



Effects of climate variability on household food availability among rural farmers in Central River Region-South of The Gambia

Momodou Badjie^{1✉}, Sidat Yaffa², Mamma Sawaneh³, Alagie Bah⁴

In The Gambia, over-dependence on rain-fed agriculture for livelihoods increases farmers' vulnerability to climate change. For farmers to increase crop production there is the need for them to be aware of climate change and how they can sustainably respond to its variability. This study examines the effects of climate variability on household food security among rural farmers in Central River Region-South of The Gambia. Multi-stage sampling techniques were employed to collect data from 219 farmer household heads through a household survey, focus group discussions and key informant interviews. Descriptive statistics were used to summarize the household information on food security status. The study also used Pearson correlation to establish the relationship between climatic variables and crop production in the study area. The findings indicated that 90% of the farmers obtained food from their own production. Moreover, an overwhelming majority of 75.5% % of the households responded that they faced food shortage and August is the most difficult month to obtain food. As to coping strategies, the majority of the household resort to a combination of strategies to cope with food shortages such as rely on less preferred and cheaper foods, borrow food, or rely on help from a friend or relative, limit meal sizes among others. Therefore, the study recommends Government in collaboration with other stakeholders to clearly outline climate change adaption needs and implementation plans especially for smallholder farmers who depend on rain-fed to improve their climate change knowledge thereby enhancing their adaptive capacity to climate change effects, thus improving household food security status.

INTRODUCTION

The concept of climate change and variability is probably the most debated phenomena of our time. There is consensus in the scientific field that the land and sea temperatures are warming under the influence of Greenhouse Gases (GHG) and will continue to warm regardless of human interventions for, at least, the next two decades (IPCC, 2007). However, there is also a small but vocal number of scientists in climate change related fields who argued that there is no conclusive evidence that climate change is happening. As explained by Abid *et al.* (2015) and Asayehegn *et al.* (2017), climate change and climate variability is one of the most widespread silent crisis in the recent decades affecting agricultural production and its consequences are not immediately visible and easy to prevent. Unfortunately, Africa is regarded as the most vulnerable continent to the impacts of climate change with West Africa being a key region of concern due to its poor adaptive capacities to climate extremes.

Africa's over-dependence on rain-fed agriculture for livelihoods, as discussed by Smit and Wandel (2006) and Ifeanyi-obi *et al.* (2012), are some of the causes of vulnerability of communities mostly rural areas.

IPCC (2007, p.30) defines climate change as "any change in climate over a long period of time mainly 30 years and above, whether due to natural variability or as a result of human activities". This definition by no means differs from that in the United Nations Framework Convention on Climate Change (UNFCCC, 2007, p.30), where climate change refers to a "change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods".

Climate change is slow and gradual. Unlike year-to-year climate variability, climate change is very difficult to perceive without scientific records. On the other hand, climate variability-which is considered as a component of climate change is defined as the way climate fluctuates yearly above or below a long-term average value. Challenges posed by climate change and variability as lamented by Food and Agricultural Organization, FAO (2016), are threatening the attainment of food security and Sustainable Development Goals (SDGs)-"Zero Hunger" in developing countries, especially Sub-Saharan Africa. Climate change and variability, desertification and urbanization, amongst others, are challenges faced by most Sub-Saharan countries which further threatens household food security status (Oyiga *et al.* 2011). The devastating effects of climate change and variability have gone beyond national burden, i.e., the cause and effects of climate change cannot be addressed by a single country. The most seriously affected by climate change and variability are the developing countries, especially the rural people even

¹WASCAL – West African Science Service Centre on Climate Change and Adapted Land Use, University of Lome, Togo; ²WASCAL – West African Science Service Centre on Climate Change and Adapted Land Use, University of the Gambia; ³ School of Agriculture and Environmental Sciences, University of The Gambia;

[✉]Corresponding author: WASCAL – West African Science Service Centre on Climate Change and Adapted Land Use, University of Lome, Togo; Email: msbadjie22@gmail.com; Tel: (+220) 3505082

though their contribution to Greenhouse Gases (GHGs) emission is very low compared to industrialized countries (Agbo *et al.* 2015) and Ali & Erenstein (2017).

The situation is devastating due to the fact that agriculture is the most hard-hit sector. Most farmers especially small scale farmers in Africa depend on rain-fed agriculture for food production (Lasco *et al.* 2011). Research conducted by Tariq *et al.* (2014) indicated that the adverse effects of climate change on agriculture, ecosystems services and coastal food system are alarming. With climate change and variability, ensuring food security is one of the disturbing and frustrating challenges faced by mankind in recent decades. Because climate change is regarded as a threat multiplier combined with other factors such as land degradation, desertification, conflicts and urbanization etc., there is a need to build urgent resilience and adaptation systems in agriculture and other sectors such as environment and ecosystems (FAO, 2007).

