

MENTAL HEALTH IMPACT OF CLIMATE CHANGE AND SUSTAINABLE WAYS OF MITIGATION AND ADAPTATION

Onwuzurike, Uloma Adaugo¹ & Nwabudike, Chukwuma Patrick^{2*}

¹Geographical and Environmental Education Unit, Department of Social Science Education
Faculty of Education, University of Nigeria Nsukka

²Population and Family Education Unit, Social Science Education Department
Faculty of Education, University of Nigeria Nsukka

Abstract

Evidence has shown that climate change is among the greatest challenge facing the global community. Understanding the concept of climate change and its consequential impact on human health is crucial in adopting the best mitigation and adaptation response to it. The main objective of this study was to explore the impacts of climate on human health in Nigeria and the best mitigation and adaptive response to the problem. This paper examined recent peer reviewed articles on health impact of climate change using various data bases and key words. It also included gray literature such as reports and guidelines from government agencies and organizations. The study has no sample size as it was a systematic review of existing literature on climate change and its impact on human health. Data was analyzed using qualitative data analysis to synthesize the findings from the literature review. Narrative synthesis was also used to describe the main theme and patterns across the articles. The concept of climate change and its health impact are well discussed in the study. It concluded with the clarion call for the best mitigation and adaptive responses to be adopted for sustainability of man.

Keywords: Climate change, mitigation responses, health impact, adaptation strategies

Introduction

Climate change and its effect on human health will be devastating to the sustainability of man if nothing is done to cushion the effect. Unfortunately, the effect of climate change and its variability is severe in West Africa, affecting agricultural production and other sectors and thereby causing food insecurity, health issues and other problems linked with climate change. West Africa is of great concern because of the limited ability it has in adapting to the extremes of the climate (Badjie et al, 2019). Over the last few decades, it has been a global issue involving actions, even from the grassroots for humans to respond to climate change especially the emission of greenhouse gases. Despite these actions, variations in climate change mitigation and adaptive responses can still be seen across nations, cultures, communities and individuals. It is unfortunate that most studies and education interventions of global climate change have concentrated on personal knowledge of and misconceptions concerning mitigation and overlooked the essential construct of personal understanding of climate change adaptation. This is in line with the works of researchers like Boyes, Chukran & Stanisstreet (1993) and O Corner, Bord, & Fisher (1999) who stated that student's conception of adaptation to climate change are generally rare from literature as most studies focus mainly on mitigation. IPCC adopted mitigation and adaptation approach to climate change as essential human response and preparation of a climate literate citizen (IPCC 2007). For the basis of clarity, it is important to define mitigation to differentiate it from adaptation.

Mitigation according to IPCC is actions set out to reduce anthropogenic net emission of green house gases (2007). This can either be done by reducing outputs of GHGs or by capturing the gases already emitted. Carbon capture encompasses actions that reduce the quantity of GHGs. This may either be done by decreasing deforestation or capturing methane at landfills so as to increase the rate at which photosynthesis takes place. The IPCC reports that recent carbon emission levels have already altered the earth's systems to the point that mitigation alone cannot be sufficient in tackling the negative impact (IPCC 2007). It is recognised that certain mitigation action or practices may hinder economic development (IPCC 2007). Literature reveals that many people are still confused on practices that make up mitigation and how they affect the climate systems (Boyes, Chuckran and Stanisstreet 1993; McNeill and Vaughn, 2012).

Adaptation according to IPCC (2007) is the adjustment of natural and biological systems in response to climate changes which minimises the extent of harm or capitalises on gainful opportunities for living organisms. In adaptation, one prepares for and responds to impact of climate change. There are varieties of human response in the bid to adapt to a certain situation. Some of these responses can also be linked to mitigation actions. In other words, adaptation and mitigation can be said to be complementary. This is further supported by IPCC when it stated that some adaptive responses are lined to mitigation practices (2007). For example, trees with massive canopies increase the extent of covering for biological organisms and reduce their vulnerability to high temperatures. Similarly, these large canopy trees further mitigate emissions by using up carbon in the atmosphere to photosynthesize. Adaptation to climate change has been defined as adjustment in natural human systems in response to actual or expected climatic stimuli or their effects which moderates harm or exploits beneficial opportunities (IPCC TAR 2001). Adaptation to climate change is a process that aims to strengthen, cultivate, and put into practice strategies for moderating, coping with, and capitalising on the impacts of climate related events (UNDP, 2005).

