

Health and Environmental Problems Associated with Climate Change in Rivers State

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Abstract

Climate Change remains a global problem as its impact on mankind and the environment have become a Public health concern. This study investigated Health and Environmental Problems Associated with Climate Change in Rivers State, Nigeria. The study adopted a descriptive survey research design and used stratified and simple random techniques to select 250 respondents for the study. The instrument used for data collection was a self-developed and structured questionnaire titled 'Health and Environmental problems of Climate Change questionnaire. Frequencies, percentage, mean, and standard deviation were the statistical tools used for data analysis. The finding of the study showed that majority of the population agreed that hyperthermia, dehydration, skin cancer, respiratory illnesses water borne diseases, vector borne illnesses were health problems associated with climate change, while flooding, drought, land degradation, soil erosion food scarcity were environmental problems of climate change. Also, majority of the respondents agreed that older people, children and people with pre-existing medical condition were more vulnerable to the problems associated with climate change. This study recommended among others that Health Educators should sensitize the public on the health problems associated with climate change in order to adopt some mitigatory measures so as to reduce its negative impact on human health and Government should strengthen the existing laws that prohibit the emission of high percentage of greenhouse gases as it constitute major pollutants of the atmosphere.

Key word: Change, Climate, Environment, Health, Problems and Rivers State

Introduction

Human activities are enormous which ranges from commerce and industry, educational development, technology advancement, oil and gas exploration and exploitation, agriculture, and the most recent information and communication technology. Climate change is principally a major problem caused by increase in human activities which can be called human mismanagement of the earth. This leads to several direct and indirect impact on human health and the environment. According to Guernie (2004) and Jeffe (2012), climate change had wide range of harmful impact on human health such as: increase in heat, dehydration, spread of infection disease such as; skin cancer, cholera, malaria, malnutrition, damage of public health infrastructure, and migration of man However, in Sub-saharan Africa, such as: Ghana, Kenya, Uganda, Ethiopia and Tanzania, Climate change is of public health concern. Some of the African countries mention above experience droughts which has affected the water levels in their dams and has led to low hydropower generation (Besada & Sewankambo, 2009; Kamani, Onguru & Kithyoma, 2012). The Intergovernmental Panel on Climate Change IPCC (2014) has predicted that temperature across African are expected to increase by 2-6^{0c} within the next 100 years and rainfall variability is expected to increase, resulting in regular flooding (Hulme, Doherty, Ngara, New, & Lister, 2001). The IPCC (2007) report on Regional climate projection

stated that by 2050 the average temperature in African Continent were expected to rise by 1.5-3^oc and the warming of Africa was very likely to be severe than other Regions. (Collier, Conway, & Venables, 2008) On this note, Gameda and Sima (2015) explained that the impacts of climate change in Africa is so worrisome that studies have considered the Continent the most vulnerable to climate change in the world. It is most likely that the situation may be worse in Nigeria.

However, Nigeria as one of the developing countries may not stand indifferent from the problems stated above. It has several oil and gas companies with numerous gas flaring sites. According to Akinro, Opeyemi and Ologunagba (2008), Nigeria is reported to have 120 gas Flaring sites making Nigeria one of the highest emitters of greenhouse gases in Africa. Hence, Nigeria is recognized as being vulnerable to climate change. However, Climate change and global warming if left unchecked will cause adverse impact on livelihoods and the environment in Nigeria. It is on records that oil is the primary base of Nigerian Economy and the cause of Major environmental and social problems in Niger Delta region, especially in Rivers State (Idow, Ayoola, Opele, & Ikenweuwe, 2011).

Nevertheless, oil and gas exploration and exploitation activities in Rivers State have given rise to physical, economic, environmental and social problems. Ebirein and Ozioma 2005 observed that, over the year's oil exploration, production and refinement in Rivers State has resulted in various environmental and health related problems that ranges from oil spill, gas flaring, habitat destruction, pollution and desertification. The authors lauded that the major cause of oil pollution in the Niger Delta region remains, to a great extent from activities of: illegal oil bunkering and illegal refineries operated by indigenes or some highly placed individuals in government. As a result of these illegal activities, chemical properties of oil spillage alters the productiveness of soil and water bodies, thereby causing irreparable damage to agricultural lands and water bodies (Ebirein & Ozioma, 2005). Also, gas flaring releases toxic substances into the atmosphere which cause harm to both health and the environment.