Researchers, including Cgiar (2009) and Makate *et al.* (2017), predicted that farmers in developing countries who depend on rain-fed agriculture will face a very immediate and direct threat to food shortage which also affects their livelihood as a result of irregular or erratic rainfalls, leading to low crop yields. Even without relying on rain-fed agriculture which is already threatened by climate variability, many agricultural systems in Africa are at a critical point (Agbo *et al.* 2015). As elaborated by Muller-Kuckelberg (2012), feeding rapid global population growth is becoming a major burden on agricultural lands, ecosystems and ecosystems services, fisheries, rivers and lakes. In most part of Africa, shrinking of water bodies for example, Lake Chad is becoming a major concern hindering the intensification of agriculture. With climate change and variability, the threats are being amplified and can be noticed within countries with low adaptive capacities. Climate change and variability do not only affect food production in the present years. Using climate models, Koohafkan (2008) predicted that agricultural yields by some farmers in Africa who depend on rain-fed agriculture will suffer a reduction of 50% by 2020. The prediction further demonstrates that by 2025, approximately 480 million people in Africa could be living in water-scarce or water-stressed areas. This could have severe consequences on farmers for food production, thus contributing to food insecurity, conflicts, malnutrition and other related threats to human security.

Climate change and variability have had and will continue to have significant economic costs in The Gambia. The Gambia is highly vulnerable to any changes to its climate characteristics and it is evidently documented that there is an increase in average monthly minimum temperature by 0.40 degree centigrade over 40 years. Research conducted by Jaiteh (2010) and Yaffa (2013) revealed that there is an observed reduction in rainfall both in amount and in duration and increased frequency and length of dry spells in most part of the country. Yaffa (2013) further highlighted that for at least 29 years out of 40 years in the North Bank Region of The Gambia, rainfall had dropped below average. Citing Balk *et al.* (2007), Jaiteh (2011) stated that The Gambia is one of the most vulnerable countries to sea level rise. Mean temperatures are expected to increase between 3°C and 4.5°C by the year 2075. The Gambia's Greenhouse Gases (GHGs) emission may be relatively low, however, there are evidence of climate variability.

The Gambia is a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and is working towards the reduction of GHG emissions. In order to address the threats of climate change, The Gambia has developed and implementing National Adaptation Programme of Action (NAPAs) and prioritized climate change resilience to withstand the climate shocks. This focuses on

thematic areas such as adaptability, susceptibility, and sustainability of a country. Good adaptation measures can minimize the negative impacts of global warming and climate change. These measures comprise the growing of alternative crops, intercropping different crop varieties, use of drought tolerant seed varieties, employing irrigation and water harvesting techniques, crop diversification, early warning and monitoring systems, construction of dykes, human migration, changing planting dates, diversifying in and out of agriculture, reliance on safety nets and social networks among others. One constraint to adaptation especially in agriculture has been that some of the adaptation technologies such as irrigation systems and dykes require huge capital investments.

The paper is organized as follows: the first section briefly discusses background of the study and review of past studies on the impact of climate change on agriculture and food security. Data and methodological procedures are discussed in section two. Section three presents empirical results as well as discussions. The last section consists of conclusion.

METHODOLOGY

The Study Area

This study was conducted in the Central the River Region-South of The Gambia. It lies on the southern part of River Gambia, stretching from Sofaa Naima Bolong (Pakaliba Bridge) in the West to Farato Village in the East (Figure 1). The study was conducted in three randomly selected districts of the Central River Region-South of The Gambia namely; Niamina West, Niamina East and Lower Fulladu West. Simple random sampling was employed to select three communities from each of the selected district. Kumbaney Buniadu, Sambang Mandinka Kunda and Katamina were the communities selected from Niamina West district. The villages selected from Niamina East were Sambel Kunda, Sotokoi and Kerewan Touray. In Lower Fulladu West, Sinchu Magai (Mara Magai), Medina Ceesay Kunda and Sankuleh Kunda were the communities selected for the study.

Sampling Technique and Sample Size

The study population comprised all the households in the selected communities for the study. The sample frame for the study was the list of households in the study area with the sampling units being farmer households and the target respondents for the study were household heads. A multistage sampling method was used for this study. The first stage was the purposive selection of one region in country. The Central River Region-South was selected due to its climate sensitivity, high food poverty levels and high participation in farming which is predominantly rain-fed and subsistence.

In the second stage, simple random sampling technique was used to select three districts from the six districts in the region. Using the socio-economic data obtained from Gambia Bureau of Statistics (GBOS), three most vulnerable districts and food poor in Central River Region-South were purposively selected. Names of each community/settlement and population were imputed in the Microsoft excel statistical tool using the randomization formula to select the communities. Three communities were selected from each district making a total of 9 settlements for the entire study area.

