be reasonably inferred that the food accessibility dimension has substantially been met.

Food Utilisation

The Food Utilisation dimension is commonly understood as the way the body makes the most of various nutrients in the food. Food utilisation in this study focused on how food security policies have helped improve diet quality and diversity as well as promote the consumption of locally available nutritious foods. The study has revealed that modern crops of low nutritive value, such as maize, have replaced indigenous nutritious foods such as millets and sorghum. Diet quality has resultantly deteriorated. The emphasis on quantity of food over its quality is manifest. "Food is available, only meat is difficult to come by"

(with emphasis) (A. Pwagea, personal communication, January 1, 2019). "Millet based meals are much healthier than maize based meals...See them sitting here, they are very, very old but some of them are much stronger than us, and it's as a result of the foods they ate in their days. So foods of the past gave vitality than the foods of today" – male focus group discussant, Katiu, Kasena-Nankana West District, Ghana.

This is suggestive that more food is being made available but at the expense of nutrition. When asked "between foods eaten in the past and foods eaten today, which would you say make people healthy and strong?" over two thirds (67%) of participants in Burkina Faso and nine out of 10 (87%) in Ghana said foods eaten in the past made people healthier and stronger than foods eaten nowadays. This is as illustrated in Table 4.

This suggests that merely increasing food production, and or improving farmers' income, may increase the quantity of food eaten but it does not necessarily improve the quality of food people eat. Two-thirds of respondents in Burkina Faso (33.3%) as compared to 13% in Ghana indicated that they could not make the difference between the nutritive value of foods eaten today and foods eaten in the past. The figure is higher in Burkina Faso most probably because diets in Burkina Faso have not shifted from their indigenous base – in terms of variety and diversity - as much as they have in Ghana. This implies, and Abazaami, Atuik and Dasoberi (2018) concur, that variety and diversity is what improves the nutritional value of what is consumed. It is significant to note that, though the food utilisation dimension has been problematic, all study participants have acknowledged that, notwithstanding the deterioration in the quality of diets, food security policy has made a huge dent on hunger, and this provides good food for thought.

Food Stability

The Food Stability dimension is based on the assumption that even if your food intake is adequate today, but you have inadequate access to food on a periodic basis, risking a deterioration of your nutritional status, you are food insecure. Food stability in this study

looked at how the political climate, including current food security policies, support the sustainable production of food to meet current needs without compromising the ability of future generations to meet their own food needs. The results show that policy inconsistencies, political interference in the implementation of food security policy, and wrong policies, have been major roadblocks to the achievement of food stability.

Policy inconsistency

Government fertiliser and seed subsidy policies have been inconsistent and varied from year to year which has seriously disoriented farmers and hurt their food production plans and farm outcomes. In Ghana, a "Passbook system" in which farmers kept the book and took it to an inputs dealer to buy subsidized fertiliser and seeds, changed to a "Coupon System" in which farmers got coupons and used them to redeem subsidized fertiliser and seeds at designated inputs dealers. In 2018, the coupon system was abolished and everyone could buy subsidized fertilizer but the supplies were woefully inadequate. A key informant explains how policy inconsistencies complicate and hurt farming decisions: "With the Passbook system the highest number of fertilizer you could buy was 10 bags... But the coupon system is a challenge because farmers cannot have easy access to the coupons ... Also, during the 2017 farming season only farmers who farmed five acres or less could benefit from the seed and the subsidized fertilizer. That policy is not good because you want to help people and they are farming 15 acres, 20 acres..." - male key informant, Chiana, Kasena-Nankana West District, Ghana.

A focus group discussant also narrates his ordeal: "I prepared my maize seed so that I could plant the following year. But when the time came the government said if you don't buy the certified maize seed you won't get the fertilizer. But I already had maize seed. So I didn't plant maize this season. I have retrogressed..." - male focus group discussant, Chiana, Kasena-Nankana West District, Ghana. "We used to have best farmers for various crops [during the annual farmers' day celebrations]. We had best farmers for groundnuts, maize, soya bean, rice, even irrigated rice and upland rice. We even had best organised women's group. But this year (2018) everything was generalized into crops and livestock... [and] criteria for selection included Acreage, Farm Management, Livestock (housing), Spacing, Ventilation and Sanitation. The crops were Maize, Cowpea, Soya Bean, and use of improved seed or certified seed carried more marks!" - male focus group discussant (Agricultural Extension Officer), Navrongo Municipality, Ghana.

Political interference

Political interference in the implementation of food

security policies adversely affects food stability. During the 2018 farming season, the authorities at the Mairie or Commune (District) level in Burkina Faso took over from the Ministry of Agriculture the distribution of fertilizers and other agricultural inputs meant and for smallholders to improve food security. When asked if that is a more efficient way of ensuring that inputs get to the right people at the right time, an Agricultural Extension Officer said it was too early to tell. He however put it in more diplomatic terms that the Ministry of Agriculture has the advantage of having worked with the farmers over a long period of time so they know the farmers better in terms of their needs, where they are located and how to reach them.

