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CONTRIBUTORS

Only manuscripts that adhere to the guidelines below will be accepted for publication in the Nigeria School Health Journal.

1. The manuscripts should be typed in double space on A4 white paper, and should include quoted materials and references.
2. The title of article, author's name and affiliation, and the full address to which correspondence should be sent must be included on a separate sheet.
3. Preferred manuscript length is 12 to 15 typewritten pages. Longer manuscripts will only be considered only if they are topical and of exceptional quality. Manuscripts are subjected to peer review.
4. Photographs and artwork may be submitted with manuscripts. If an author wants such material return, the name and address to which they are sent must be clearly marked on the back of each write-up.
5. Materials forwarded to Nigerian School Health Journal for consideration should simultaneously, not be submitted to another publication simultaneously. Manuscripts accepted for publication are copyrighted by NSHA and becomes the intellectual property of the Association.
6. Tables and figures should be submitted on separate sheet and numbered consecutively, using Arabic numerals.
7. The referencing style for the journals is the current APA, (the American Psychological Association format).
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10. Manuscripts related to School Health Education are welcome. Various types of articles are suitable for submission: practical, theoretical, technical, philosophical, research report, how-to-do, controversial, inspiration etc. the journal readership include people from different walks of life such as the general public, school, college r university students, as well as professionals in health related fields.
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EDITORIAL POLICY AND EDITORIAL

Each volume of Nigerian School Health Journal offers in-depth theoretical and empirical analysis of issues mainly on school health and by extension on all health matters that can be taught and promoted at any level of health education as a subject i.e from childhood to tertiary level of education.

The authors, reviewers, editors and readers should serve through articles in each volume as advocates of health education as an integrated school subject at basic education level and as a separate secondary school subject as well as a discipline or major course of study in tertiary institutions or as a general studies course for non-health major course related students. Potential authors must write in simple English but not sacrificing essential terminologies, be culture and gender sensitive and stimulate new thinking and better ways of addressing youth health through health education especially in school settings.

Articles are welcome from all over the world and it is important to state that the views expressed in each volume of the journal are strictly those of the authors.

In this volume, diverse articles on environmental health related issues form the bulk of articles while others include those related to tuberculosis, family planning, protective devices and consumer health. The editorial team believe that readers will find them educative and interesting.

The Editorial Team.
EFFECTS OF CLIMATE CHANGE ON HEALTH

By

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Abstract
Climate and weather influence health positively or negatively. Climate change is caused by two basic factors, natural processes and human activities. Climate change affect industrial, agriculture, transportation, energy, infrastructure. It also causes reduction in the quality of air and water, and reduction in the quantity and quality of food. These effects in turn have direct or indirect implications on physical health (infectious and non-infectious diseases), social health and economic life of the people.

Introduction
The physical environment where human beings lived before the industrial evolution was pure and unpolluted. But the quest for good life and comfort by human beings through acquisition of knowledge and skills in science and technology have taken unprecedented strides in manipulating the environment to bring comfort, good life and advancement in health. Human beings have taken giant strides in manipulating their environment through the acquisition of skills and knowledge in science and technology to improve their life and advance health. However, these manipulations have two sides of the coin; improved their quality of life, physical, emotional, financial and productive lives of people on one side, and on the other side have brought some climate changes that have caused some untold health challenges in the areas earlier mentioned.
Climate change is often used synonymously with the term ‘global warming’, referring to the confirmed increase in the earth’s mean surface temperature over the last 200 years, although it involves several other variables. Climate change is a long-term shift in climate due to human activities and natural variability. (Building Nigeria’s Response to Climate Changes, 2011). According to Her Majesty the Queen in Right of Canada (2008), climate change is any change in climate over time, whether it is the product of natural factors, human activity or both.
Climate change is caused by two basic factors, which include natural processes (bio geographical) and human activities (anthropogenic). The natural processes are the astronomical and the extra-terrestrial factors.
The astronomical factors on the one hand include the changes in the eccentricity of the earth's orbit, changes in the obliquity of the plane of the changes in orbital procession, while the extra-terrestrial factors are solar radiation quantity and quality among others. On the other hand, the anthropogenic factor in climate change involves human activities that either emit large amount of greenhouse gases into the atmosphere that depletes the ozone layer or activities that reduce the amount of carbons absorbed from the atmosphere. The human factors that emit large amounts of greenhouse gases include industrialization, burning of fossil fuel, flaring, urbanization and agriculture. However, human activities that reduce the amount of carbon sinks are deforestation, alterations in land use, water pollution and agricultural practices. The human factors have been proven to be responsible for the ongoing unequivocal climate or global warming (Intergovernmental Panel on Climate Change (IPCC), 2007).