In the last stage, simple random sampling was used to select households from each community for the entire study as household heads (small-scale farmers) serve as the sampling units for the study. In each selected household, one household head (male or female) was

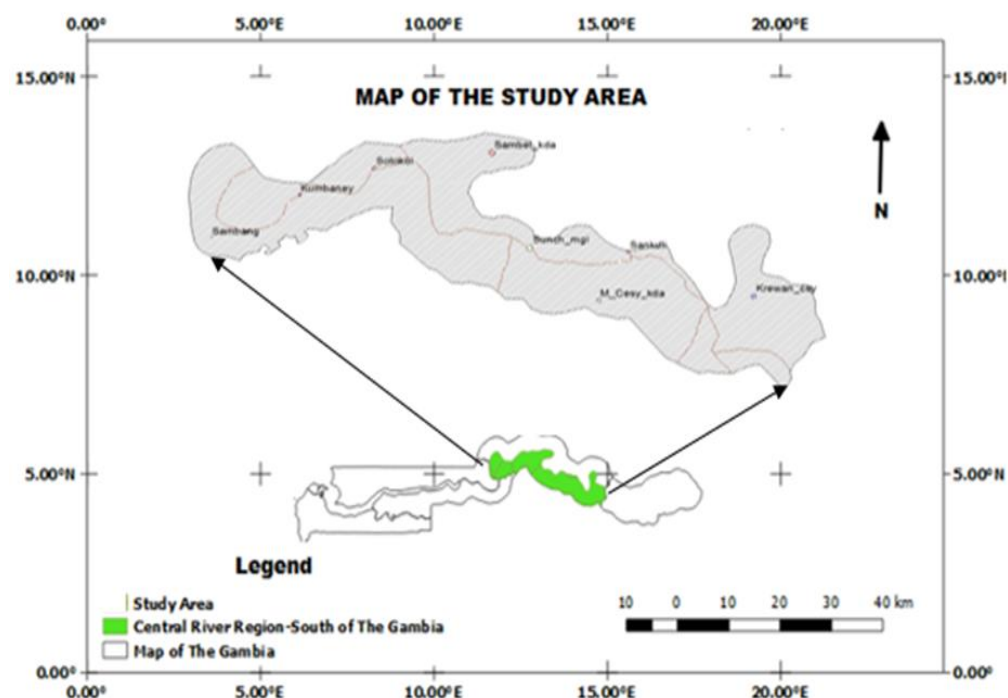


Figure 1 Map of the Study Area

Table 1 Sample of the Study Area

Districts	Settlements	HH. N°	Sampled Households	Percentage (%)
Niamina West	KumbaneyBuniadu	23	10	5
	Sambang Mandinka Kunda	46	20	9
	Katamina	78	34	15
Niamina East	SambelKunda	81	35	16
	Sotokoi	112	48	22
	KerewanTouray	25	11	5
	SinchuMagai (Mara Magai)	44	19	9
Lower Fulladu West	Medina Ceesay Kunda	15	6	3
	SankulehKunda	82	35	15
3 Districts	9 communities	506	219	100

Source: Gambia Bureau of Statistics (GBOS), 2013

interviewed. Also, in the absence of the household head, adult members (more than 25 years) answer the questionnaire on his/her behalf.

The sample size determination was based on Kothari (2004) formula. This procedure takes into consideration (1) the nature of the population, (2) the type of investigation, and (3) the degree of precision desired. The method accepts an estimation of tolerable error margin of 0.05, allowing 95% confidence level. Hence, the formula is represented below;

$$n = \frac{Z^2 P q N}{e^2 (N-1) + Z^2 P q} \text{Equation..... (1)}$$

Where: n= the minimum number of sample size within the range of acceptable error margin,

N= the total number of households in the four selected administrative districts;

z= confidence level (95%) and which is 1.96;

e= acceptable error margin (0.05);

p= proportion of sampled population (0.11); and

q= estimate of the proportion of population to be sampled (0.89).

Sample size calculator (software) was also used for better sample size determination and accuracy.

A sample total of 219 household heads was obtained using the formula, to obtain the exact number of respondents from each village, the total number of households in each community obtained earlier was divided by the total households for the study (506) and the value multiplied by 219 (Table 1).

Data Collection and data Sources

Primary data collected for the study were socio-demographic characteristic of households, household food security components (availability, accessibility, utilization), household coping strategies to food shortages, perception on climate change, household preferred sources of climate information, and finally data on the challenges farmers faced in their farming systems through structured questionnaire administration.

The secondary data collected were the relevant information obtained from newspapers, books journals, reports and internet. In addition, climate change data (1971-2016) was collected from the Department of Water Resources (DWR) to test correlation between climate variables and crop production variables. The climate variables collected included annual precipitation as well as minimum and maximum temperature. Crop production data of the study area was also collected from the department of planning from 2011-2016 as well as the population data of The Gambia from The Gambia Bureau of Statistics (GBOS) 2013 census.