Gas flaring causes significant environmental and health related problems round the globe including Rivers State. However, Rivers State emits approximately 70 million metric tons of carbondioxide annually thereby increasing their concentration in the atmosphere, causing the earth to warm like green house (Fubara & Nowski 2012). The authors added that it was estimated that in Rivers State, gas flaring is statistically likely to cause 69 premature deaths, 150 respiratory illness among children and 96 percent asthma attacks each year. Also, IPCC (2014) stated that it is "very likely" that human activities are the main causes of warming in the past 150years unlike the ozone effect (in the upper atmosphere). Okechukwu (2013) reported from climate indicators that in the next two decades (probably between 2030 and 2050), that climate change is expected to cause approximately 250,000 additional deaths per year, from malnutrition, malaria, pollution, flooding, respiratory disease, vector and water born disease. Climate change indicates greater danger to developing areas like Rivers State and has resulted to about 95 per cent of all diseases or disasters related death hence, climate change is a global problem requiring global attention which may not be limited to a specific region like in Rivers State (Thomas, 2009).

Climate Change

Climate change is one of the notable challenges confronting mankind all over the world hence, has been given different definitions by different authorities. IPCC (2014) defined climate change as a statistically significant variation that persist for an extended period of time, typically decades or longer which include shift in the frequency and magnitude of sporadic weather period events as well as slow but continues rise in global mean surface temperature.

As stated above, human activities are the main causes of changes seen in climate which is done through activity that cause emissions of greenhouse gases (carbon dioxide, water vapour, methane and nitrous oxide) (IPCC, 2014). Carbon dioxide is one of the most important gases responsible for greenhouse effect. The author added that these greenhouse gases are able to absorb long wave radiation emitted from the earth surface and increases the quantity of heat energy in the earth's climate system. Similarly, the United Nations Framework Convention on Climate Change (UNFCCC) (2011) defined climate change as change of climate that is attributed directly or indirectly to human activity then altering the composition of the global atmosphere. The author was of the view that the human activities include the pollution that arises from industrial house gases such as carbon dioxide which has the ability to absorb the spectrum of infrared light and contribute to warming of our atmosphere. Once produced, these gases can remain trapped in the atmosphere for tens or hundreds of years.

Coburn (2004) saw climate change as changes in the earth's climate, especially those said to be produced by global warming which is attributed to human activities such as brining of fossil fuel, deforestation and the growing world population which causes change in the earth's climate thereby leading to the extreme events like: flooding, drought, erosion, storm, extreme heat, heavy precipitation and rising sea level. These extreme events of climate change threaten our health by affecting the food we eat, the water we drink, the air we breathe and the weather we experience. Elenwo (2014) in his own view defined climate change as a change in the state of the climate that can be identified by change in the means or the variability of its properties, and that persist for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity.

As defined by Ayodele (2005), climate change is the change in the statistical distribution of weather patterns when that changes last for an extended period of time. It may also refer to a change in average weather conditions, or in the time variation of weather within the context of longer-term average condition. To the author, climate change is caused by factors such as; biotic processes, variation in solar radiation received by earth, plate tectonics and volcanic eruptions. Certain human activities have been identified as primary cause of ongoing climate change, often referred to as global warming. The three major causes of climate change are Carbon dioxide, Methane, Nitrous oxide and fluorinated gas (Ayodele, 2005).

Carbon dioxide: Is produce primarily through the burning of fossils fuel, (oil, natural gases, and coal), solid waste, trees and wood products. Deforestation and soil degradation add carbon dioxide to the atmosphere, and causing a change in the climate. **Methane:** Is emitted during the production and transport of oil, coal and natural gas. Methane emission also comes from livestock and agricultural practices and from anaerobic decay of organic waste in municipal solid waste landfills. **Nitrous oxide:** are emitted into the atmosphere during agricultural activities as well as during combustion of fossil fuel and solid waste. It lasts about 121 years in the atmosphere and cause change in the climate. **Fluorinated gases:** are emitted from a variety of industrial processes, commercial and house hold activities and do not occur naturally so, all these substances contribute to the change in climate (Ayodele, 2005).