Adaptation strategies on the other hand refers to deliberate actions taken to adjust and respond to changing conditions, particularly in the context of environmental or socio-economic challenges. Adaptation strategies involve all those plans and actions that help to change or adjust to the environment for sustainability. Some of the adaptation strategies to climate change include planting of trees, use of organic waste in farming, recycling, restoring forests, practicing crop rotation, use of bicycles rather than motors, discouraging bush burning and many more. There is need to imbibe innovative strategies in our education curriculum, in our communities and our media systems to help the populace to adjust to the uncertainties and the complexities of changes in the climate. There is need for innovative strategies that will be used to manage cotemporary, anticipated, unexpected, indirect, non –linear and cumulative climate change implications (Davidson & Lyth, 2012). There should be strategies to mitigation responses, adaptive learning and development of skills to match the uncertainties and complexities of climate change. There is an increased need to imbibe climate mitigation responses and adaptation strategies into the curriculum or core subjects, in the media houses such as mingles and educative programs and also extend these teachings to our respective communities so as to have a foundational understanding of the issue at hand for a sustainable development. This call is for all and sundry

Climate change

Climate is the average weather condition of a place over an extended period. Climate controls the world's vegetation structure pattern, precipitation pattern, plant composition, animal species composition and productivity in general. Climate change is seen as the long-term noticeable change in the expected average weather condition of an area over a particular period of time. According to IPCC (2018), climate change is the shift in the mean state of the climate over an extended period of time due to natural or prolonged change from human activities in the atmospheric condition or in land use. Climate change is a complex phenomenon because it includes the social sphere (economics and politics) and also the personal sphere which demands action taking (Busch & Osborne, 2014). Climate change can result from both natural factors and also by human factors (Anyadike, 2009). The global community is more concerned on the human or anthropogenic causes of climate change.

Anthropogenic causes of climate change which is also referred to as the human factors influence climate in various ways like in land use change, industrial activities, input from fossil fuel consumption, gas flaring, agricultural practices, bush burning, draining of wet land, energy insufficiency, solid waste disposal and modification of the earth (IPCC, 2007). The human cause of climate change now exceed the natural cause (Karl & Trenberth, 2003) and the IPCC (2007) expressed that the most significant cause of climate change comes from human activities. . Global warming is highly on the increase. Though global warming is a natural phenomenon, human activity helps to worsen it. The chief contributor to global warming is greenhouse gases. Other types of green house (GHGs) gases include water vapor (H₂O), methane(CH₄), carbon dioxide (CO₂), nitrous oxide (N₂O), and fluorinated gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). According to Dutta and Radner (2009), the rising levels of greenhouse gasses in the atmosphere, driven by increased emissions, have led to enhanced energy absorption and subsequent rise in global temperatures, ultimately contributing to climate change. Greenhouse gases are those gasses that have the ability to trap the suns radiation preventing them from moving into the atmosphere.

Carbon dioxide is the most significant of the greenhouse gases. The world's economy recently is dependent on carbon. Carbon is the substance recovered in fossil fuels. Carbon dioxide (CO₂) is a by-product gas obtained from the burning of fossil fuels. Fossil fuels are dead and decaying parts of plants and animals found far beneath the soil surface and which has been acted upon by great pressure many years ago. Whenever crude oil burn, they release CO₂. The modern world depends solely on these fuels for energy consumption. Humans in the bid to care for his basic needs, directly or indirectly emits carbon into the atmosphere this can be seen in the use of technology such as television, computers, medical equipment, transportation facilities etc. similarly, in agricultural practices like burning of bush for land preparation, use of fertilizers and deforestation. Deforestation, which is the cutting down of trees is another significant process contributing to the increased amount of carbon dioxide in the atmosphere. Trees play an important role in the absorption of carbon dioxide from the atmosphere because carbon dioxide is used by the trees to manufacture their food through the process of photosynthesis. In this same process of photosynthesis, oxygen is produced as the by-product. This is why people living close to nature where there are abundant trees get fresh and clean air more than those living in cities and towns where most of the forests have been

replaced with built up structures. Human actions are significantly increasing atmospheric concentrations of greenhouse gases like methane (CH₄) and nitrous oxide (N₂O). Methane is generated by microorganisms present in various environments, including landfills, animal digestive systems, and the gut of animals such as cows and sheep. Nitrous oxide emission in agriculture rise as a result of the use of nitrogen-based fertilizers. (Met office, 2009).

The numerous consequences emanating from climate change can be categorised into social, economic, agricultural, health and environmental issues. Moreover, the IPCC (2000) has confirmed that climate change has numerous consequences for the worlds population, including food shortage, floods, drought, emergence of new diseases and global warming. Climate change affects all aspects of the socio-economic activities of human, even the human environment and the natural resources sustaining man in his environment (Ayandele & Jegede, 2016). This is because the climate pattern shapes the natural ecosystems together with the human economy and culture. Human actions bring about changes in the average weather condition of an area. As the weather is changing, so is the season changing. These changes when prolonged, brings about a shift in the mean climate of the place resulting in climate change. Climate change is an environmental problem needing immediate intervention and action to minimise its negative consequences to humanity especially in West Africa. Among the prime causes of climate change is global warming.

