

Environmental Determinants of Household Food Security in Northern Cross River State, Nigeria:
Implications for Community Development

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**Environmental Determinants of Household Food Security in Northern Cross River State,
Nigeria: Implications for Community Development**

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Abstract

This study examined the rural environmental determinants of food security in Northern Cross River State, Nigeria: Implications for community development. Two research questions were posed for the study. Literature review was carried out based on the variables. A cross sectional descriptive research design was adopted for the study. The purposive sampling technique was used in selecting the respondents for the study. The instrument for data collection was semi-structured questionnaires, focus group discussions and key informant interviews. The reliability estimate of 0.87 was established using Cronbach Alpha Reliability method. The statistical tool for data analysing the quantitative data was descriptive analysis of frequency counts, percentages. The result of analysis revealed that Climate Change and deforestation are determinants of household food security in the study area. It was recommended that in order to raise crop yields, some useful traditional methods of farming need to be encouraged and developed among the women farmers, for example, the use of crop rotations and intercropping.

Keywords: Food security, Climate change, deforestation, environment, Human activities

Introduction

Food security is an issue of concern to many developing countries. In these countries, the national level depict a picture of food secure population but the converse is true at household level

where individual families suffer from lack of adequate food. Food security is a multifaceted phenomenon in many regions of the world that touch on almost all aspects of life. In many countries in the developing world, especially in Cross River State, it has proved hard evading the trap of food insecurity and understanding the factors that cause widespread hunger and food vulnerability to famines. Approximately 500 million people who are food insecure are in Africa and Southern Asia (Food & Organization, 2015).

The mechanisms available to alleviate the impacts of food insecurity have remained an important area of study by many scholars interested in the welfare of societies (Braun, Teklu, & Webb, 2013). Food and Agricultural Organization of the United Nations, International Fund for Agricultural Development, & World Food Program, (2013) noted that 842 million people, around one in eight, suffered from hunger with Africa being the most affected where one in four people suffered from chronic hunger in 2012.

In Africa where Cross River State is, the state of food security has been worsening since 1970s and the proportion of the malnourished population has remained within the 33 to 35% range in sub-Saharan Africa (Rosegrant, Cline, Li, Sulser, & Valmonte-Santos, 2018). Household food security is determined by myriad factors in the Globe. Despite being the leading economy in Africa as well as a regional business center, Nigeria has still not managed to eradicate extreme poverty and hunger. Nigeria's economy enjoys the extensive sector of agriculture and even engages in the export market but nonetheless Nigeria suffers from chronic food insecurity. In Northern Cross River State, food insecurity is a constant challenge and the present food crisis is powered by multiple factors which are altering the concept of food affordability in the zone.

Most of the existing studies have focused on the physical environments as a key contributor to food insecurity while this study dealt with the determinants to food security from a farm production perspective. In addition, literature has examined environmental factors from an external perspective of the household and where it has considered the effect of the activities of the farmer on the environment in food security, they have not indicated whether the households understand the implication of their activities to the environment and to household food security.

Climate change resulting to increases in average temperatures have been observed around the globe and there is new and stronger evidence that most of the warming observed in the last 50 years is due to human activities (Field, Mortsch, Brklacich, Forbes, Kovacs, & Patz, 2017). These changes are as a result of climate change which is a long-term shift in weather conditions identified by changes in temperature, precipitation, winds, and other indicators. These changes have the potential to adversely affect the environment, communities and the economy unless action is taken now. For example, a few days of temperatures above or below a certain threshold can damage cereals and fruit tree yields (Wheeler, Craufurd, Ellis, Porter, & Prasad, 2010). Globally, climate variability has been experienced with the projected change in average temperature likely to be from 0.3 °C to 0.7 °C for the period 2016–2035 relative to the reference period 1986–2005 (Kirtman,, Adedoyin, Boer, Bojariu, Camilloni, 2013).

The practice of cutting trees is an important environmental factor because of its impact on land that produces food for households. According to UNEP, (1991) about 15% of the world's soils (1,965 million ha) are considered to be moderately to extremely degraded.

The factors responsible for the degradation include water and wind erosion, salinisation, nutrient decline and physical compaction. These factors influence the ability of the environment to

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provide sustenance to humanity in the long run (Karlen & Rice, 2015). Cutting trees degrades the environment and makes all forms of erosion possible. Changes in tree cover influences regional and global hydrological cycling due to their key role in the water cycle. It is thus expected that deforestation would influence rainfall distribution as it interferes with the water cycle process.

