

## The Impact of Desertification on Food Security in Sahel Region of North-Eastern Nigeria

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### Abstract

This study examines the impact of Desertification on food security in Sahel region of the extreme North Eastern part of Nigeria. The objectives of the study are to examine the socio-Demographic characteristics of the 360 respondents across Borno, Yobe and Jigawa States where nine communities were selected for the study. Assess the nature and causes of Desertification and its impact on agriculture and food production/security. Time frame for the study was from 2011-2015 (5years). Data were generated from interview schedule, focus group discussion, field observations, and reconnaissance visits. Multi-stage sampling techniques were employed in sample selection. Multiple Regression Correlation Coefficient was employed with SPSS computer programme. The result indicated a negative correlation of  $r^2 = 2.75$  at significant at 0.05 and at 95% degree of confidence. Federal and state government of the affected states needs more efforts to check this ugly trend in Nigeria to curb the menace of desertification and food crisis.

**Keywords:** *Impact, Desertification, Food Security, Sahel Region, North –Eastern Nigeria*

### **Background to the Study**

Our physical environment which is made up of land, water, air, hills, valley and mountain are very important to our existence. Man so much depends on this environment for survival in all ramifications. The physical environment provides man with his material resources base. It provide food for man and his animals and other biotic resources like construction and building materials, medicinal herbs, mineral resources and energy resources like solar, winds, hydro and fossils. It also provides a set of condition which may be favourable for the efficient function of production system. (William, 2009).

Desert encroachment or desertification is simply referred to as the rapid spread of desert to areas which originally were not part of it. (Peter, 2012). Desertification is but one expression of land deterioration leading to accelerated soil erosion by winds. The evidence of that deterioration is found in all parts of the world. In Guatemala for example, some 40% of the productive capacity of the land has been lost through devastating wind erosion and several areas of the country have been abandoned because agricultural activities has become economically impracticable. This very situation is 50% in El-Salvador and Haiti has no high value soil left for agricultural activities. (Arthur, 2000).

In Turkey about half of the land is severely or very severely eroded by winds. A full one-quarter of India total landmass have been subjugated. In Nigeria the affected states are some states closely located near the desert. These states are refers to as frontline states in Nigeria, they are; Katsina, Sokoto, Zamfara, Borno, Yobe, Kebbi, Jigawa and so on. Here rainfall is less than 600mm. The Sahel region of Nigeria faces deforestation, over grazing of cattle's and agricultural practices that do not promote soil conservation (Dauda, 2011).

Sahel savanna of extreme North Eastern part of Nigeria is located approximately to the north of latitude 14° N. The annual rainfall is approximately 50mm-600 mm. Rainy seasons usually last for between 3-4 months with extreme dry season lasting between 6-8 months. The temperatures are usually very high throughout the year. Humidity is 40% in raining season and 60% in dry season. It has a uniform high solar isolation and radiation. Low cloud cover with stunted grasses for cattle to eat. Baobab and Acacia gum Arabic trees and date palms are spread across the region. This situation makes food production a bit hindered. (Binge, 2014).

According to World Bank (2014) food security is not the mere availability of food stuff at local level but that the phenomenon is a global issue. The World Bank (2014) identified three major facts that mainly determined food security. These parameters or matrix are food availability, food accessibility and food utilization. Therefore, this matrix if a nation cannot meet is said to be food insecure. Dalpy, (2013) opion that a country and its populace are said to be food secured if the fear of food shortages is removed. When the poor and the vulnerable have secure access to balanced diet food, they desire to eat at any point in time. Food and Agriculture Organisation (FAO) (2014) define food security as food readily available to all times, and balanced in carbon Hydrates, protein and other food nutrients. Okolo and Ifeakor (2014) posited that food security requires fulfilling certain conditions related to the supply, demand and household level utilization of food.

Okoli and Ifeakor (2014) asserted that drought and desertification poses a serious threat to Nigeria's economy, food security and youth unemployment. He stated that sand dunes have covered a large Land mass that was supposed to be used for agricultural production. Ajayi (2015) revealed that the available ponds and tropic oasis are negatively been affected by the tropical continental air mass which exert pressure on landmass and result into the climate change which now exert extreme heat on the water bodies like streams, rivers, lakes and ponds, thereby making it almost impossible for effective agricultural production.

