



## Climate Change and Nutrition Security in Nigeria

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**ABSTRACT:** Climate change is a global reality and a major concern of many countries of the world. Its average impacts are the same globally but with some regional peculiarities. This paper reviewed the global events of climate change and its reality in Nigeria. It observed that the world's climatic elements have been undergoing changing pattern for a long period. Its reality in Nigeria was seen in changing rain pattern, relative humidity, atmospheric temperature, rising sea level, coastal flooding, erosion, desertification and drought among other indicators of climate change. These events were viewed *vis-à-vis* their impacts on nutrition security. The paper related these events to such drivers of food insecurity as food shortages; increase in crop and animal diseases; shortage of portable water; poor sanitation; loss of rural livelihood and different forms of pollution-related diseases. Measures were suggested for integration into government programmes and policy that will help in mitigating and adapting to the impact of climate change on nutrition security.

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Food is an utmost concern in the global development agenda. There has always been a strong correlation between a country's food base and her level of development. Food plays a major role in physical and intellectual development of individual's particularly young children and women of child-bearing age. When there is a poor food base a population suffers set-back in all areas of development. Food and by extension nutrition security remains Africa's most fundamental challenge for human welfare and economic growth. Far too many people on the continent are unable to acquire and effectively utilize at all times the food they need for a healthy life. A food-secure population is one where all people have access to safe, nutritious and affordable food that provides the foundation for active and healthy lives. In addition to secured access to food, nutrition security includes adequate sanitary environment, health services and knowledgeable care to ensure a healthy and active life for all household members. Latest estimates show that the number of undernourished people has been on the rise globally since 2014, reaching an estimated 812 million in 2017 from 804 million in 2016 (FAO, IFAD, UNICEF, WFP, & WHO, 2018)The majority of these people live in developing countries, where more than 14 percent of the people are unable to meet their dietary energy requirements. The root cause of food insecurity in

developing countries is the inability of people to gain access to food due to poverty. While the rest of the world has made significant progress towards poverty alleviation, Africa, in particular Sub-Saharan Africa continues to lag behind. Projections show that there will be an increase in this tendency unless preventive measures are taken. Food security on the continent has worsened since 1970 and the proportion of the malnourished population has remained within the 33 to 35 percent range in Sub-Saharan Africa. (Angela, 2006).In Nigeria, the Food and Agricultural Organization (FAO, 2014) reported that the prevalence of food insecurity, undernourishment and the number of undernourished people have been on increase in Nigeria since 2009.In a study in Nigeria, Fawole *et al.*, (2015) observed that the key food security indicators used for their study such as prevalence of undernourishment, food inadequacy and numbers of undernourished people were on the increase from the year 2009 to 2014. The implication of this is that if the trend is not halted as quickly as possible it is a time bomb that may pose grave security risks and danger to the country and African sub-region as a whole being the most populous black nation. This is because malnutrition brings about decreased energy levels, delayed maturation, growth failure, impaired cognitive ability, diminished capacity to learn, decreased ability to resist infections and illnesses,

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shortened life expectancy, increased maternal mortality, and low birth weight. Thus, malnutrition may undermine investments in education, health and other development sectors.

Food security in Africa has come under extremely threats due to diverse factors some of which are natural while some are artificial depending on the circumstances and the countries involved. There is, however, a common denominator even in the global causes of food insecurity, climate change. Climate change is an adverse environmental phenomenon that is causing great concern globally. According to Fawole et al., (2015), climate change is another reason why there is food shortage in Africa. It has changed the productivity pattern. The weather is less predictable now than before.

This paper therefore examined the evidence of climate change and its impact on Nutrition security in Nigeria.

*Climate Change: Concept and Evidence in Nigeria:* The concept, "climate change" has no universally agreed definition. There are therefore divers but related definitions of the concept. It is simply an appreciable average variation in the global weather conditions over a period of time. Climate change is caused both by natural occurrences, and anthropogenic activities on the environment Odjugo (2010).