RESULTS & DISCUSSION

Socio-Demographic Characteristics of Households

Out of the 219 households surveyed, the results indicated that 83.1% of the households were male headed while 16.9% were headed by female as shown in table 2. This shows the dominance of male headed household in the study area. This can be attributed to the culture and religion as most cultures recognize male as household heads compared to their female counterparts. In most cases, men tend to dominate females with regards to household head. This affects and limits their access to most natural resources such as land thus affecting their involvement in commercial agricultural production. Despite their substantial contribution to household food security, cultural beliefs limit women in practicing permanent food crops or plants.

The findings also revealed that 70.3% of the surveyed households were involved in monogamous marriage and 30% were in polygamous marriage. The results also shown that 4.6% of the respondents were widowed while 3.2% were single. In terms of food production, this has a positive implication especially for households that are involved in agricultural activities. This is evident that married farmers who are engaged in active farming activities could have the support of their spouse(s) in terms of labour and also help supplement the income needed to acquire agricultural input and to provide the needed food requirements of the household. Citing Nnadi *et al.* (2012), Ozor N. *et al.* (2015) illustrated that marriage encourages, support and promote adaptation efforts among farming communities, thus improving household livelihoods.

Majority representing 30.6% of the respondents were within the age bracket of 37-48 and 31.1% were within 49-60 years old. There is enough reason to state that majority of the respondents in the study area were predominantly in their middle ages hence, are economically active and thus can undergo stress and manpower to increase in food production. The data revealed that majority (46.6%) of the surveyed respondents had household sizes of between 10-17 persons while 37.9% and 11.9% having household sizes of 2-9 and 18-25 person respectively with the average household size of 12 persons per household. This indicates that most of the households within the surveyed area have fairly larger family sizes. The lowest family size was 2 while the largest was 40 persons. This large household sizes indicates or implies that large size within the rural areas would be capable of providing cheaper family labour especially agricultural activities which most of them rely

on for consumption. In addition, large family size encourages and provides diversification of enterprises by farmers and other livelihood activities that are vital in enhancing household food production and productivity and boost household income. Large family size also minimises expenses especially on labour and other activities.

Considering the educational level of the household heads, the results show that 58.4% of household heads have attended lower basic education in English and Arabic education known as 'Madrassa' while 8.2% and 5.0% have attended Upper Basic School in English or Arabic education systems respectively. In addition, the results also illustrated that 24.7% have never attended any form of education. It can be inferred from this that the majority of the respondents in the study area are literates although their level of literacy differs. This demonstrates that the acquisition of information, especially on climatic information gives them a broader understanding of climate change and improves in their diversification of food production, thus enhancing their household food security.

Acquisition of formal education as reported by Abid *et al.* (2015) will enhance the adaptation of improved agricultural technologies that are expected to positively improve their livelihood, thus food security. Household education can contribute significantly to the household's resilience. This implies that the household headed by a person with high education background is expected to have a high resilience to the impact of climate change than those without education. This is similar to the study by Piya *et al.* (2012) as cited by Nyangas and Chingonikaya (2017) which found that respondents attaining various trainings or formal education are able to increase their income by undertaking skilled non-farm activities, which are less climate-sensitive compared to farming and grazing, thereby helping the households to avert climate risks and hence increase their household resilience to the impact of climate change.

Household Main Sources of Food

In the study area, the main sources of food in the household can be categorized into two; own production and from purchase. Out of the 219 respondents interviewed, an overwhelming proportion (90%) of them reported that their primary source of food consumed in the households is from their own production while 10% of the respondents reported that purchase is the second source of household food supply (Figure 2). This is evident that in The Gambia, a large proportion of the rural population depends on crop production and animal rearing among other farming activities for their livelihood which is subsistence and purely rain-fed.

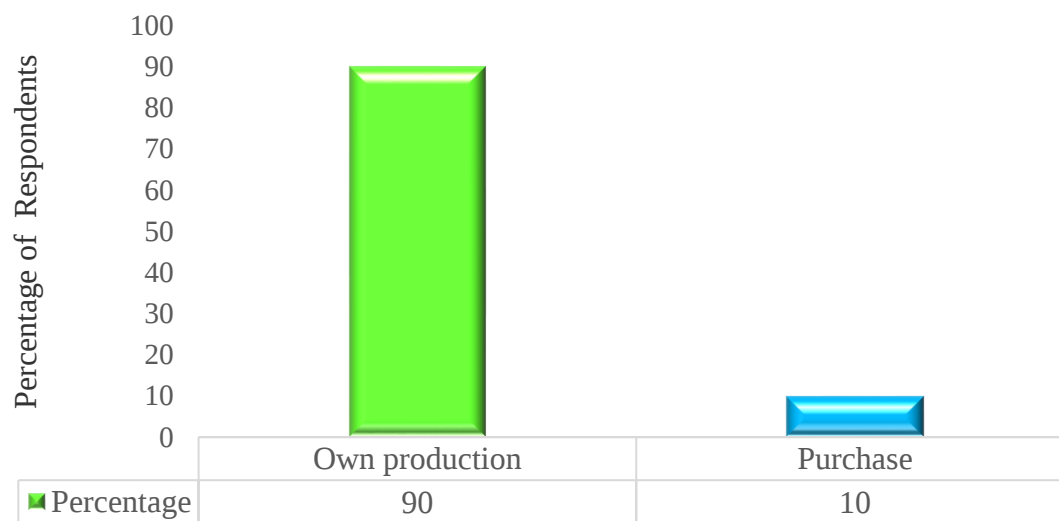
Though the findings revealed that the majority of households were engaged in farming, almost all households are net purchasers of food. Most of the households do not produce sufficient food quantities to cover the household consumption needs throughout the year. Some of them sell part of their production to cover the production expenses and other needs such as children school fees and other social events. The vulnerability to food insecurity is more severe during poor harvest seasons in which most households were unable to produce enough food to keep feeding their members throughout the year.