West Africa is especially vulnerable as a result of its limited ability to adjust to extreme conditions of the weather (Badjie et. al., 2019). According to Ozbyrak et al, 2011; Freije et al, 2017, Climate change is among the greatest problem facing humanity. Although the recent announcement of net-zero emission is encouraging, there is a substantial disparity between the lofty goals and the lack of concrete actions planed for the 2030 NDC (Kah, Kargbo, Mendy, Jawo & Mendy, 2021). Similarly, discrepancy can be seen in the level of emission recorded by current policies and the ones expected under current NDCs by 2030 and especially those required to achieve net-zero emissions by 2050 (UNEP 2020). Nigeria is among the most climate change affected countries in West Africa. The rising temperature trend reveals an increase in temperature when averaged over the country from about 26.2 degree Celsius in 1951 to about 27 degree Celsius in recent years. Nigeria has a long history of gas flaring which has released significant amounts of carbon dioxide into the atmosphere, contributing to global warming. Evidence shows that climate change is on the increase in Nigeria. There is clear indication that the country is experiencing global warming. Odjugo (2005; 2007) observed that rainfall dropped by 53% in the north-eastern Nigeria and 15.5% in the Niger Delta coastal area while rainfall intensity is on the increase across the country. Another area where climate change has a colossal impact is on what determines the social and environment of health through safe and clean drinking water, good shelter, clean air and sufficient food. Between 2030 and 2050, climate change is likely to cause about 250,000 deaths per year due to malaria, heat stress, malnutrition, and diarrhoea (World Health Organization, 2018). Other negative outcomes that might arise from climate change extremes include respiratory allergies, cholera, civil conflict, forced migration, anxiety, despair, depression, cardiovascular failure, asthma, injuries and fatalities from extreme weather conditions. This has driven millions into extreme poverty and under nourishment, caused a serious threat to mental health and even the government is not left behind as there is serious slump in the government finances in trying to meet with the necessary demands. Extreme weather events, health

problems, malnutrition, forced migration and other direct and immediate impact of climate change can result to damaged and/or destruction to education infrastructure, reduced capacity for learning due of malnutrition, inability to pay school fees or buying of learning materials and displacement of families (Siriwardhana et al., 2013;Kousky,2016; Chuang et al., 2018; Anderson, 2019; Nordstrom & Cotton, 2020).

Health impacts of climate change

Studies have recorded a lot of environmental consequences having impact on human health and lives due to climate change. Such consequences include sea level rise, increasing temperature, more extreme weather events, increased drought, air pollution, flooding and wildfires (Li, Lu, Liu et al. (2018). Other studies documented multiple health consequences such as respiratory disorders, deaths, infectious diseases, malnutrition as a result of food insecurity, adverse health related issues due to heightened tensions from socio-political conflicts (Walts, Amann, Arnell et al. 2021; Hsiang &Burke 2014; Patz, Frumkin, Holloway et al., 2014). Study by Wimalawansa & Wimalawansa (2016) associates environmental pollution such as fertilizers and heavy metal to occupational diseases such as kidney disease which is affected by increase in temperature. According to literature, most studies of this nature are done in developed and high income countries (Klinger, Landeg & Murray, 2014; Sun, Chen &Xu et al., 2018). Little has been done on developing nation hence, the need for this study.

In Nigeria, as in many developing countries, mental health issues such as depression, anxiety, distress, impaired sleep, and suicide has been recorded. This is not far-fetched as food supply becomes seriously affected, crops continue to die, water supply continues to be affected and the future becomes more bleak. This can be seen in many cases of death observed recently. There are cases of husbands burning their wives to death, cutting parts of their wives body, strangling them to death and abandoning their wives and children. Cases of wives leaving their husbands, stabbing their husbands, selling their children and committing suicide were also observed. The youths are not left behind as they engage themselves in different crimes such as robbery and ritual practices in the bid to get money. There are many cases of young males using their girl friends, their parents and random individuals for rituals. The youths are running helter skelter looking for means to make end meet. They sell different goods online, do Tik tok videos of themselves in various outfits and also create various contents just to provide for their daily needs as a result of harsh economic situation arising from climate change. A typical example could be seen in the recent incident that occurred at Nnamdi Azikiwe University Awka on the 11th day of February, 2025 where a female student fought, insulted and bit her lectures because he interrupted the Tik Tok video of herself which she was recording. What could have given a student the impetus to attack a lecturer for such flimsy excuse if not that the mental wellbeing has been affected? Desperation to make money has made the younger generation not to act normally again. All these are as a result of anxieties and pains resulting from the consequential effects of climate change on agriculture, economy and the society in general. Many Nigerian families cannot boast of three square-meals, adequate health care and taking care of their daily bills due to climate change. This is in line with the findings of Boko et al.,(2018) who discovered in the northern Sahel region of Nigeria, a decrease in food production due to desertification and loss of lake Chad that supplied irrigation water. Prices of goods in the market continue to rise on daily bases,