Health Problems Associated with Climate Change

There are several health problems associated with climate change globally. Onauha (2009), stated that increase in frequency or severity of hot weather is capable of causing: Dehydration, Skin Cancer, Hyperthermia, increase in vector born disease, increase in water borne disease and respiratory illnesses.

Dehydration

Is a condition in which water in the body drops below normal levels, usually caused by sweating, not drinking enough and exposure to extreme heat. National Research Council (2010), opined that dehydration is when the body lose more fluid than it retains, and the body does not have enough fluid to carry out its normal functions. Exposure to extreme heat can result to dehydration. As the climate warms due to emission of greenhouse gases and other pollutants, individuals are exposed to extreme heat which cause a lot of sweating and lose of body fluid, and when the body loses water than it retains, it leads to dehydration. However, when one is dehydrated, it affects the organs of the body which can to kidney stone, cholesterol problems, constipation, liver, joints and muscle damage (Anyanwu, 2008). The author also added that dehydration also leads to the following health challenges: weaken immune system, increase risk of obesity and premature aging.

Skin Cancer

The skin is one of the sense organs that form the outer surface of the body. It receives the sense of touch and feeling and has direct contact with the atmosphere. So, the skin can be adversely affected when there is a change in the climate hence, climate change can cause skin cancer on our body. According to Achalu (2008), skin cancer refers to an abnormal development of cells and tissues on the skin and the author identified three type of skin cancers such as, Basal cell Carcinoma, Squamous cell Carcinoma, and Melanoma.

Hyperthermia

As the earth warms and the atmospheric temperature increases during climate change, it causes a rise in the body temperature known as hyperthermia which is different from fever hence, climate change also causes hyperthermia to the body. Huynen (2003) maintained that hyperthermia is synonymous with fever but, not quite, when an individual is ill, the body purposefully raises its temperature to try and fight the infection, but hyperthermia is a little different. The author stated that in hyperthermia, the body temperature rises, but not on purpose, rather the body heating and cooling mechanism is over run and the body cannot get rid of excess heat as a result of hot weather thereby causing: heat, heat cramps, heat exhaustion, and rashes. Efe and Weli (2015) opined that climate change represent a massive direct threat to respiratory health by aggravating respiratory disease or indirectly increasing exposure to risk factors for respiratory disease. Climate change is capable of causing water borne diseases. WHO (2014) explained that water borne diseases are illness caused by pathogenic microorganism that are transmitted through contaminated water, drinking contaminated water or by eating food exposed to infected water.

Environmental Problems Associated with Climate Change

Everything God created in our environment is for the benefit of mankind. Therefore, Man interacts with its environment through numerous human activities which can create negative impact on the environment. Ozor (2009), in listing the problems associated with climate change stated that the variations in climate have led to devastating consequences and damage to our environment therefore causing the following problems: flooding, drought, heavy rainfall, acid rain, soil erosion among others.

Flooding:

Flooding refers to an overflow of water that submerges land areas that are usually dry. Flooding typically occurs when rivers, lakes and streams overflow, but heavy and sustained rains may produce flash flood even in dry regions and areas where bodies of water are scarce. Flooding occurs when the ground is incapable of absorbing water from rainfall, melting snow

or ice. Flooding also occurs when rivers burst its banks if it is carrying so much water that cannot be contained to its usual course. The heavy rainfall and the melting of the polar ices as a result of global warming cause an overflow of river banks leading to flooding. Therefore, flooding is not a normal condition for rivers, but it is seen as an extreme situation due to climatic changes. The extent to which the river exceeds the flow that can be contained in its bank determines the severity of the flood and is sometimes related to how often flooding occurs.

Drought

There is a required and an average rain water and vapour in an area which make our environment wet and humid. Therefore, when there is no rainfall for a long period of time in an environment and the rain water and vapour fall below average, the area will become dried, drought then sets in. Thomas (2007), explained that drought is a period of below – average precipitation in a given region, resulting in prolonged shortages in water supply, whether atmospheric, surface water or ground water. A drought can also last for months or years or may be declared after as few as 15 days. The author added that drought can have serious impact on the ecosystem, Agriculture, human health of the affected region and harm to the economy.