Purpose of the study

The purpose of this study is to examine the determinants of food security in Northern Cross River State, Nigeria.

Specifically, the study sought to investigate;

- i. Climate change and food security
- ii. Deforestation and food security

Research question

The following research questions were posed to guide the study

- i. To what extent does climate change influence food security?
- ii. To what extent does deforestation influence food security?

Literature review

Climate change exerts a major role in household food security especially among one-third of the people living in drought-prone areas in Africa which are very vulnerable to the impacts of drought (Boko, Niang, Nyong, Vogel, Githeko, Medany & Yanda, 2017). Small holder farmers are the most vulnerable to weather variability with multiple stresses occurring at many levels, limiting their adaptive capacity (Boko et al., 2017). The same views are echoed by Baez, Kronick, & Mason, (2012) who assert that the poor households have limited choice for their livelihoods and restricted faculty to deal with climate variability and natural disasters. In addition, Aerts, Lasage, Beets, de Moel, Mutiso, Mutiso, & de Vries, (2017), asserts that extreme climate variability is expected in Africa in the future where the annual precipitation is expected to increase. He further states that temperatures will rise and potential evaporation will increase as well and hence net water availability is projected to decrease. It is likely that in many African regions, agricultural production and food security will be severely compromised by climate change and climate variability. At the present, there is already a high mortality risk because of food insecurity in many African regions including Kitui County (Boko et al., 2017).

According to the GoK, (2019) the agricultural sector employs the majority of the populace with own production providing food for households. Furthermore, areas considered arid or semi-arid which are not suitable for rain fed agriculture due to low and inconsistent rainfall has mass of smallholder farmers (GoK, 2019). They therefore exhibit frequent crop failures and low crop and animal productivity.

These areas also have a high population and producing sufficient food poses an environmental dilemma. To sustain food security, food production need to be increased but growing more food damages the environment which reduces our chances of increasing food production in the future (Raven, Berge, & Johnson, 1993 cited in Wolman, 1993). In addition, increasing food production may not translate to food security if the weather pattern and seasons continue to change as a result of climate change. These changes can disrupt food availability and quality whereby, as

temperatures increase and precipitation changes and human activities that support desertification in arid and semi arid lands (ASALs) increase, the effect is evidenced in reduced agricultural productivity (GoK, 2019).

Climatic changes that have been reported are intensified by global warming and since the small holder farmers depends on rain fed agriculture, any slight changes in weather from what they are used to has the ability to affect their livelihood. Agricultural producers are hard hit by these changes and household food security is compromised. This is because weather patterns and seasons are affected by climate variability and change which resultantly impinge on households' capability to secure food.

It has been contended that economic advancement and expanded financial security will in general encourage materialistic frames of mind including an expanded worry for nature (Essien, Essien, Aganyi, Owan & Imo, 2020). The environment faces many challenges arising from human activities by cutting existing forests, releasing materials that harm the environment like the spillage of pollutants like pesticides, soil exhaustion and poor land use methods. All these challenges to the environment must be addressed and constructive solutions to the problem sought if small scale farmers are to realize food security. Land degradation is a serious problem which has effect on land that provides goods and services for livelihood at the individuals and the national level (Bach et al., 2011). There is a decrease in agricultural production due to land degradation which results from human activities. These human activities compromise soil fertility which leads to a reduction in returns to be accrued by the farmer from the field as well as the integrity of the environment (Erkossa, Wudneh, Desalegn, & Taye, 2015).

Changes in forest or tree cover influences regional and global hydrological cycling due to their key role in the water cycle (Avisar & Werth, 2015). It is thus expected that deforestation would influence rainfall distribution as it interferes with the water cycle process. An analysis of changes in rainfall over Borneo forest in Indonesia reveals that there has been a constant decline in total annual rainfall between 1951 and 2007. The most abrupt decreases occurred in the 1980s, when intensive deforestation activities (primarily logging) occurred in search of timber for garden furniture, paper pulp and chopsticks (Kumagai, Kanamori & Yasunari, 2013). This trend can also aggravate the possibility of extreme drought and forest fires, principal to even more deforestation.