Buhari (2015) opines that extreme North Eastern Region or Sahel Region of Nigeria is reeling under the challenge of climate change which has a direct negative impact on desertification. He asserted that drought is on the increase and that Lake Chad basin in North East is gradually wiping away because of desertification. He also said that effect of the desertification has posed a serious threat to food security in the North East Sahel Region of Nigeria. He urges the world leaders to bind resolutions for its sustainable development.

Daily Trust, (2015) reported that more than 20 million of people living in Sahel Region of Nigeria go to sleep hungry every night due to unceasing menace of desertification and food shortage. Babagana (2007) in his study observed that most smallholders farmers have abandon their farm lands for motorcycle riding business in Kano, Gusau, Sokoto, Kaduna and other big cities. Studies from multinational organization such as Food and Agriculture Organization (FAO, 2013) World Bank, (2014) Non-governmental Organizations (NGOs) (2014) Tefpala 2015; Okoli 2014; Medugu 2009 and Odiogor (2010) asserted that the problem of water supply in Sahel Region of Nigeria has adversely affected agricultural activities in the Sahel Region of North Eastern Nigeria.

### **Statement of the Problem**

Agriculture is the Nigeria biggest employer of labour accounting for about 75 to 80% of the work force of the nation. The Nigerian farmers are smallholders and subsistence in nature. The use of traditional agriculture farming tools such as Cutlasses, Hoes, Sickles and Axe are the major farming implements. Nigerian farmers are famous in the production of Tubers crops such as yam, cassava, potatoes and Grains such as Rice, Millets, Sorghum, Maize and other crops such as legume are also produced. Cash crops they produced include cocoa, coffee, cotton, Rubber, Kola nut, groundnut, beans and the host of others.

However, in recent years particularly from 1971 – 1973 when the North Eastern Nigeria particularly the Sahel Region of Borno, Yobe and Jigawa states that are situated in semi arid area faced drought, over grazing, deforestation and diseases which adversely affected the agricultural production in the region and led to shortage of foods. Desertification of the extreme North Eastern part of Nigeria which also represent the Sahel region of the country have exert a range of hazard characterized by chronic drought and desert encroachment which is already affecting the spheres of human endeavours including inadequate supply of water and fertile soil for food production due to climate change and desertification. This devastating situation in the region led to food insecurity which also led to strain cordial relationship that have existed for long between the food producers and the general wellbeing of people in the study area thereby leading to engaging in other gainful activities

like commercialization of motorcycle for domestic needs. Petty trading, hooliganism, prostitution and other activities at the expense of agriculture. Therefore, this study serves as a medium for enlightenment campaign for smallholder farmers as the way forward for them to return to farming in the region to reduce the problem of food inadequately. It is against this backdrop that this research attempt to fill the literature gap to investigate the impact of desertification on food security in Sahel Region of extreme North Eastern part of Nigeria.

### **Objectives of the Study**

The aim of this study is to generate quantitative empirical information and analysis on the impact of Desertification on food security in Sahel Region of extreme Northern Eastern part of Nigeria.

This specific objectives will be achieved through the following:

- i. Examine the number and socio-demographic characteristics of the respondents.
- ii. Investigate the nature and causes of the Desertification
- iii. Assess the effects of desertification on water supply
- iv. Examine how the trend affects agricultural activities and food production/security.
- v. Proffer possible solutions to the problem.

### **Hypotheses**

Base on the following statement the basic hypothesis to be tested are:

**Ho<sub>1</sub>:** There is no significant relationship between desertification and food security in Sahel region of north-eastern Nigeria.

**Ho<sub>2</sub>:** There is no signification relationship between the nature of soil and agricultural productivity in Sahel Region of Nigeria.

### **Methodology**

Sources of data were gathered from both primary and secondary sources, primary sources of data include the indepth interview schedule, focus group discussions, reconnaissance visits and personal observations of the environment and the general life pattern of the respondents. While the secondary sources of data were drown from up-to-date map of Nigeria, newspapers information on drought in northern part of Nigeria, journals, magazines, newsletters, pamphlets and other sources of information.

Multi-stage sampling techniques of purposive sampling, stratified random sampling and convenient sampling were employed in the selection of 360 respondents across the three states of study which are Borno, Yobe and Jigawa states. The local government/communities under study in Borno state are Abadam LGA 48 respondents, Mobbar LGA 44 respondents and Guzamala 44 respondents. In Yobe state we have Yusufari LGA 36 respondents, Yunusari LGA 42 respondents, and Machina LGA 34 respondents, while in Jigawa State we selected Maigatari LGA 40 respondents, Babura LGA 32 respondents and Yanwashi LGA 40 respondents, making a total of 360 respondents respectively. Data generated were collected together, collated, corroborated and analysed using SPSS computer statistical programme of multiple Regression correlation coefficients to test the relationship between the variables impacts of desertification on food security in extreme Sahel Region of North Eastern part of

Nigeria. Simple percentages were employed to describe the socio-demographic characteristics of the respondents.