Crop diversification practiced by households can be seen as a measure taken to adapt to adverse effects of climate change, considering uncertainties facing onset and cessation and rainfall distribution. This was further manifested by household heads and stakeholders during FGD in the study area. In The Gambia, most of agricultural activities employed by farmers are labour intensive, time consuming with little returns. There is a need for research and development of labour saving technologies to remedy the situation, thus increase household

Table 2 Socio-demographic Profile of the Respondents

Variables	Frequency(n=219)	Percentage (%)
Gender		
Male	182	83.1
Female	37	16.9
Age of household head		
25 -36	20	9.1
37-48	67	30.6
49-60	68	31.1
61-72	50	22.8
73 and above	14	6.4
Marital status		
Single	7	3.2
Married monogamous	154	70.3
Married polygamous	48	21.9
Widowed	10	4.6
Household size		
2-9	83	37.9
10-17	102	46.6
18-25	26	11.9
26-37	7	3.2
33 and Above	1	.5
Educational level of Household head		
Never attended school	54	24.7
LBS/Madrassa	128	58.4
UBS/Madrassa	18	8.2
Secondary	11	5.0
Tertiary	8	3.7
Economic activity		
Crop production	195	89.0
Petty trading	3	1.4
Fishing/hunting	4	1.8
casual works	9	4.1
Others	8	3.7

Sources: Field Survey, 2017

**Figure 2** Distribution of Households' Main Sources of Food

Source: Field Survey, 2017

livelihoods. Muzamhindo (2015) also opined that the development of labour saving technologies, improved access to credit and extension will increase the likelihood of adaption to climate change by vulnerable farmers who depend largely on rain-fed agriculture.

A similar study conducted by Ozor, N. *et al.*(2015) illustrated that household who practice crop diversification and household gardening are more resilient to food insecurity. Household food production is a key instrument in determining food availability. Any activity within the capacity of household to secure food can be considered as production.

FGD further revealed that the majority of the households sell a large proportion of the farm produce to the market to supplement other household needs such as providing education and other basic needs of the household. Household mostly engage in food purchase when the farm harvest is poor and the food stored has been exhausted. In addition, petty trading constituted 10.5% and livestock 11.0% respectively contribute greatly in generating household income needed to complement household food needs.

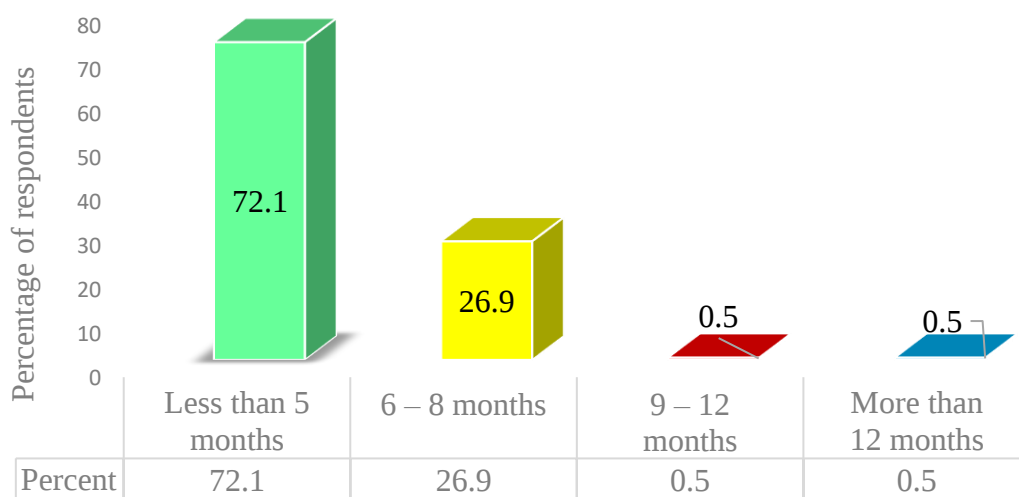


Figure 3 Distribution of Respondents' Time Periods that their Farm Produced Lasts
Source: Field Survey, 2017