Soil Erosion

The ground is the receptor of all precipitation no matter how heavy it is and the consequent run-off. So, when the run-off is heavy as a result of the heavy rainfall, it washes away the soil surface which leads to soil erosion. Oladi (2004) defined soil erosion as a process that involves the wearing away of the topsoil, the loosening of the soil particles and or washing away of the soil particles, and either ends up in the valley and faraway lands or washed away to the oceans by rivers and streams. To the author, the outcome of soil erosion reduces agricultural productivity, leads to ecological collapse, soil degradation and possibility of desertification

Acid Rain

There are naturally existing gases in the atmosphere. These gases combine with rain water during precipitation to form weak acid which falls back to the ground as rain water. Therefore, acid rain is formed as a result of many pollutants in the air reacting with water in the atmosphere. Gene (2009) reported that sulphur oxide and nitrogen are the major contributors to acid rain and that acid rain is 70 percent sulphuredioxide and 30 percent nitrogen oxide which reacts with water to form sulphuric Acid. The author added that any precipitation or dust particle that contains abnormal levels of sulphur dioxide and Nitrogen dioxide is considered as acid rain. According to Jean, Paul and Claude (2016), acid rain directly affects the chemicals and P^H balance in ground water and the excess aluminum created by acid rain makes aquatic environment such as: sea, lakes and stream uncondusive for aquatic animals. The animals that can withstand the imbalance of the water is natural animals which might survive, but quickly loss their food source as weaker creature like algae die off and acid rain leaches calcium out of the soil when it is absorbed by the earth (Jean, el al, 2006). Acid rain is also corrosive to the roofs of buildings and other metallic materials in our environment.

Population most vulnerable to the problems Associated with Climate change

In a given population, there are different groups such as; the children, the elderly, the pregnant and nursing mothers among others. All these different groups in the population can be affected by climate change at one point or the other in their lives. People living in some developing countries and coasted regions and people living in areas with insufficient health and environmental infrastructures are particularly vulnerable to problems associated with climate change. Some factors may be responsible for this vulnerability as some people are more

affected by climate change than others. Stern (2006) highlighted that the factors include; where they live, their age, health condition, income, occupation and how much they go about their daily activities and that the populations more vulnerable to climate change include; older adults, people with medical condition, children and the poor.

According to Brown (2008), older adults are vulnerable to climate change related health impacts for a number of reasons; the normal changes in the body associated with aging, such as: muscle and bone loss which can limit mobility and some older adults especially those with disabilities that may also need assistance for daily activities. Similarly, Brown (2008) reported that nearly over 65 percent were reported to have disability, compared to about 17 percent of people age 21-64. Which include disabilities in one or more area related to communication (seeing, hearing or speaking), mental functioning (such as: Alzheimer disease, senility, or demeritia), and physical functioning like limited or not able to walk, climb stairs or life or grasp objects Extreme heat exposure can increase the risk of illness and death among older adult, especially people with diabetes, and other chronic health conditions that increases sensitivity to heat. Higher temperature have also been linked to increased hospital admissions for older adults people with heart and lungs conditions and air pollution can also increase the risk of heart attack in older adults, especially those who are diabetic or obese (Brown, 2008).

People with previous medical conditions are always at risks of endemic and epidemic diseases. On this note, Sly (2008) reported that some of the most vulnerable are people with medical conditions, disabilities or living in nursing homes or assisted living facilities. Climate change impact could worsen in this people by interruption in medical aid and challenge associated with transporting patients with their necessary medications and any equipment like oxygen. Existing medical conditions can make individuals more susceptible to these exposures, increasing the potentials for health impact and worsening symptoms. For example, individuals with respiratory conditions (such as: cardiovascular disease, asthma) are more likely to be negatively affected by exposure to poor air quality than those without these conditions. In addition, some underlying health condition can make it difficult for people to limit their exposure or adapt to risks, for example, individuals with Alzheimer's disease may have difficulty responding to and evaluating health condition during an extreme health event. Certain medications may also impair the body's ability to regulate temperature or maintain fluid or electrolyte balances, changing health patterns and more intense and frequent wildfires which also raise the amount of pollution dust and smoke in the air, thereby exposing people with asthma and Chronic Obstructive Pulmonary disorder (Sly, 2008).