Similarly, a modeling experiment in the Indochina peninsula reveals that deforestation is coupled to changes in hydrological course both close by and regionally. At the local level, the effects include higher temperatures and lower rainfall. At the regional level, it has been observed that there is a weakening of the monsoonal flow over east China, near the Tibetan Plateau, and a strengthening over the neighboring South China Sea (Sen, Wang, & Wang, 2014). This trend suggests that deforestation may be one of the key drivers of climatic change in the region that has a serious effect on food security.

Rapid population growth rates and commercial activities increase have meant higher consumption and increasing rates of wastes generation which have now become a problem in terms of environmental pollution (Ojong, Egboniyi & Akpo, 2019).

Studies by UNEP, (2006) indicate that Africa is faced with a lot of environmental degradation and considering that 70 % of its population depends on the land for its survival, land damage is a serious issue. In addition, there is a lot of strain on agricultural productivity and food security in Africa arising from environmental degradation. For instance, the current threat of

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desertification observed on dry lands which constitute the home to about a third of the world's population. This reduces the adaptive capacity of these dry lands which affect the productivity of the lands and thus food insecurity become rampant.

Human activities tend to create or worsen the environment through increased soil erosion and mineral depletion of the soil both of which occur globally. Water and wind are particularly effective in removing soil in the sense that rainfall loosens soil particles which is later transported away by moving water. Wind on the other hand loosens soil and blows it away especially if the soil is barren and dry. Because soil erosion reduces the amount of soil available for cultivation, it limits the growth of crops planted (UNEP, 2006).

Erosion causes a loss in soil fertility because important minerals and organic matter that are important components of the soil are removed (García-Díaz et al., 2017). As a result of these losses, the productivity of eroded agricultural soils drops, and restoration of the fertility by using fertilizer or manure has to be done to replace the lost nutrients. Therefore, Soil erosion is one of the greatest causes of land degradation in Africa (Thomas, 1997). Deforestation enhances soil erosion by reducing the vegetation that would otherwise protect the soils. In addition, Ongwenyi, Kithiia, & Denga, (1993) states that soil erosion is mainly due to surface water run-off from —bare soil surface with the problem being more pronounced in the marginal lands, as a result of sparse vegetation cover, intensive deforestation, cultivation and overstocking.

These human activities often accelerates soil erosion with poor soil management practices where removal of natural plants during construction of roads or buildings and cutting trees for charcoal or brick burning increase erosion. The world forest is therefore being cut down with little replacing. Tropical low lands, or rain forest- biologically the richest areas on earth- have so far been reduced to half their original size. In Asia, Africa and Latin America, what remains is two thirds of the original forest cover and if the trend continues, most will be gone in the next coming years. Inefficient or short term exploitation with disorganized logging and clearing (often by burning) results in irreversible damage of the productivity of these lands (Raven et al., 2013). Tree planting as a determinant to household food security ensures that agricultural land is protected from soil fertility losses and thus increasing or retaining the productivity of the land.

According to GOK (2019), rapid population growth, high poverty levels, land use changes/poor land use systems and deforestation (increase of farm lands and exploitation of existing forests for charcoal burning, fuel wood, construction materials and fodder), has worsened the state of land contributing to food crises. Furthermore, it has also been observed by Erkossa, Wudneh, Desalegn & Taye (2015) that food security is affected by land degradation where habitat is lost a result of soil erosion and siltation which further led to land denudation and the reduction of agricultural potency of the land. Similarly in Makuani County, Kieti et al., (2016) observed that bio-physical changes which affect agricultural production and eventual food security are mainly as a result of land use practices which degrade the environment. These practices also include cutting trees and clearing of vegetation for crop production and livestock pasturage, with consequent heavy losses of soil, have caused serious degradation of most areas in Kitui (Makenzi, 2010). Kironchi, Liniger, & Mbuvi, (2010) further argue that depletion of soil cover due to cutting trees has adversely affected the soil physical properties.

Methodology

The study employed a cross sectional descriptive research design. The design aided in providing a general picture of the environmental determinants to household food security in Northern Cross River State, Nigeria. The design allowed the incorporation of elements of both quantitative and qualitative research methodologies within the same study. The study engaged respondents within a period of one month to investigate the influence of their environmental determinants to household food security in Northern Cross River State.