In sub-Saharan Africa are reports of variations in several indicators of climate change as reported by several authors, Ward et al. (1999), Nicholson (1981) and Duru (2008). Nigeria is not left out in this global experience, (Enete, 2014, Federal Ministry of Environment, 2014), reported that the country's temperatures have risen significantly above normal since the 1980s, with relatively higher figures in 1973, 1987 and 1998. The various ecological zones of the country, according to the report recorded temperature increases of approximately 0.2 to 0.3°C per decade. There were even records of variability in climate change indicators in Nigeria long before the 1980s. Available meteorological data on surface air temperature for Kano, Calabar and Lagos show evidence of increasing surface air temperatures since 1920 (Federal Ministry of Environment 2003). Data also from Nigeria Meteorological Agency (Fig. 1a, b and c) show average temperature, relative humidity and rainfall in Nigeria from 1975 to 2010. The three figures show variability in the three indicators of climate change. Mabo (2006) and Ikhile (2007) attributed a sharp increase in temperature between 1971 and 2005 to the effect of climate change and its associated global warming. The micro-level research

by Duru (2008) on implication of variability in Rainfall over Imo State reveals that there is a significant variability in rainfall pattern between 1975 and 2007. Odjugo and Ikhuria (2003) and Adefolalu (2007) report that increasing temperature and decreasing rainfall in the semi -arid region of Sokoto, Katsina, Kano, Nguru, and Maiduguri may have resulted in the increasing evapotranspiration, drought and desertification in Nigeria. Others show evidence of other indicators (Fasona and Omojola 2005; Chindo and Nyelong 2005; Nwafor 2007; Umoh 2007). Several past research studies on climate trends (Olaniran and Summer 1989; Anyadike 1993; Oladipo 1995; Gbuyiro 1998; Aisiokuele 2000; Clerk 2002; Nkeiruka and Apagu 2005); Akpogiogaga and Odjugo (2010) Fashae and Onafeso, (2011) have also shown significant variation in temperature and other climatic elements in Nigeria. The impact of climate change is not the same for the regions in Nigeria. The combination of rising heat and less rain in the Northern region has hastened desert encroachment, with loss of the wetlands, and fast reduction in the amount of surface water, flora and fauna resources on land (Federal Ministry of Environment, 2014; Ebele and Emodi, 2016; Abdulkadir *et al.*, 2017; Akande *et al.*, 2017.). The Southern region, sea level rise, increased precipitation, coastal erosion and flooding have resulted in the displacement of many settlements (Sayne, 2011; Federal Ministry of Environment, 2014; Matemilola, 2019). However, flooding has become a common denominator in the two regions. Floods are the most common, recurring disaster in the country (Federal Government of Nigeria, 2013). The durations and intensities of rainfall have increased in the last three decades, producing large runoffs and flooding in many places (Enete, 2014). In Northern Nigeria, a flood in 2010 affected 2 million people in Jigawa State (Elisha *et al.*, 2017). Fashae and Onafeso (2011) and Anabaraonye et al., 2019 reported rising sea level and ocean surge in Southern Nigeria which submerged villages in Lagos and some places in the Niger Delta.

Nigeria's climate has therefore been changing, evident in: increases in temperature; variable rainfall and humidity; rise in sea level and flooding; gradual disappearance of clear distinction between the rainy and the dry season; drought and desertification; land degradation; more frequent extreme weather events; affected fresh water resources and loss of biodiversity as cited above from various authors and illustrations from meteorological institutions spanning over long periods. There are even climate projections for the coming decades that reveal a significant increase in temperature over all the ecological zones (Akande *et al.*, 2017).