The children is another group in the population that can be more vulnerable to the problems associated with climate change. Fritize (2008) explained that children will suffer disproportionately from climate change and growing environmental risks and will have to content with the immediate and life threatening dangers of climate related disasters, food insecurity, rising air pollution, increased risk of vector-borne diseases, acute respiratory infections, diarrheal diseases and malnutrition. Children live their lives at a faster pace than adults. Consequently, anything harmful in the environment is bound to have relatively greater impact on them than adults. For example, younger children breathe twice the rate of adults therefore, in polluted environments their risk of respiratory infections such as; pneumonia, asthma among others, is most likely to be far higher than in adult. Furthermore, Datar (2013) postulated that climate change exposes children to vector-borne diseases such as dengue, malaria and diseases associated with poor water quality, inadequate sanitation and poor hygiene practices, such as diarrheal diseases. In 2015, malaria was estimated to cause 438,000 deaths of which more than two-third were children under five years of age, the number of children

potentially exposed to climate risks and their effects are alarming as over half a billion children are living in areas with extremely high level of flood occurrences, and nearly 160 million live in areas of high or extreme drought severity (Datar 2016). Most of these children live in some of poorest communities within the state with the least capacity to manage these environmental risks, thereby exposing them to these life threatening dangers posed by climate change.

Purpose of the Study

The purpose of this study was to investigate the health and environmental problems associated with climate change in Rivers State. Specifically this study sought to:

- i.** Determine the health problems associated with climate change in Rivers State, Nigeria.
- ii.** Identify the environmental problems associated with climate change in Rivers State, Nigeria.
- iii.** Ascertain the population that is more vulnerable to the health and environmental problems associated with climate change in Rivers State, Nigeria.

Research Questions

- i.** What are the health problems associated with climate change in Rivers State, Nigeria?
- ii.** What are the environmental problems associated with climate change in Rivers State, Nigeria?
- iii.** Which population is more vulnerable to the health and environmental problems associated with climate change in Rivers State, Nigeria?

Methods

This study adopted the descriptive survey research design in carrying out this research aimed at investigating health and environmental problems associated with climate change in Rivers State. The study was conducted in Rivers State which has 23 local government areas. The population of the study comprises indigenes of Rivers State who are resident in the state and non-indigenes who have lived in the state for at least two decades. However, the total population of Rivers State is about 5,198,716 people (National Population Commission 2016). The sample size for this study was 250 respondents which were selected from Rivers State. One hundred people each were randomly selected from indigenes of Rivers State in the rural and urban areas while 50 people were randomly selected from non-indigenes who have lived in the state for at least two decades. The instrument used for data collection was a self-developed and structured questionnaire titled; Health and Environmental Problems of Climate Change Questionnaire (HEPCCQ). The questionnaire was made up of two sections, A and B. Section A contained items that elicited socio-demographic data of the respondents, while section B contained items that emphasized on the variables of the study. Respondents were required to indicate their response on each item using modified Likert four point scale of Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD). The instrument was validated by experts in Health and Safety studies and others in related field for scrutiny and evaluation. The input of the experts was incorporated and the instrument was thus found to be valid for the study. With the help of three trained research assistants, 250 copies of the questionnaire were distributed to the respondents and retrieved on the spot. Out of the 250 copies of the questionnaire distributed, 243 were retrieved while seven were not properly filled which yielded 98 per cent return rate. So, data analysis was done using 240 questionnaires as the researcher adopted the descriptive statistics of frequency distribution, simple percentage, mean and standard deviation.

Results

Research question 1: What are the health problems associated with climate change in Rivers State, Nigeria?

Table 1: Analysis of the health problems associated with climate change

S/N	Items	SA	A	D	SD	\bar{X}	S.D
1.	Climate change causes hyperthermia	90	88	40	22	3.0	0.95
2.	Climate change contaminate the air and therefore cause respiratory illness.	105	65	40	30	3.0	1.05
3.	Climate change increase vector borne illness.	115	68	32	25	3.1	1.51
4.	Climate change can cause dehydration.	95	65	50	30	2.9	1.15
5.	Climate change can decrease the nutrient in crops and therefore cause lack of safe food.	88	52	68	32	2.8	1.07
6.	Climate change increases water borne diseases.	98	62	55	25	2.9	1.03
7.	Climate change increases transmission of diseases.	95	65	50	30	2.9	1.05