Climate change is now recognized as one of the global phenomena of the 21st century that is influenced by and affects people and places throughout the world. It is of great importance for human rights, public health and social equity because of its profound consequences in all sectors of society: water and energy supplies, food production, coastal communities, ecosystems, and many other aspects of society and the environment domestically and globally, (WHO, 2009, WHO, 2007). Climate-related changes do not act in isolation but interact with and often exacerbate the impacts of other non-climatic stressors such as habitat destruction, over harvesting and pollution. The dilemma with climate change to other types of environmental exposure is that all countries in the world are affected and children most affected. It is expected to become more acute over the next decades despite the greenhouse gas emissions stabilizing at year 2000 level (WHO, 2007).

Major human health impacts of climate change occur due to changes in the environment, with direct effects from heat, sea level rise, changes in precipitation resulting in flooding and drought, hurricanes and storms, poor air quality and increased exposure to toxic environmental pollutants, organic pollutants, metal and pesticides (The White House Council on Environmental Quality, 2010, WHO, 2009). On this note, in 2008, the World Health Assembly (WHA) and the 193 member states of World Health Organisation (WHO) passed a resolution calling for stronger commitment to protect health from climate change; that climate change and health must be placed more firmly within the overall context of improving global health. In response to the WHA resolution, practitioners' donors, representatives of the United Nations (UN) and other agencies converged a meeting attended by over 70 leading professionals in this field (WHO, 2008).
The indications of climate change are trends in warming temperatures, varying rainfall patterns, more frequent extreme weather events (such as storms, high rainfall intensity, floods, droughts, and heat waves), sea-level rise along coastal regions and glacial melt in polar or mountainous regions (Building Nigeria’s Response to Climate Changes, 2011).

**Effects of Climate Change**

Climate change is a phenomenon that is domiciled domestically and globally with its antecedent health challenges directly or indirectly. Climate change harms human health both directly and indirectly. Direct effects can include earth system changes such as rise in temperatures, increase in climate variability, rainfall and snowfall in some areas and drought in others, and frequent severe weather events, all of which have considerable potential effect on human health. Heat waves for example can cause direct effects such dehydration, heat exhaustion and heat stroke. Indirectly, climate change brings new challenges to the control of infectious diseases. Climate related ecosystem changes can increase the range, seasonality and infectivity of some vector-borne diseases (Intergovernmental Panel on Climate Change, 2007).

The environmental consequences are flooding, drought, heat waves, intensive hurricanes, storms, and degraded air quality that endangers human health directly and indirectly, and its potentially disproportionate impact on vulnerable and socially marginalized populations. Climate change will affect industrial and agricultural section, transportation and energy infrastructure and these indirectly have negative effect on health. Akinremi (2013) reported that climate change will affect all with some people more vulnerable. Examples of more vulnerable people are people living in small island developing states, coastal regions, megacities, mountainous and polar regions, those living in poor countries, elderly people, children and people with infirmities or pre-existing medical conditions.

**Climate Change and Physical Health**

There has been a large scientific and public debate on climate change and its direct and indirect effects on health. Weather and climate affects the key determinants of health, air, food and water. They also influence the frequency of heat waves, floods and storms as well as the transmission of infectious diseases, (WHO, 2008).