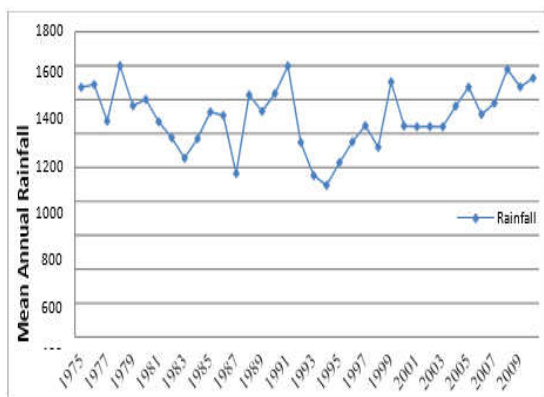


Fig.1a Annual mean rainfall in Nigeria between 1975 –2010. Idumah et al., (2016)

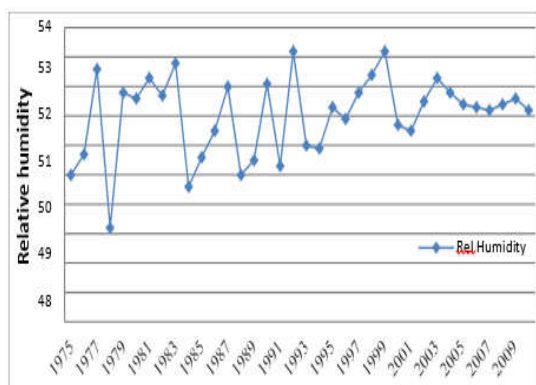


Fig 1b Annual mean relative humidity in Nigeria (1975-2010).Idumah et al., (2016)

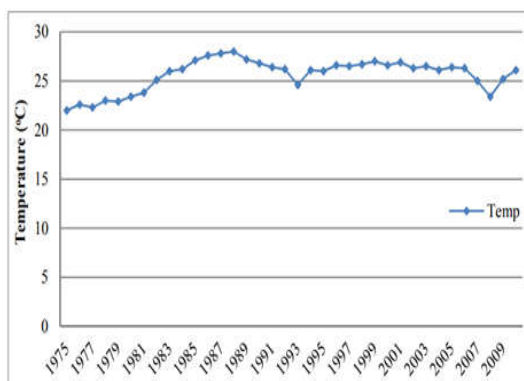


Fig. 1c. Annual mean temperature in Nigeria (1975-2010). Idumah et al., (2016)

*Consequences of Climate Change on Nutrition security:* Climate change impacts on nutrition security in specific ways. The impacts are both direct and indirect and they network in a variety of ways. These are food shortages; decreased Water supply, poor sanitation, compromised rural livelihood and child care practices. The quantity and quality of food produced at a given time and space determine the food

security status of a given people. There can be no successful food production if any of the climatic factors are out of balance both in quality and quantity at any given period. Literature is replete with irregularities in the climatic variables globally and locally as highlighted above. This has become a major source of concern because of their impact on agricultural output especially in the developing countries because of their dependence on climatic elements for their agricultural system. Adejuwon (2004, Anabaraonye et al., 2019; BNRCC, 2011) observed that Nigerian agriculture depends highly on climate because temperature, sunlight, water, relative humidity are the main drivers of crop growth and yield. Climate is also a major driver of food system performance at the agriculture end of the food chain. It can affect the quantity and quality of food produced as well as production-related income. About 80 percent of Nigeria’s population depends on rain-fed agriculture and fishing as their primary occupation (Abdulkadir et al., 2017; Ebele and Emodi, 2016). The impact of climate change on agricultural output in Nigeria has been enormous. During the flooding in the country in 2012, several hundreds of thousands of farmland/crops were destroyed (FGN, 2013). Flooding of the River Niger, for example, has washed away significant amounts of farmlands (Nkechi et al., 2016). (Sayne, 2011) reported, rising sea level, flooding farmland, rendering soils too salinized for planting along the Southern coast and eroding soils in the Southeast. Rising sea level impact negatively on aquatic harvest, while soil salinity and erosion reduce soil quality and consequently crop yield in quantity and quality. Added to flooding and rising sea level were heat stress and drought, stemming also from climate change, these also adversely affect the food production system. Drought and heat stress causes substantial decline in crop yield through negative impact on plant growth, physiology and reproduction. Heat stress is also a challenge to poultry farmers due to its adverse effect on chicken growth and productivity. A survey conducted in Kaduna and Oyo states in 2017 observed that 10 percent of all farmers have experienced losses of product (chicken, eggs) due to heat waves (Liverpool-Tasie et al., 2018). It is estimated that by 2100, Nigeria and other West African countries are likely to have agricultural losses of up to 4% of GDP due to climate change (Mendelsohn et al., 2000). This is based on the assumption that parts of the country that experienced soil erosion and operate rain-fed agriculture could have decline in agricultural yield of up to 50% between 2000-2020 due to increasing impact of climate change (Agoumi, 2003; IPCC, 2007). All these translate to food shortages in quantity and quality. Water resources are predicted to be strongly impacted by climate change. There have been