The table 1 above shows a calculated mean of 3.0 and the standard deviation of 0.95 for the item 'climate change causes hyperthermia'. This means that the mean of 3.0 is > the criterion mean of 2.5. Therefore, the statement is retained. The highly accepted mean of 3.0 and SD of 1.05 were recorded for the item 'climate change contaminates the air and therefore causes respiratory illness'. A highly accepted mean of 3.1 and Standard deviation of 1.51 were equally recorded for the item 'climate change increases vector borne illness'. A mean of 2.9 and SD of 1.15 was recorded for the items that say climate change cause dehydration. A mean of 2.8 and SD of 1.07 was recorded for the item 'climate change can reduce the nutrient in food crops'. A mean of 2.9 and SD of 1.03 was equally recorded for the item 'climate change increases water borne disease'. While a mean of 2.9 and SD of 1.05 was recorded for the item 'climate change increases transmission of disease'

Research Question 2: What are the environmental problems associated with climate change in Rivers State, Nigeria?

Table 2: Analysis of environmental problems associated with climate change.

S/N	Items	SA	A	D	SD	\bar{X}	S.D
1.	Climate change causes flooding.	150	50	30	10	3.4	0.86
2.	Climate change causes drought.	195	25	15	5	3.7	1.65
3.	Climate change may lead to land degradation.	100	95	35	10	3.2	0.83
4.	Climate change lead to migration.	105	85	35	15	3.2	0.89
5.	Climate change extreme events can lead to loss of life and properties.	190	30	16	4	3.7	1.63
6.	Climate change extreme events can lead to soil erosion.	90	88	40	22	3.0	0.95
7.	Climate change extreme events can destroy food crops and therefore cause lack of food.	95	65	50	30	2.9	1.05

The table 2 above shows the calculated mean of 3.4 and standard deviation of 0.86 for the item ‘climate change causes flood’. A mean of 3.7 and SD of 1.65 was recorded for the item ‘climate change causes drought’. A mean of 3.2 and SD of 0.83 was recorded for the item ‘climate change can lead to land degradation’. A mean of 3.2 and SD of 0.89 was recorded for the item ‘climate change can lead to migration. A mean of 3.7 and standard deviation of 1.63 was equally recorded for the item ‘climate change extreme events can lead to loss of life and properties’. Also a mean of 3.0 and standard deviation of 0.95 was recorded for the item ‘climate change extreme events can lead to soil erosion’, while a calculated mean of 2.9 and SD of 1.05 for the item ‘climate change extreme events can destroy food crop and therefore lead to lack of food’.

Research Question 3: Which population is more vulnerable to the health and environmental problems associated climate change in River State, Nigeria?

Table 3: Analysis on the most vulnerable population to the problems associated with Climate change

S/N	Items	SA	A	D	SD	\bar{X}	S.D
1.	The poor suffers more when flooding takes place.	100	109	21	20	3.0	0.90
2.	The blind to survive without help during climate change extreme events.	77	61	61	41	2.7	1.09
3.	Climate change extreme events affects old adult more.	82	64	63	31	2.8	2.20
4.	People with preexisting medical cases are more affected during climate change.	111	89	15	25	3.2	0.72
5.	Rich people do not experience climate change because of the economic status.	55	62	83	40	2.6	1.02
6.	Children suffer when climate change occur because of their weak immune system.	111	89	15	25	3.2	0.72
7.	People of high economic status have equipments to keep themselves safe during climate change.	66	57	68	49	2.5	1.09

The table 3 above shows a calculated mean of 3.0 and standard deviation of 0.90 for the item ‘climate change extreme events such as flooding affect poor people more’. A mean of 2.7 and SD of 1.09 was recorded for the item ‘blind people suffer more during climate change without help’. A mean of 2.8 and SD of 2.20 was recorded for the item ‘climate change extreme event affect older adult more’. A mean of 3.2 and SD of 0.72 was recorded for the item people with preexisting medical condition are more affected by climate change. A mean of 2.9 and SD of 1.02 was recorded for the item ‘rich people do not experience climate change impact because of their economic status’. A mean of 3.2 and SD of 0.72 was recorded for the item ‘children suffer more during climate change’ and also mean of 2.5 and SD of 1.09 was for the item ‘people of high economic status have equipment to keep themselves safe during climate change’.