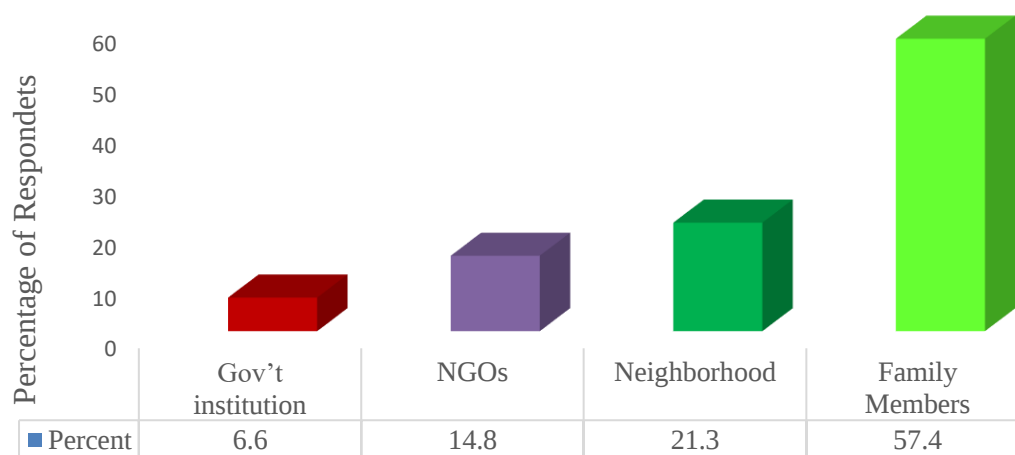


Figure 4 Distribution of Household Institutional Support
Source: Field Survey, 2017

Table 3 Correlation between Climate Elements and Major Crop Production

FOOD CROPS	Mean Rainfall	Maximum Temperature	Minimum Temperature	Relative Humidity
	r	r	r	r
Early Millet	-0.04	0.03	0.06	0.49
Late Millet	0.27	0.69	0.04	-0.84**
Sorghum	0.62	-0.21	0.15	0.26
Maize	0.28	0.88**	0.21	-0.69
Rice	0.71	0.54	0.42	-0.68
Findo	0.57	0.27	0.07	-0.40
Groundnut	0.84**	0.46	0.77*	-0.50
Sesame	0.16	0.65	0.11	-0.95***
Cereal crops	0.74*	0.59	0.39	-0.46
Cash Crops	0.81**	0.50	0.74	-0.57

The association between each food crop production and climatic variable is computed using Pearson correlation and the significance level are denoted as follows: ***1%, **5% and *10%

Source: Department of Planning, 2017

Household Food Availability

Findings from household interview revealed that, most of the respondents (72%) reported that farm produce can only cater for less than 5 months for family consumption while 26.9% of the surveyed respondents explained that their farm produce can only cater for 6-8 months (Figure 3). Findings further revealed that only 0.5% of the respondents narrated that their farm produce can cater for 9-12 and more than 12 months respectively. This can be further attributed to the family sizes and poor harvest among many other factors. Most of the respondents expressed their views during FGD that climate variability and lack of adequate farm inputs are the main contributing factors to poor yields. Poor storage and processing facilities was also highlighted due to fact that most of the interviewed communities lack these facilities.

To attain household food security, efficient assessment is vital to highlight the number of months on which households depend on their own farm production is important. In most cases, household food production, especially in rural Gambia are not enough even in the normal rainfall year, to feed the member of the household for the whole year period. This is mainly as a result of extended families depending on a single source of livelihood. This compelled most households to struggle to get additional food from other sources such as remittance and neighbourhood assistance during months of food shortage. Due to their large dependence on rain-fed agriculture, climate variability is expected to exacerbate and further complicate the number of months of food shortage for households by lowering crop yields which is subsequently caused by unreliable rainfall pattern and shorter growing seasons.

During FGD, the majority of the respondents affirmed that food security is a serious challenge and it severely affects livelihoods as the majority of the respondents expressed that their own farm produce cannot feed their household for the whole year. The probable reason why their own food production is not enough to feed the family may be a function of many different factors, like climatic condition, loss of soil fertility, or the loss of household productive assets or some other related challenges. With regards to the surveyed population, most of the factors contributing to household food insecurity can be identified as unreliable rainfall pattern and lack of farm inputs.

Household Additional Sources of Food Supply

The existence and strong relationship among households is key in helping minimise the severity of food shortage. When their own production cannot cater for household consumption throughout the year, they employed varieties of ways to respond to food shortage. The majority of respondents outlined that they resorted to other mechanisms to acquire food items. Findings from the study exposed that a good proportion 57.4% and 21.3% of the respondent stated that they normally get assistance from family members/relatives in The Gambia and abroad and neighbourhood respectively in form of food and non-food items such as money in cash as for remittance while 14.8% of the respondent gained assistance from NGOs such as Action Aid The Gambia, FAO among others (Figure 4).