reports of reduced quantity of fresh water supply in Nigeria due to rising temperatures, rising sea levels, drought, floods and changes in rainfall pattern (Nkechi et al., 2016 BNRCC, 2011). Availability of water is key to proper sanitation and hygiene. Total food production alone does not define food or nutrition security since food must be safe. Access to safe and clean water and good sanitary conditions are essential for safe diet. Reduced access to portable water for drinking and other uses particularly in food preparation often lead to compromised hygiene and raised the risk of diarrhea and other water-borne diseases such as typhoid fever, cholera and river blindness. Diseases generally are known to increase nutrient needs while most of them causes mal-absorption of nutrients and so exacerbate malnutrition where present. They therefore cause nutrition insecurity by impacting negatively on food utilization. Morbidity and mortality arising from diseases affect food security indirectly by wasting human and material resources. Diarrhea, for instance, largely caused by lack of water and attendant poor sanitation and hygiene (WASH) is a leading cause of death in children under-five globally (World Health Organization and UNICEF (2012)), and its constant presence in low-income settings may contribute significantly to under-nutrition. It is estimated to be the second leading cause of morbidity and mortality among under five children in low and middle income countries and the leading cause of death in sub-Saharan Africa. (<https://www.spring-nutrition.org>.) This is because diarrhea like other diseases depletes the host of nutrients, heightens the nutrient needs and then predisposes him to malnutrition. Parasitic infections, worms caused by lack of sanitation and hygiene, are usually associated with inadequate water supply. Such infections can lead to anaemia, reduced physical development and inhibited cognitive development (Ziegelbauer *et al.*, 2012). Approximately a third of all child deaths are attributable to nutrition-related factors, such as low birth weight, stunting (low height for age) and severe wasting, all of which are closely linked to lack of access to water and particularly poor sanitation and hygiene.

Women, on the average, comprise 43% of the agricultural labour force in developing countries and account for an estimated two-thirds of the world's 600 million poor livestock keepers. In Nigeria, more than 50% of women are engaged in agricultural production across value chains (FAO 2011). These women who are essentially rural dwellers depend on natural resources. They are primarily responsible for gathering wood for cooking and heating, collecting the household water supply, and managing the household

resources. Traditionally, due to patriarchal land ownership system, relative low access to credit facilities and poor access to education, they consequently operate at a very low level in agricultural production. All these reduce their adaptive capacity. Any negative imbalance in agricultural production or natural resources will affect them greatly. Climate change therefore has enormous impact on women. This is well captured by Madu, (2016), Onwutuebe, 2019 who observed that the high vulnerability of the agricultural sector to climate change will continue to affect women disproportionately as a larger percentage of them are poor farmers who rely on small-scale and rain-fed agricultural. Similarly, Nnadi et al., (2019) observed that in Anambra in Southeast Nigeria, for example, women farmers were more vulnerable to the changes in climate than men as they supply most of the labour required on farms, in addition to managing their own farms and they also felt more impact of food and water shortage, resulting from changes in rainfall in the area. Other livelihoods engaged in by women are also vulnerable to climate change. The majority of women involved in fish processing in Nigeria, for example, use firewood or wood products in their activities. Women play a major role in agricultural value chain. They are responsible for processing, preservation, storage and marketing of agricultural products (IFPRI, 2010). These aspects of agricultural value chain need appropriate weather condition for optimum results and good road network for distribution. Women are the backbone of the rural economy, especially in the developing world including Nigeria. They are the drivers of rural livelihood and care-giving activities for members of the household particularly children. They are therefore responsible for ensuring household food or nutrition security. Their vulnerability to climate change would consequently induce various types of stresses on rural livelihoods. These stresses will translate into reduced access to physical food, reduced purchasing power and less time for care giving activities. In order to adapt, different coping strategies are usually employed. This include adjusting the quantity of food eaten by household members and spending longer period away from home trying to strengthen household livelihood. Thus diets could become smaller in quantity, less varied and/or less nutritious. On the other hand, care-giving activities particularly for young children are neglected. These actions have links with different forms of under-nutrition and micronutrient deficiencies.