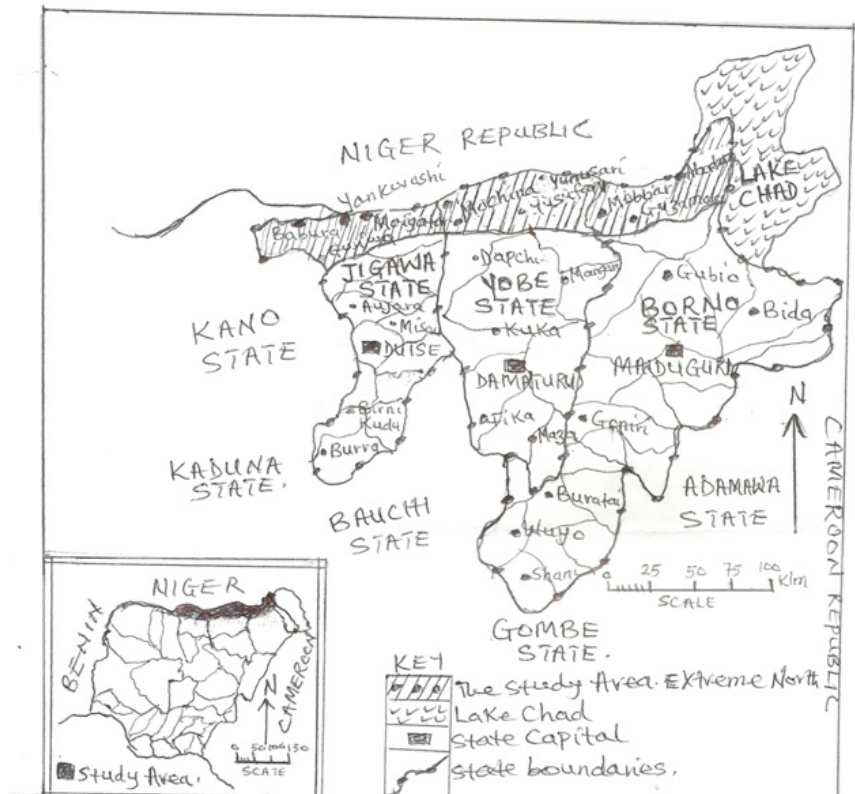
### **Scope of the Study**

The study was carried out in some selected communities in three states of Borno, Yobe and Jigawa States. The communities are Abadam, Mobbar, Guzamala, Yusufari, Yunusari, Machina, Karasuwa, Yankwashi, Gwiwa, Babura and Maigatari respectively. All these communities are located at the extreme North Eastern part of Nigeria. They are all situated in the Sahel Region of the extreme north that Sahel boundary with republic of Niger as shown in figure 1.

### **Result and Discussions of Major finding**

The research sample comprise of 360 respondents drawn evenly from the selected study area across the Sahel Region of the extreme North Eastern Nigeria. The investigation revealed that the age group of between 21-29 years and 40-49 years are the majority and represent 29.4% and 30.0% others are 50-59 years represent 92 respondents and 25.6%. While 60 years above only represent 54 and 15.0%, meaning that majority of them are of productive ages. Majority of the respondents are predominantly Muslims. About 86.9% are male while the female represent only 13.1%. About 51.1% of them have primary education while 28.3% are of secondary education. Tertiary education represents 13.3% and Quranic education score in 7.3%. Majority of them are married and represent 82.5%, while 14.7% are divorce only 2.8% are widowed. Majority of the respondents have family size of between 6-10 persons and represent 58.3%, followed by 25.5% that has 1-5 persons while family size of between 11-15 persons represents 16.2%.

Majority of the respondents have between 6-10 years farming experience and represent 53.8%, followed by 24.7% that has between 1-5 years. 11-15 years represents 14.6%, while 16-20 years of farming experience represent only 6.9%. in terms of farm land holdings 73.3% of the respondents have between 1.0 -1.9 hectares, while 13.6% of them have between 0.0-0.9 hectare while only 0.6% has between 3.0-3.09 hectare of land for farming activities. Majority have abundant their farm lands for other occupations that they consider lucrative to riding (Okada). While very few of them are civil servants, of either primary school teachers rural dispensaries while some of them engages in petty trading of selling roasted meat, cigarettes, cake selling, dates and tiger nuts, etc as shown in Table 1.