WHO (2005) report showed that about 2.5 million people die every year from non-infectious diseases that are directly attributed to environmental factors such as air pollution, extreme weather events, stressful conditions in the workplace, exposure to chemicals such as lead, and environmental tobacco smoke. WHO (2003) reported that lead exposure accounted for 2% of the ischaemic heart diseases and 3% of the cerebrovascular diseases.
Exposure to outdoor air pollution accounted for approximately 2% of global cardiopulmonary diseases. In USA, about 12% of the ischaemic heart disease burden has been related to occupation for the age group 20 – 69 years. An estimate of 17% of deaths from ischaemic heart disease is associated with occupational risks, and 11% of those from stroke in Finland, (Numminen and Karjalainen, 2001).

Changes in climatic conditions and climate variability represent a further factor that can affect human health directly and indirectly through changes in biological and ecological processes that influence the transmission of several infectious diseases. Direct effects on human health include; thermal stresses due to increased frequency and intensity heat waves (cardiovascular and respiratory diseases, heat exhaustion); deaths and injuries due to extreme weather events. Indirect effects are malnutrition; food, water and vector-borne diseases, increased morbidity due to the combined effects of exposure to high temperature and air pollution.

Diseases

Climate change has the potential to influence the distribution of prevalence of water, food and insect vector borne infectious diseases (Confalonieri, Menne, Akhtar, Ebi, Hauengue, Kovats, Revich and Woodward 2007). Certain food and water borne disease vectors are favoured by climate change which allow these pathogens to expand into new geographic regions. For example, populations living in mountain states may become more susceptible to certain vector borne diseases as a result of warming temperatures which allow these vectors, such as mosquitoes to live and reproduce at higher elevations, (Meads, 1999) Furthermore, Hugh (2008) indicated the effects of climate change on people’s health as follows:

i. **Respiratory allergies and diseases:** Respiratory allergies and diseases may become more prevalent because of increased human exposure to pollen mould, air pollution and aerosolized marine toxins due to increased temperature, coastal runoff, humidity and dust from droughts.

ii. **Cancer:** Increased duration and intensity of ultraviolet (UV) radiation are direct effects of climate change that causes cancer

iii. **Cardiovascular Disease and Stroke:** Climate change may exacerbate existing cardiovascular disease by increasing heat stress, increase the body burden of air borne particulates, and change the distribution of zoonotic vectors that cause infectious diseases linked with cardiovascular disease.
iv. Foodborne Diseases and Nutrition: The effect of climate change is associated with staple food shortages, malnutrition, and contamination of seafood from chemical contaminants, bio-toxins, and pathogenic microbes and of crops by pesticides.

v. Vector-Borne and Zoonotic Diseases: The climate change may increase disease risk due to related expansions in vector ranges, shortening of pathogen incubation periods, and disruption and relocation of large human populations.

vi. Weather-Related Morbidity and Mortality: Climate change results in increased incidence and intensity of extreme weather events such as hurricanes, floods, droughts, and wildfires which may adversely affect people's health immediately during the events or later following the event.

vii. Water Borne Diseases: Climate change increases water temperature, precipitation frequency and severity, evaporation-transportation rates. Changes in coastal ecosystem health could increase the incidence of water contamination with harmful pathogens and chemicals, resulting in increased human exposure.

viii. Heat-Related Morbidity and Mortality: Heat-related illnesses and deaths are likely to increase in response to climate change.

ix. Human Development Effects: Climate change affects agriculture negatively thereby creating fall in food supply. Food shortage leads to malnutrition that affects normal human development, particularly during prenatal period and early childhood.

Climate change may increase pollutants such as nitrogen dioxide grand level ozone and particulate matter (pm) and has been linked to increase in allergic diseases such as asthma, especially among children. Children's lungs are vulnerable as they are not fully developed and children tend to spend more time outside. Fatal diseases, such as malaria and dengue fever, are sensitive to climate and children are more susceptible to these because of low immunity. The World Health Organisation (WHO) indicated that 75 percent of malaria deaths occur in children under 5 years (UNICEF Innocenti Discussion Paper, 2009).