Only few respondents (6.6%) stated that they gained assistance from government institutions such as agricultural projects through the Department of Agriculture (DoA) in form of agricultural implements such as seeders, power tillers, fertilizers to increase in production and productivity, thus enhancing household food availability. During FGD, the respondents stated that more support is needed from government institutions in form of microfinance, vegetable gardening, livelihood improvement strategies and farm inputs to improve production. During

difficult months of food shortage, household respond by selling livestock, selling firewood and charcoal and borrowing from better off households, shopkeepers, “*banbana*” among other strategies to compliment household food requirements.

Effect of Climate Variability on Major Crop Production in the Study Area

Climate is fundamental in the growth of cereals and cash crops. Correlation between climate elements and major crop production (cereals and cash crops) in the study area was analyzed using XLSTAT version 2014 (Pearson correlation). The results revealed that climate elements (mean rainfall, maximum temperature, minimum temperature, relative humidity) have substantial effects on the production of cereal and cash crops in the study area. These findings corroborate with Adamgbe & Ujoh (2013), Yamusa *et al.* (2015) and Ali *et al.* (2017) that variability in climate change presents a major challenge to cereal crop production and rural livelihoods as rural farmers depend on agriculture for food production. Crop production is directly influenced by precipitation and temperature. Precipitation determines the availability of freshwater and the level of soil moisture, which are critical inputs for crop growth.

From the findings, the correlation between early millet and rainfall was (-0.04) indicating that rainfall have negative effects on the production and productivity of early millet. Furthermore, the results have shown that rainfall have significant positive effect on groundnut production. The correlation between rainfall and groundnut was (0.84**), meaning that the yields of groundnuts are likely to increase as rainfall increases. It is evident from the correlation matrix that both cash crops (0.74*) and cereal crops (0.81**) respectively have strong correlation with rainfall in that the yields of these crops depend on the amount of rainfall received. Although data from the meteorological records have indicated that rainfall has been fluctuating, late onset and early cessation of rainfall as reported by respondents have contributed to the variation of yields of cereals and cash crops per season. The results further revealed that the correlation between maize and maximum temperature was (0.88**) showing that maize yields are likely to increase with the increasing maximum temperatures. This shows that every crop responds negatively or positively to a certain threshold throughout its growth stage (Table 3).

Moreover, the results also pointed out that there is a significant correlation between late millet and relative humidity (-0.84**), indicating that relative humidity can increase the yield of late millet. This is clear that efforts to sustain household food security are suffering from serious challenges of agricultural vulnerability to climate change. The negative impacts of climate change such as increase in temperature and variation in rainfall are expected to lower the benefits for production of the agricultural sector, thus threaten household food security status. Climate change is regarded as a threat multiplier by causing spatial and temporal distribution of rainfall that further threatens household food security in the developing world. This is evident due to the fact that agricultural production and productivity, food security components, including storage are affected by climate change extremes. Agricultural vulnerability to climate change puts many rural people under extreme poverty and food insecurity situation. Therefore, understanding climate change causes and its effects in order to develop an adaptation and mitigation policy is very important to achieve sustainable agricultural production and eradicate hunger, thereby attaining sustainable development goals.

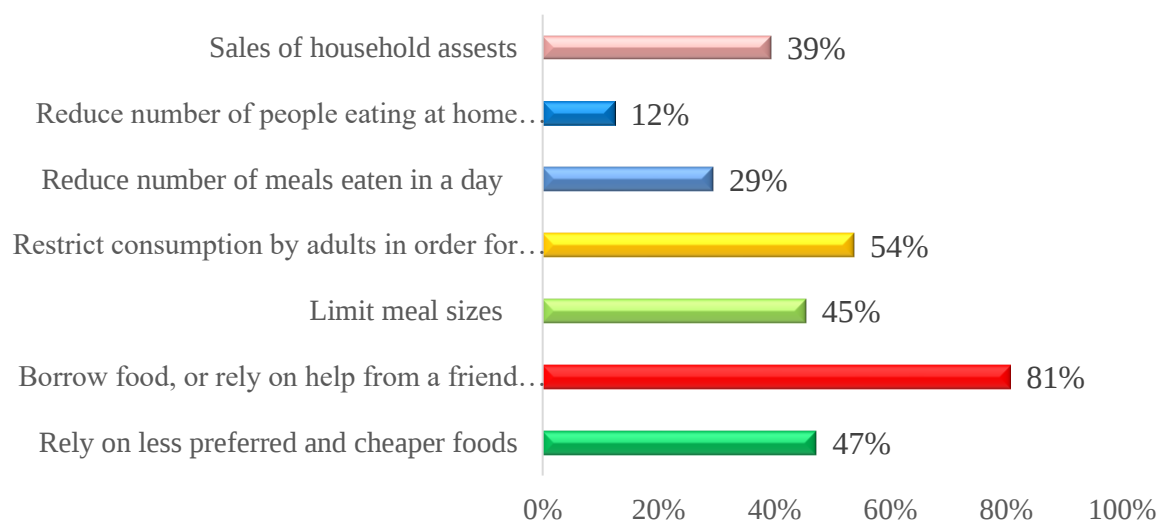


Figure 5 Proportion of Households Coping Strategies during Food Shortage
 (**multiple response to household coping strategies)
 Source: Field Survey, 2017