**Figure 1: Extracted Map of Borno, Yobe and Jigawa States**  
**Source: Cartoprints Ltd. Kaduna 2013**

**Table 1: Socio Demographic Characteristics of the Respondents Variables**

**Age Distributions**

Age (yrs)	Frequency	Percentage	Gender		
21-39	106	29.4%	Male	313	86.9%
40-49	108	30.0%	Female	47	13.1%
50-59	92	25.6%			
60-above	54	15.0%			

**Educational Attainments**

Primary education	184	51.1%
Secondary Education	102	28.3%
Tertiary Education	48	13.3%
Quranic Education	26	7.3%

**Marital Status**

Married	297	82.5%
Divorced	53	14.7%
Widowed	10	2.7%



Family size (person)			Farming Experience (yrs)		
1-5	92	25.5%	1-5	89	24.7%
6-10	210	58.3%	6-10	25	6.9%
11-15	58	16.2%	11-15	52	14.6%
16-20	194	53.8%			

Farm land holdings (ha)		
0.0-0.9		12.5%
1.0-1.9	264	73.3%
2.0-2.9	49	13.6%
3.0-3.9	02	0.5%

**Table 2:**  
Cumulative Description and perception of the effects of Desertification on Agricultural Production in tons (2011-2015)

State	Community	Millets	Maize	Sorghum	Beans	Rice	Onions
Borno	Abadam	74	20	64	52	3	4
"	Mobbar	69	21	37	54	3	3
"	Guzamala	81	18	39	49	3	3
Yobe	Yusufari	82	21	37	34	2	2
"	Yunusari	89	20	39	36	2	1
"	Machina	97	31	41	34	2	2
Jigawa	Babura	843	28	96	82	3	3
"	Gwiwa	824	25	59	84	4	4
"	Maigatari	834	25	96	88	3	3

Source: Field Survey 2015

**Table 3: Household Food Affordability**

State	Community	Respondents	Percentage
Borno	Abadam	48	10.1%
"	Mobbar	44	11.0%
"	Guzamala	44	11.2%
Yobe	Yusufari	36	11.2%
"	Yunusari	42	10.3%
"	Machina	34	11.6%
Jigawa	Babura	32	11.6%
"	Gwiwa	40	37.2%
"	Maigatari	40	23.4%

Source: Field Survey 2015

Variable characteristics of desertification on food security in Sahel Region of North Eastern of Nigeria  
 X – variables

**Parameters for measurements**

- X<sub>1</sub> Climate change
- X<sub>2</sub> Higher temperature
- X<sub>3</sub> Longer drought
- X<sub>4</sub> Devastating wind Erosion
- X<sub>5</sub> High level of sand Dunes deposition
- X<sub>6</sub> Increasing violent storms
- X<sub>7</sub> Low farm land fertility
- X<sub>8</sub> Inadequate water supply
- X<sub>9</sub> Mass centrifugal migration
- X<sub>10</sub> Social insecurity
- X<sub>11</sub> Abandonment of farm lands
- X<sub>12</sub> Spread of diseases
- X<sub>13</sub> High cost of food stuff

**Table 4:**

The regression correlation analysis showing the relationship between desertification analysis showing the relationship between desertification and food security in Sahel Region of extreme North eastern part of Nigeria.

X	nr	r <sup>1</sup>	t(calculated)	df	r <sup>2</sup> (critical)
X <sub>1</sub>	360	0.020	02.56	3	0.001
X <sub>2</sub>	360	0.020	02.56	3	0.001
X <sub>3</sub>	360	0.020	02.56	3	0.001
X <sub>4</sub>	360	0.020	02.56	3	0.001
X <sub>5</sub>	360	0.020	02.56	3	0.001
X <sub>6</sub>	360	0.019	02.14	3	0.01
X <sub>7</sub>	360	0.019	02.14	3	0.01
X <sub>8</sub>	360	0.018	02.11	3	0.01
X <sub>9</sub>	360	0.014	02.10	3	0.01
X <sub>10</sub>	360	0.014	02.10	3	0.01
X <sub>11</sub>	360	0.012	02.08	3	0.01
X <sub>12</sub>	360	0.012	02.08	3	0.01
F <sub>1</sub> ratio		0.208			
r <sup>2</sup>		2.75			