Climate Change and Social Health
The United National Framework Convention on Climate Change (UNFCCC)(1992), stated that parties should protect the climate system for
the benefit of present and future generations of humankind, based on equity and in accordance with their common but differentiated responsibilities and respective capacities. Climate changes exacerbate vulnerabilities, places human health and security at risk and impede sustainable development. The impacts of climate change will increasingly affect a wide range of the daily lives of people and sustainable development everywhere in terms of employment and livelihoods, health, education, poverty, mobility, housing, water, food security and nutrition, and the realization of gender equality and other human rights directly or indirectly, (World Food Programme, 2011).

Climate-related disasters according to World Food Programme (2011) can trigger powerful downward spirals in human development. For instance, 2.6 billion people live on less than US $2 a day, while the high-income people cope with shocks through private insurance, selling of their assets, drawing on their savings, while the poor in the alternative reduce consumption, cut nutrition, take children out of school or sell the productive assets on which their recovery depends. These avoidable low human developments traps are choices that limit human capabilities and reinforce inequalities.

Population Displacement Compromise Health and Damages Lives: The destruction of ecological and agricultural systems by flood caused by climate change forced people to abandon their communities and seek new homes and livelihoods. Forced displacement is associated with a range of health issues, such as social isolation and mental disorders, and in many cases reduced socioeconomic status and cause other associated health problems. The recent record-breaking drought in Australia caused many rural families to abandon their farms and move to cities, with a range of associated negative social and health effects.

Climate Change and Agriculture Sector
Climate change according to Cordova, Gelober, Hoerner, Love, Miller, Saenger, and Zaidi, (2006) will affect employment within the agricultural sector in two main ways:

i. Increase in the frequency and the intensity of extreme weather events will expose agriculture to greater productivity risks and possible revenue losses that could lead to abrupt layoff.

ii. Changing weather and precipitation patterns could require expensive adaptation measures such as relocating crop cultivation, changing the composition or type of crops and increasing inputs such as pesticides to adapt to change in ecological composition that lead to economic denigration and job loss.

Climate change increases the risk of acute events such storms, droughts and floods, cyclical changes in precipitation, or long-term changes in temperature and sea levels, (World Food Programme, 2011).
Nigeria and Climate Change

Considering the strong nexus between climate change and development, Nigeria is highly at risk in the area of food security, poverty reduction, energy and most importantly, infrastructure and general economic developments. For example, it is estimated that in the Sudan-Sahel area of Nigeria, between 89,297 and 133,944 square kilometers of arable land, would be at risk, and the capital value at risk stands at about US $6.4 billion for the current level of development (Nigeria Climate Change Commission (NCCC), 2003).

The location and size, and the characteristic relief in Nigeria give rise to a variety of micro-climate, ranging from tropical rainforest climate along the coasts to the Sahel climate in the northern parts of the country. Nigeria has a population of about 140 million impact on the physical environment through their various activities within an area of about 923,000 square kilometres. This, coupled with variability in elements of climate such as rainfall and temperature among others, exposes several physical and socio-economic sectors in the country to the impacts of ecological zones, alter animal and plant composition, aggravate soil erosion and flooding in areas of higher rainfall, heighten drought and desertification in the marginal and zones of the country and salt water intrusion along the coastal belt. Climate change will also impact the agricultural sector. Agriculture remains a major source of food, industrial raw material and a means of earning foreign exchange. It employs close to 70 percent of the Nigerian population (NCCC, 2003).

In December 2009, Nigeria, like many other countries, had the opportunity to address its climate change issues at Copenhagen, Denmark, as she was not left out the climate change being experienced globally. Climate change in Nigeria, according to Building Nigeria’s Response to Climate Changes, (2011) is not going away and its impacts being felt throughout the Nigeria are likely to get worse in the future. Across the country, from the north to the south, millions of women and men are already experiencing, and reacting to changing seasonal patterns of rainfall, increased temperature and more frequent weather events, leading to drought and flooding and storm surges along the coast. It further stated that vulnerability and the impacts of climate change are felt differently in the different parts of the three ecozones. For example, Nigerians in the Nigeria’s long coastline to the south in the coastal/rainforest region are vulnerable to sea level increases and storm surges. Communities to the north, in the Sahel region, which already experience cyclical drought, is vulnerable to increasing aridity due to higher temperatures and reduced rainfall.