Household Coping Strategies to Food Shortage

In The Gambia, strategies to coping during food shortage are diverse. It could be noted that coping strategies to food shortage needs a careful decision in order to minimize further threats. This was further lamented during FGD where majority of the households reported that they combined two or more coping strategies within the same period of food shortage. In order to understand how household cope in responding to food shortage, respondents were asked to identify from the list provided, the most common combination of strategies adapted by household to cope in case of food shortage periods;

- rely on less preferred and cheaper foods
- borrow food, or rely on help from a friend or relative
- limit meal sizes
- restrict consumption by adults in order for small children to eat
- reduce number of meals eaten in a day
- reduce the number of people eating at home (e.g. by sending a child to eat from relatives or friends).
- sales of household assets.

The findings have revealed that households are engaged in multiple coping strategies to food shortage. Among household surveyed in the study area, the coping strategy most prevalent to households is borrow food or rely on help from a friends or relatives which represent 81% of respondents. One of the main reasons as expressed during the household interview and FGD is that they borrow money to cover food need, health expenses and pay school fees. In addition, 47% of the respondent also alluded that they rely on less preferred and cheaper foods as a coping strategy during food shortage. This means that households consumed food items that are not expensive such as forest foods among others. Meanwhile 39% of the respondents reported that as a coping strategy, they sell their household assets such as jewelries, assets and other household materials while 54% stated that they restrict food consumption by elders to allow the younger ones, elderly, and the less immune people to eat (Figure 5).

The findings further revealed that 29% of the respondents reduce the number of meals eaten in a day while 12% of the respondents reported that they reduce the number of people eating at home by sending them to

relatives or neighbors. The results also highlighted that a good proportion (45 %) of respondents reported that as coping strategies, most households limit meal sizes consumed in a day. This implies that households that consume, for instance, 5kg per three square meals per day are compelled to reduce to 3kg per three square meals per day. Reducing the number of meals eaten in a day on the other hand implies that households that consume three-square meals per day are compelled to reduce to two or one meal per day as a way of coping strategy during food shortage.

CONCLUSION

Attaining food security is among the most significant development challenges faced by government of The Gambia. In fact, there is sufficient evidence to admit that it is the most urgent task faced by many countries today. Attaining sustainable food security requires a complex and a holistic approach from both public and private sectors and other actors. It implies reaching a number of development goals, including motivating agricultural production, intensifying livelihood opportunities, increasing incomes, and improving nutrition directly at household level. Currently food security had become virtually synonymous with development.

As outlined in the major findings, the majority of households in Central River Region-South of The Gambia largely depend on their own production to secure food for livelihood. They are also net purchasers of food items. It can therefore be concluded that household own food production is insufficient to sustain the food needs of the family.

Correlation matrix between climate elements and major crops (Cereal and Cash crops) production has indicated that climate factors have consequences on cereal and cash crops production. This also have severe effects on livelihood of farmers who depends mainly on rain-fed agriculture for crop production in the study area. Therefore, it can be concluded that variations in climate factors have repercussions on crop and livestock production, thus affecting household food insecurity status.

Coping strategies to food insecurity vary from household to household. However, it can be concluded that the majority of household used a combination of coping strategies like to rely on less preferred and

cheaper foods, borrow food or rely on help from a friend or relative, limit meal sizes, restrict consumption by adults to enable small/younger children to eat, sales of household assets among others to cope during food shortages. The most prevalent among the coping strategies is borrow food or rely on help from a friend or relative representing 81%.

Government should help to establish food/cereal banks, food storage and processing facilities. They should also help household to have access to markets, improve value addition to food items, establish agricultural insurance and stabilize the market for agricultural products by fixing price to agricultural products, thereby encouraging farming and also reduce exploitation of farmers.

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Article Keywords

Climate Variability, Rural Household, Food Security, Vulnerability, Coping strategies

Acknowledgement

The authors are grateful to the West African Science Service Center on Climate Change and Adapted Land Use (WASCAL) and the German Federal Ministry of Education and Research (BMBF) for their financial contribution and support towards this research.

Article History

Received: 20 August 2018

Accepted: 14 September 2018

Published: January - March 2019

Citation

Momodou Badjie, Sidat Yaffa, Mamma Sawaneh, Alagie Bah. Effects of climate variability on household food availability among rural farmers in Central River Region-South of The Gambia. *Climate Change*, 2019, 5(17), 1-9

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