Discussion

Table 1 showed the mean and standard deviation of each questionnaire item related to the health problems of climate change. The number of respondents who agreed that climate change can cause some health problems, is a clear indication that such problem exist, majority of the respondents agreed that climate change can cause hyperthermia, skin cancer, respiratory illness, vector borne illness like malaria, they also agreed that climate change can reduce the nutrient in crops and therefore cause lack of safe food, increase water borne illness and also increase transmission of disease. This finding is expected therefore not surprising because anything that happens on the atmosphere will affect the inhabitants of the earth especially in Rivers State where air pollution is high due to industrialization. This finding is in line with the assertion of Onuoha (2009) which holds that increase in frequency or severity of some extreme weather events as a result of climate change threatens the health of individual during and after the event. The finding is consistent with the position of Efe and Weli (2015) which holds that climate change represent a massive direct threat to respiratory health by aggravating respiratory disease or indirectly increasing exposure to risk factors for respiratory disease and is capable of causing water borne diseases.

Table 2 revealed that there were some environmental problems associated with climate change. Majority of the respondents agreed that environmental problems associated with climate change were flooding, drought, land degradation, soil erosion and scarcity of food. This often leads to adverse condition of the environment. This finding is expected therefore not surprising because the location of Rivers State in the coastal region predisposes it to climate change which can lead to land degradation, drought, soil erosion and lack of food in Rivers State, Nigeria. This confirms the view of Ozor (2009) which stated that variation in climate has devastating consequences and causes damage in our environment. The findings also collaborates with the view of Jean, Paul and Claude (2016) which holds that acid rain directly affects the chemicals and P^H balance in ground water and the excess aluminum created by acid rain makes aquatic environment such as: sea, lakes and stream uncondusive for aquatic animals. Similarly, the finding supports Gene (2009) who reported that sulphur oxide and nitrogen are the major contributors to acid rain and that acid rain is 70 percent sulphuredioxide and 30 percent nitrogen oxide which reacts with water to form sulphuric Acid. The author added that any precipitation or dust particle that contains abnormal levels of sulphur dioxide and Nitrogen dioxide is considered as acid rain.

Table 3 revealed that the mean response to agreed is 3.2 and SD of 0.72 is higher than the criterion mean of 2.5 with the SD of 1.09. This means that majority of the respondents responded to the variable that some group of people are more vulnerable to the problems associated with climate change in Rivers State, Nigeria which are older people, children and people with preexisting medical conditions. This finding is expected therefore not surprising because in a given population, some groups of people are more prone to adverse conditions than the other. This finding supports the view of Sly (2008) which holds that everyone in the population is affected by climate change but some specific groups are more vulnerable, therefore the government and non-governmental organizations should be involve in disaster preparedness activities at all levels in other to protect those who are mostly affected. Also some of the respondents disagreed that the rich are not affected by climate change because of their economic status. This finding is in line with the report of Efe and Weli (2015) which stated that climate change affect everybody both the rich and poor no matter your economic status.

Conclusion

With regards to the result of this study, the researcher concluded that there are health and environmental problems associated with climate change in Rivers State, Nigeria which are hyperthermia, skin cancer, respiratory illness, vector borne illness, water borne disease, flooding, drought, land degradation, soil erosion and food scarcity. Also the study revealed that the groups mostly affected by the problems associated with climate change are older people, children and people with preexisting medical conditions.

Recommendations

Based on the findings of this study, the following recommendations were made;

1. Government should strengthen the existing laws that prohibit the emission of high percentage of greenhouse gases as it pollutes the atmosphere.
2. Health Educators should sensitize the public on the health problems associated with climate change in order to adopt some mitigatory measures so as to reduce its negative impact on human health.
3. Environmental Management Agency should partner with the government to ensure proper planning and safeguarding of the environment in order to reduce environmental problems associated with climate change.
4. The general public should give preference to those groups in the population that are most vulnerable to the health and environmental problems associated with climate change
5. Non- governmental organizations should assist the government to organize conferences, seminars, workshops to educate the general public on issues of climate change.

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