Climate change has started impacting on desertification and on plant species composition in Northeastern Nigeria; and this may not be the only impact of climate change in Nigeria (Odjugo and Ikhuoria, 2003, Ayuba, Maryah, Gwary, (2007).
The historical record (between 1971 and 2000) shows a trend of rising temperatures in Nigeria which is projected to increase over time, (Building Nigeria's Response to Climate Changes, 2011).

1. Longer rainy seasons are predicted in the south of Nigeria and shorter rainy seasons (i.e. early cessation) are predicted for northern Nigeria;
2. Heat waves are likely to occur more often over the entire country in the future;
3. More extreme weather events, such as rain and wind storms, will increase in frequency; and
4. Sea level rise will occur along the coast.

The above climate change hazards are predicted to have devastating impacts on agriculture in Nigeria, causing lower crop productivity everywhere, and difficulties with vegetation and livestock husbandry in the North. The greatest impact will likely occur in the northeast, where a drier and hotter climate is predicted. Climate change is also expected to have a severe impact on the health sector of the entire country due to increase in the incidence of disease epidemic, such as malaria (Building Nigeria's Response to Climate Changes, 2011).

Increasing temperature (global warming) and decreasing precipitation Odjugo (2010) in most parts of the world are the greatest impacts of climate change. These bring about either negative or positive ecological impacts in different parts of the world. The increasing temperature has led to increased land based ice instability and its melting. The thawing of the Arctic, cool and cold temperate ice, the increasing rainfall in some parts of the world and expansion of the oceans as water warms has started to impact on sea level rise, coastal inundation and erosion. The current global estimate of sea level rise is 0.2m and it is projected to increase to 1m by the year 2010 then 18,400 km of the coastal region may be inundated (Network on Environment Study Team)(NEST, 2003). Coastal settlements like Bonny, Forcados, Lagos, Port-Harcourt, Warn and Calabar among others that are less than 10m above the sea-level would be seriously threatened by a metre rise of sea-level.

Climate change scenarios for West Africa, including Nigeria, indicate that the climate variability currently being experienced is likely to increase and intensify. Droughts, floods and storms are likely to increase in both frequency and intensity and changes in precipitation levels and patterns are also likely to occur. Temperature is expected to increase across board, exacerbating other climatic impacts. For example, in thirty years, over ninety percent (90%) of Lake Chad has been lost. In coastal areas, sea level rise and rising sea temperatures will continue to threaten coastal areas and the ecosystems. The prospective impact of climatic change on the society and economy across the region are huge, potentially affecting all sectors and all
Conclusion

Climate change is an ill wind that has no boundary and its actions has a devastating effect with physical, emotional, social and financial effects on the individuals and community at large. Therefore, human beings should endeavor to put up healthy behaviour that will help to reduce effects of climatic changes.

Research and health education programmes should be promoted for a better assessment and awareness of the health implications of:

i. Strategic decisions, such as investment in water demand management (improving efficiency of water use and reducing waste, thereby increasing water availability).

ii. Specific policies (e.g. promotion of small dams, which increase water access but can increase infectious disease transmission).

iii. Technologies to deal with water stress (e.g. the use of reclaimed water and desalination). In the food and agriculture sector, there is a need for the rapid assessment of the health impacts of policies that are fast-acting such as the increased production of biofuels, which may impact on food security, as well as modelling of the effects of more gradual changes, such as crops selection.

iv. Environmental education curriculum should be included in the school health education, from primary school to tertiary institution, and it should made compulsory for all learners.

v. Public awareness programme on climate change should include environmental issues, environmental education programmes in School and zero tolerance to unsustainable lifestyle.

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