Significant at p < 0.05 at 95% Degree of confidence

Therefore, r<sup>2</sup> = 2.75 indicating negative correlation between agricultural production and food supply/security



The matrix for the measurement of the impact of desertification on food security are climate change, high temperature range, longer drought, devastating wind erosion, sand dunes depositions, violent storms, low land fertility, inadequate water supply, centrifugal migration, lack of social security farm land abandonment and the general food insecurity are the parameters used. After a careful cross tabulation of the variables the regression correlation analysis indicated a strong negative correlation of  $r^1$  0.208 on  $r^2$  0.075. The interpretation is devastating in the extreme North Eastern part of Nigeria that the food security is not properly guaranteed without food importation to the area. Food affordability by household ranges between 10.1 – 37.8 as shown in table 3. Food grain production indicated between 1 - 834 tons of grains produce. Though we have the effects of Boko Haram insurgence which have led to massive centrifugal migration of families South wards in search of social security. Extreme harsh weather have led to drying of streams and rivers during the dry season of between November and May, this adversely affect irrigation farming. Fasaty 2015 opion that any area that has this streams and river drying up in dry season will lack some basic farm products like Spinach, Okro, maize, tomatoes, onions and the Green leaves that are useful for food preparation. FAO (2015) observed that the household that cannot afford basic food is on the increase. World Bank (2014) observed that desertification is one of the major causes of insecurity in the extreme northern region of Nigeria. Many household can no more afford adequate food supply and that poverty is a serious challenge. Many cannot afford basic foods.

Hassan 2015 observed that many households consume local food of burasa, danbun dusa and local milk from cows. Tercula 2015 observed that Nigeria losses about 350,000 hectare of her land to desertification, most of which are arable lands before the encroachments. Another study by Ariyo 2015 observed that inadequate rainfall and sand dunes coverage have seriously affected food production in the extreme northern part of Nigeria and local food production. The levels of food crops and livestock's have been greatly affected. Okoli and Ifeakor 2014 are of the view that desert encroachment posses a devastating threat to the food security; Teffola 2015 stated that sand dunes have almost covered all the arable lands, Oasis, lakes and ponds of Borno, Yobe and Jigawa States. That inadequate food production threatens human existence. Mohammed (2015) reported that the situation of desertification has affected the population of the area as people migrate southwards to do other just like motorcycle riding, water sellers, cigarette sellers, prostitutions, while others even involve in stealing. From the discussions so far one will observe that the Extreme northern part of Nigeria that was known for the production of wheat, millets, maize, sorghum, rice, onions and where tomatoes and pepper were not sold to visitors but given free is now turn to area of food insufficiency and begging. Food insufficiency and high level of poverty and hunger are experienced in the area.

### **Conclusion**

In conclusion therefore, this study on the analysis of the impact of desertification on food security in Sahel region of the extreme northern parts of Nigeria is a serious threat to food security in the study area. The effect of climate change on the study area have resulted into a prolong drought, high temperature, high mobility of sand causing sand dunes deposition, low land fertility, water shortage, centrifugal migration of smallholder farmers, abandonment of farm lands, spread of diseases and the general social insecurity have resulted into low production of foodstuffs thereby resulting into high cost of supply.

## Recommendations

1. Tree planting campaign should be intensified by local, state and federal government at those frontline extreme northern part of Nigeria.
2. The Great Green Wall Programme (GGW) must be taken serious during the raining and dry season to plant more trees. Just as crude oil pipeline way laid from Port Harcourt to Kaduna. So water pipeline be laid from river Niger, River Benue and Osa in Lagos to these eleven northern states of Adamawa, Borno, Bauchi, Gombe, Jigawa, Kano, Katsina, Sokoto, Yobe, Kebbi and Zamfara states. Each of these states should have an empty dams where water pipes should be channeled to so that excess rain water from the southern Nigeria could be stored in those dams. Then used throughout the year for irrigation agriculture and tree plantings.
3. Adequate and on time provision of farm inputs for peasant farmers.
4. Tree cutting for firewood must be stopped hence forth. The planting of Jatropha and Leem trees must come up.
5. Modern agricultural technology in terms of credits must be made available to all farmers.
6. Efficient monitoring and evaluation units must be created by the federal government to monitor the implementation of the policies.
7. The indigenous communities must be involved in the project. They must be sensitized on how it will affect their water supply, agriculture and temperature regulations.
8. Tree should be planted around the Lake Chad basin for at least ½ k/m round the lake. Eater pipeline should also be laid to feed the lake with reserved rain water from the water dams.

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