*Suggested Responses:* To address the impact of climate change on nutrition security in Nigeria, some measures are suggested.

*Education:* Education is a key aspect of the global

response to climate change. It helps people understand and address the impact of climate change, encourages changes in their attitudes and behavior, and helps them adapt to climate change-related trends. Awareness on climate change is still limited among the Nigerian populace. Educating the different segments of the population on climate change is necessary. Young people are the drivers of change and development, they therefore should be targeted. Educational curriculum planners should include well-tailored instruction on climate change in not only programmes in Agriculture but also in related areas. The instruction should be given as separate subjects or spread across subjects through the levels of education. The instruction for the rural dwellers should be integrated into already existing programs like agriculture extension services. Other sections of the population could be reached through various identified platforms.

*Driving Existing Nutrition Intervention Programs:* Government through relevant agencies and institutions should intensify efforts in driving existing programs designed to address food and nutrition insecurity such as nutrition sensitive agriculture and food fortification. The intervention should be implemented equitably across the different zones of the country.

*Gender-Targeted Programmes:* Women constitute a substantial percentage of agricultural workforce in Nigeria and are known to be strategic in ensuring household food and nutrition security. Therefore, well-tailored and monitored intervention programmes should be made available to them particularly the women farmers especially those prone to the vagaries of climate change such as drought, flood, erosion etc. Such intervention should include provision of small scale agriculture development assistance and nutrition education. In addition, removal of cultural restrictions that limit women's access to factors of agricultural production and natural resources should be addressed by relevant stake holders.

*Inter Disciplinary Intervention Project/Programmes:* Government should develop programmes to address the other off shoots of climate change that impact on food and nutrition insecurity.

They include affordable health care services and programs, provision of portable water, provision of platform for the practice of sustainable agriculture, conducive environment for income generation by small business, provision of access to credit through microfinance institutions, provision of good road network and driving programmes that address malnutrition among the vulnerable groups.

*Individual Lifestyle Change:* Anthropogenic activities contribute monumentally to the increase in greenhouse gases emission which is the major cause of climate change. The shift from traditional diets to animal based foods, sugars and over processed food, generally referred to as nutrition transition put a burden on the climate. Nutrition transition fuels industrialization and some other sources of greenhouse gases emission like waste generation. Aggressive public campaign and education for climate smart- nutrition will help our environment and our food system. Nutrition experts and collaborative partners should take up this challenge.

*Conclusion:* Climate change has no consensus definition. Its causes are both natural and anthropogenic. It is a global reality and it impacts regions of the world differently including Nigeria. In Nigeria, climate change has a negative impact on food and nutrition security in a variety of ways. It brings about poor agricultural output, rise in food prices, water shortages, poor sanitation and hygiene, compromised livelihood particularly among rural women and the overall consequence of which is malnutrition. Adequate nutrition is key to human capital development which is the foundation for sustainable development of Nigeria and in fact any nation. It is therefore important that concerted efforts should be made by various stakeholders in Nigeria to mitigate or adapt to the impact of climate change. These include climate change literacy, provision of different forms of interventions and programmes by government, agencies, institutions and individual lifestyle changes.

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