The area of this study is Northern Cross River State, Nigeria. The zone is situated in the Northern Senatorial district of the state. It shares boundary with Benue State to the North, Boki Local Government Areas of Ikom Education Zone to the South, the Cameroon Republic to the East, and Ebonyi State to the West. Its geographic coordinates are between latitudes 5°32' and 4°27' North and longitudes 7°50' and 9°28' East. It has an area of 306 Square Kilometers (118 sq mi). According to Cross River State National Population Commission, (2015) the Zone has a projected population of 1,044,056 people which implies 526,266 males and 517,790 females. It consists of five (5) Local Government Areas: Bekwarra, Obanliku, Obudu, Ogoja, and Yala.

The target population of the study was households resident in Northern Cross River State, Nigeria. The accessible population was adult individuals available in the households at the time of the study that were selected from the four Local Government Areas. The sample size of the study was 961 respondents. The study utilized the stratified random sampling technique.

The study utilized both quantitative and qualitative data collection methods. These were semi-structured questionnaires, focus group discussions and key informant interviews. These methods were used for triangulation purposes in order to achieve the objectives of the study. The use of more than one method enabled a greater understanding of the environmental factors that influence household food security in the study area. The varied methods ensured that the limitations of one type of data collection method were balanced by the strengths of another. The use of multiple methods was also significant in increasing accuracy of data collected.

The questionnaires were administered to adult respondents within the households in Northern Cross River State. The questionnaire was administered by the researcher and/or assistants and included both closed-ended and open-ended questions. Cronbach alpha reliability procedure was used to determine the internal consistency of the instrument which was found to 0.87 which imply that the instrument is reliable for investigation. Data collected through questionnaires was checked for completeness, cleaned, coded, and entered into a computer system ready for analysis. Quantitative data was analyzed through the aid of Statistical Package for Social Sciences (SPSS) version 23 to run data. Descriptive analysis of the data was carried out.

Result/discussion

The research findings presented in this section relate to the demographic profile of the respondents. This was considered to be necessary because it assist the researcher to understand the targeted group in details. The information pertaining to respondents is shown in Table 1.

Frequency and percentages was first used to analyze the demographic variables (Gender; Age; Educational level and marital status) and the result is presented in Table 1. Out of the 961 respondents used in this study, 564 representing (58.7%) were females while 397 representing (41.3%) were males, this result is so because there are more female in the population than male and

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because females are more involved in agricultural practices in the study area than male. The distribution of the respondents based on age reveals that, most of the respondents 396 (41.2%) are 40 years and below; 290 (30.2%) are those between 41-50 years while 275 respondents representing (28.6%) were 51 years and above.

Out of the 961 respondents' most of the respondents 347 (36.1%) have completed secondary school; 250 (26.0%) respondents had barked higher education degree; 187 (19.5%) have only primary school education while a significant number 177 (18.4%) do not have formal education. In terms of marital staus, more than half of the respondents' 684 (71.2%) are married while 277 (28.8%) respondents are single.

TABLE 1
Frequency and percentages of demographic variables

Variable		N	%
Gender:	Male	397	41.3
	Female	564	58.7
Total		961	100
Age:	40 years and below	396	41.2
	41 – 49 years	290	30.2
	50 years+	275	28.6
Total		961	100
Education level:	No formal education	177	18.4
	Primary education	187	19.5
	Secondary education	347	36.1
	Tertiary education	250	26.0
Total		961	100
Marital status	Married	277	28.8
	Single	684	71.2
Total		961	100

Climate Change and Household Food Security

The study examined the influence of climate change on household food security. The assumption that farmers have perceived climate changes because it has been the talk of the day which has implications on livelihoods is misleading since people perceive issues differently. Many farmers have continued to suffer losses from the inherent effects of climate change in the grassroots. Findings of this study as presented in Table 2 showed that most farmers (68.5%) had perceived a changing climate while only a few (31.5%) had not. The findings that respondents perceived climatic changes in the study area are indicator that there are variations in the climatic conditions of the area. These changes, in turn, have implications for household food security.