landlords increase their rents and educational institutions keep increasing their tuitions fees. The worst part of it is that very little or nothing is being done to raise the salaries of both private and public workers. The situation is very frustrating. Climate change has affected the environment enormously. When the environment is affected, the quality of air is greatly reduced as health issues like cardiovascular and respiratory diseases increase giving rise to cancer and kidney failures. Recently, many cases of death are being recorded as corpses are taken to the morgue every minute. Those that cannot afford the mortuary bills bury their loved ones at once to avoid much cost. Anger and frustration could be seen in the faces of different people in the roads and streets. The same situation is seen among motorists and transporters as lots of them continue to shout and abuse each other at the slightest mistake. Poverty, degradation and economic hardship can result to increased suicide cases and mental problems. On the first day of March 2025, a 43 year old woman used pestle to hit the head of her nine-year old son at Efon Local government area, Ekiti State causing him serious injuries. What could have caused a mother to be so heartless in treating the son in such a ruthless manner if not for frustration, desperation and anger about negative impacts of climate change which have affected all aspects of human life? People are at the verge of running mad with the current situation of things and positive measures need to be taken urgently to curb the effect of climate change. Research indicates that many regions of sub-Saharan Africa are experiencing disasters threatening the people's well-being and environment due to climate change (Coulibaly et al., 2020; Rigaud et al., 2018).

In most developing countries including Nigeria, the resources available to mitigate and adapt to climate change impacts are scares resulting to more vulnerability to harsh weather events with its related consequences like vector- borne diseases, stress, anxiety and air pollution. According to Beagley, Scagliarini, & Husselby (2021), people whose wage are low mostly reside in poor houses than higher wage earners thereby exposing them to the effect of heat, storms, flooding and vector-borne diseases and this is further escalated by limited access to health services. Climate change leads to greater rainfall and causes the average temperature to rise thereby allowing for favourable breeding ground for mosquitoes that cause malaria and dengue fever. Increased flooding due to heavy rainfall can also increase the contamination of water supplies with their resultant consequences such as cholera and typhoid diseases. On the contrary, areas of extreme low rainfall results to extreme drought jeopardising access to clean and safe water. This also affects agriculture leading to poor and inadequate pastoral land and consequently, food insecurity. In most remote villages in Nigeria, due to lack of alternative energy source, tree cutting for fuel wood and charcoal were embraced as a means of cooking and this has numerous environmental impact. This is in line with the assertion of the United Nations Development Program which states that due to limited cheaper energy alternative, firewood and charcoal becomes the only easily reachable and suitable energy source for cooking while processing charcoal and tree felling become the main reliable economic activities for communities that live near the forests (UNDP,2020). Tree felling promotes deforestation leading to erosion, desertification and loss of biodiversity thereby increasing climate change threats. Tree felling also affects the oxygen level of an area because trees produce oxygen during the process of photosynthesis. That is why people living very close to nature where trees abound get more cleaner and fresher air than those living in cities where the air has been greatly polluted. Sustainable efforts should therefore be made by practicing

these mitigative and adaptive responses to curb the effect of climate change which directly and indirectly affects the well-being of man.

The Way Forward

While educating the people, efforts should also be made to train experts on the topic. Scientific information should be translated to a wide audience through teaching and training. For instance, the people can be educated on how to reduce energy consumption like the reduction in using charcoal and firewood in cooking because such actions promote the cutting down of trees and exposes the soil but rather, they should be made to plant trees which will promote the absorption of carbon dioxide in the atmosphere as a mitigation practice and also the prevention of run-off and maintenance of soil fertility which is an adaptive practice. There is need for maximum adaptation opportunities and strategies to be explored. Schools should work with local authorities to ensure that issues relating to climate change be mitigated and possible adaptation strategies adopted for sustainability of every community. While the school is providing education for and research on climate change adaptive strategies, the community should provide opportunity for climate action plans to be executed because in issues concerning climate change, we think globally but act locally. To adapt to climate change, one need to have heightened foresight, critical thinking and participative decision making. They should work together as a team because collaboration helps to bring together different ideas and thereby easier solutions to practical problems.

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