In Ghana, political interference manifests itself in the selection of agricultural inputs dealers as well as the determination of award winners during Annual Farmers' Day celebrations. Though the procedure for nomination is clear, food security considerations predominate awards categories, prizes and citations, as well as the processes and criteria for the selection of winners. "Field officers monitor and nominate potential award winning farmers. Then a screening team from the Ministry of Agriculture goes out to the field to see what the nominees are doing. But of late politicians have taken over the process. Even if you follow the right procedures and make the necessary nominations, when you and bring the names to the leaders they end up doing their own things" - male focus group discussant (Agricultural Extension Officer), Navrongo Municipality, Ghana.

Thus, in Ghana and Burkina Faso, food security policies are subject to political interference, which hurts food stability, that is, all year round availability of food. In some instances, political interference in the implementation of food security policies has heightened the vulnerability of smallholder farmers to food insecurity. This jeopardizes not only the attainment of true food security but also sustainable agriculture, a view shared by Abazaami (2012).

CONCLUSIONS AND RECOMMENDATIONS

Conclusions:

Differences and similarities between food security frameworks

The literature search, in addition to illuminating our understanding of the complexity of the concept of food security, points to one major flaw in the different food security frameworks reviewed – they generally focus on the four dimensions of food security, which means at worst they do not seriously consider methods of food production as an underlying driver of food insecurity, or at best, embed it under one of the dimensions, especially the food stability dimension. Findings from the qualitative study enabled similar conclusions to be drawn.

Smallholder farmer food security and the four dimensions of food security

In both Ghana and Burkina Faso, technology associated with food security policy has helped increase food production and farm productivity. It has equally raised farmers' incomes, enabling them to buy food from the open market. Resultantly, improved availability of, and accessibility to food has drastically reduced the incidence of hunger among Kasena smallholder farmers. Food utilisation has however been problematic because diet quality has deteriorated and unsustainable consumption patterns have been established. Policy inconsistency and political interference in food security policy implementation are largely to blame. These developments have not only compromised food stability but they have also jeopardized sustainable farming, and as long as future farming is endangered, food insecurity will persist. Therefore, as far as Kasena smallholder farmers of the West African Savannah are concerned, food security policy is not sustainably addressing hunger because only two dimensions of food security - food availability and food accessibility - have reasonably improved. Even with the four dimensions of food security, smallholder farmer food security is not being met.

Strengths and weaknesses of the dimensions food security framework

The four dimensions food security framework focuses on the food itself and not on how the food is produced, much less who produces it. So even if all the four dimensions of food security were met, sustainable food systems could not still be guaranteed. The conclusion then is that, the four dimensions food security framework is a useful tool for assessing the food security of people in diverse socio-political and spatial locations but it is not a suitable tool for assessing the food security status of African smallholder farmers for whom farming is not just a livelihood activity but a vocation.

The general conclusion is that, the four dimensions food security framework is not adequate for assessing the food security of smallholder farmers in the West African Savannah, and by implication, smallholder farmers in other indigenous societies whose main livelihood is agriculture. How food is produced and who produces it are so critical to food security that they cannot be taken granted nor subsumed under any of the four dimensions, and this calls for expanding the food security framework beyond four dimensions which itself will engender a redefinition of food security.

Recommendations

True food security is a function of sustainable farming systems, and for farming systems to be sustainable they must be attuned to nature. True food security is when food is available, readily obtainable, with balanced diets guaranteed all year round, and the food is obtained through food production systems that are attuned to nature and sensitive to ecological balance. The five pillars of food security are Availability, Accessibility, Utilisation, Stability and Sensitivity, as depicted in the proposed Five-Star (five dimensions) Food Security Framework in Figure 7. "**Sensitivity** to ecological balance" as a dimension of food security takes the view that "if food is available, readily accessible with variety and balanced diets guaranteed at all seasons, but the food is obtained through food production systems that are not sensitive to ecological balance, food insecurity exists". The proposed framework is simplified in Table 2 below.

These findings have implications for the processes for formulating food security policy, the content of the policy itself, its implementation, monitoring, and evaluation of impact. All these engender inclusive participation of the majority of the end users of food security policy – smallholder farmers. There is also the need for further exploration of the suggested five dimensions food security framework by testing it in other settings similar to or different from the fragile West African ecological zone.



Figure 7. The proposed 5-Star (Five Dimensions) Food Security Framework. Researchers' Construct (Santuah et al.,

Conflicts of interest:

This paper emanates from the work of my PhD thesis assessed and approved on 31st July 2019 based on

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