TABLE 2
Climate change and food security

Distribution on climate change	F	%	Food F	Secure %	Food F	Insecure %
YES	732	76.2	465	48.4	566	58.9
NO	229	23.8	496	51.6	395	41.1
TOTAL	961	100	961	100	961	100

The study also sought to establish the influence the climate change experienced by individual households had on their household food security. The findings of the study indicated that 51.6% of the respondents who did not experience the climate change were food secure although they were very few. A significant number (48.4%) of respondents were food secured despite observing changes in climate. This shows that majority of the households who had observed climatic change were significantly affected by the change since only 48.4% out of the total were food secure. These findings show that majority of the respondents had observed climate changes in the recent past which has had a significant effect on their food situation. Very few households had not experienced the climatic change but the majority whether they experienced the change or not were still food insecure. These findings demonstrate that most respondent were aware of the changes and it was imperative that the study further assess the perceived climatic changes.

Climate change and variability exerts a major role in household food security by creating multiple stresses which compromises households' adaptive capacity (Boko et al., 2007). The findings of this study concur with those of Mutunga, Charles, & Patricia, (2017) in Kaveta and Mikuyuni villages in Kitui who found that respondents were aware of climatic changes in their locality which had an implication in household food production.

Deforestation and Household Food Security

The study examined the influence of deforestation on household food security. Results of the distribution of respondents indicated their households engaged in deforestation are as presented in Table 3. A small proportion of households (35.6%) engaged in deforestation while the majority (64.4%) did not. Further, descriptive data demonstrated that 28.8% of households that deforest were less food secure compared to a significantly higher number (34.1%) of those households that did not deforest.

TABLE 3
Deforestation and food security

Distribution of respondents involved in deforestation	F	%	Food F	Secure %	Food F	Insecure %
YES	342	35.6	634	65.9	277	28.8
NO	619	64.4	327	34.1	684	71.2
TOTAL	961	100	961	100	961	100

These findings indicate that deforestation has an influence on household food security for the households engaged in it. Households may cut trees for many reasons but the main one is survival. The findings of this study are in line with GoK, (2002) where cutting trees for charcoal burning, fuel wood, and construction materials leads to food crises. Households that engaged in cutting trees despite being the minority in the study area faced food crises to a higher margin than the rest of the households. This study is supported by Steward's, (1955) third fundamental procedure on the extent to which the behaviour patterns entailed in the exploitation of the environment affect other aspects of culture. Households that cut trees for food may find it difficult to secure food and this may require certain adjustments to the changing environment through a change of their dependence on the trees.

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Implications for community development

Food security is necessary in every house hold or family, community, state and the nation in general as this is seen as part of a developing or developed society. No society can thrive or do well in the midst of food crisis. Food security is a powerful community development tool and it is pertinent to improve access to food and strengthen food policies and systems. Food security is recognized as one of the most important [social determinants of health](#) and has been linked with increased prevalence of chronic diseases such as diabetes, hypertension, and cardiovascular disease. Those who are food insecure in communities most often live in poverty and have great difficulty obtaining the food needed to manage chronic diseases like the ones mentioned previously. The study may lay the groundwork for the remarkable local and sustainable food interest in communities that may catch fire across the country in the coming years.

According to Essien, Essien, Effiom and Onnoghen (2020), the study may assist community development planners and developers in Nigeria on the need to organize training, seminars, workshops for youths and residents in order to create awareness on the importance of positive attitude to the environment. This study may as well help community development experts understand the impact of food security on their livelihood.

Conclusion

Conclusively, the study established that majority of households in Northern Cross River State location were food insecure and environmental factors that were reviewed have an influence on household food security. The study found that respondents had perceived a changing climate, majority of the respondents that perceived a change in climate were food insecure. Inadequate rainfall was the main climatic change perceived that affected household food security the most. Human activities that contributed to degradation of the environment were reported to affect household food security. Respondents indicated that some households were engaged in cutting trees and their food security was also low. According to the cultural ecology theory, the extents to which the behaviour patterns entail exploiting the environment affect other aspects of culture. Households that cut trees sought to derive their livelihood from cutting trees but this exploited their environment and affected household food security.

Recommendations

It was recommended that;

- i. In order to raise crop yields, some useful traditional methods of farming need to be encouraged and developed among the women farmers, for example, the use of crop rotations and intercropping.
- ii. Agricultural extension demonstration plots should be introduced at accessible sites such as near local markets, churches or schools. These are usually centres where people frequently meet and they would, therefore, have a chance of observing the good farming practices and, consequently, be able to transfer the knowledge gained to their own farms.

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