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Climate Change: Causes, Effects and Mitigations a Case Study of Warri Metropolis, Nigeria

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Abstract:
Climate change is an undesirable environmental happening that is causing massive alarm throughout the whole world. The Intergovernmental Panel on Climate Change (IPCC) 2002 glossary define Climate in a narrow sense as the "average weather," or more rigorously, as the statistical/demographic description in relation to mean and inconsistency of relevant quantities over a period ranging from months to thousands or millions of years. The conventional period is always three (3) decades as defined by the World Meteorological Organization (WMO). These quantities are most often drift up functions such as temperature, precipitation, and wind. Climate in a wider perspective is the condition, including arithmetical description, of the climate system. The study assesses the climate change (causes, effects and mitigations) profile in Warri Metropolis. Data were acquired by administering questionnaires among the residents of the study area using random sampling method and descriptive statistics, SPSS version 23 software as a tool was used to generate frequencies of the demographic characteristics of the respondents and descriptive statistical illustration of the respondents in percentage for the analyses. The study revealed that most of the respondents have awareness of the climate change and believe the major causes of climate change are; industrial activities and carbon dioxide while the major effects are; the rising in maximum temperature, loss of biodiversity and economic implications. Whereas the major mitigations from the respondents are: renewable energies, sustainable agriculture and forest management, efficient consumption and recycling, conservation of forest/trees/woodlands and agricultural reforms, energy and water efficiency, sustainable transportation. The research signified how important it is to understand climate change, in order to prepare for the future. The potential implication of global climate change includes flooding due to rising of sea level as a result of warmer sea temperature. From the results of this study, it can be concluded by saying that Warri metropolis and its environment oil producing city are being exposed to danger of climate change of various types.

Key Word*: Climate Change; Causes; Effects; Mitigations; Warri Metropolis; Environment.*

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I. Introduction

Climate change remains one of the contemporary global environmental challenges of our time. This is demonstrated by the wave of conferences, advocacies, reports and researches on climate change in the last two decades. Climate change is recurrently conceived as any kind of variation in climate that may be human-induced or usual (natural). Climate change is an undesirable environmental happening that is causing massive alarm throughout the world entirely. It refers to some anomalies in the climate scheme that is resulted from human activities. These anomalies include increase in the concentration of Green House Gases (GHGs), Hydro Flouro Carbons (HFCs) and ChloroFlouro Carbons (CFCs) in earth's atmosphere, which will ultimately trigger global warming (Ikenweiwe *et al.,* 2011).

It is an abnormal variation in the earth's climate that usually occurs over intervals ranging from decades to millions of years. In the 20th century, research findings demonstrate that global mean temperature amplified by 0.6 which is the 6 hottest years occurring between 1997 and 2007 (IPCC, 2007). This warning of the world's climate has been connected to higher carbon dioxide and other Green House Gases (GHGs) concentrations in the atmosphere, which are mainly of man-made origin like fossil fuel burning, land use and deforestation.

According to United Nation Framework Convention on Climate Change, climate change is related with human actions which alter the global atmospheric structure in addition to the natural climate variability experiential over comparable time scales. Similarly, the term climate in general is recognized as the average weather condition generally over a short period of time (Lakeman, 1996). While climate change refers to a long-term disparity in the average temperature or global weather pattern (Cianconi *et al.,* 2020). Human activities

include the flaming of fossils fuel which has been the prime source of rising greenhouse gases concentration in the atmosphere to about 80% from 1970 to 2010 followed by carbon dioxide emissions from forestry, land use and land use change (IPCC, 2014).

II. Literature Review

Climate (from Ancient Greek klima, meaning inclination) is generally defined as the meteorological condition of a given place averaged over a long period (Skamarock *et al.,* 2008). The most familiar standard averaging period is about three (3) decades, and also some may be using other periods contingent on the purpose of the study. Furthermore, Climate includes numbers or information other than the average, such as the expanse of day-to-day or year-to-year variations.

The Intergovernmental Panel on Climate Change (IPCC) 2002 glossary define Climate in a narrow sense as the "average weather," or more rigorously, as the statistical/demographic description in relation to mean and inconsistency of relevant quantities over a period ranging from months to thousands or millions of years. The conventional period is always three (3) decades as defined by the World Meteorological Organization (WMO). These quantities are most often drift up functions such as temperature, precipitation, and wind. Climate in a wider perspective is the condition, including an arithmetical description, of the climate system.

The most difficult aspect of Climate change is an environmental occurrence which is triggering massive concerns in the entire whole world. Man-made activities constitute major predominant causes that result in some anomalies in the climate system. These contradictions include elevation in the concentration of greenhouse gases (GHGs), hydro fluorocarbons(HFCs) and chlorofluorocarbons (CFCs) in earth's atmosphere, which consequently lead to global warming (Ikenweiwe *et al.,* 2011).

A research by (Olaniyi *et al*., 2013) pointed out that climate change is implied as an upsurge in typical universal temperatures. Natural trials and human activities are believed to be foremost things that devote to a surge in average universal temperatures. This is caused largely by increases in greenhouse gases such as carbon dioxide (CO_2). Nigeria has encountered unfavorable weather-related impacts on the welfare of millions of people in the country. Persistent rainfall seizure and flooding, off season rains and dry spells have sent growing seasons out of orbit, on a country dependent on a rain fed agriculture.

The issue of Climate change, or global weather patterns, or global warning can be delineated as the leading environmental challenges of contemporary era. It is universal in effects but its repercussions are far more reaching in emerging countries such as Nigeria. It is a topical controversy worldwide because of its attendant problems that are frightening the nourishment of man and his biota. These are predominantly becoming harsher in the under-developed and emerging countries. Climate change has become the new uncertainty of the whole in our time. It brings with it changes in weather patterns that can have adverse repercussions on human being, upsetting seasonal cycles, harming ecosystems and water supply, affecting agriculture and food production, causing sea-levels to rise. Climate change has a collective consequence on natural resources and the cohesion of nature. Its effects are already noticeable in Nigeria (Ezeudu *et al*., 2012).

III. Material And Methods

The research design is projected to offer a suitable frame work for the study. It envisages questionnaire method which is a well-structured questionnaire was established to include (climate change causes, effects, and mitigation) in Warri Metropolis. Descriptive research design was deployed to find out the effects, causes and mitigations of climate change in study area. This design suggests a profile of described appropriate features of the phenomena of interest from the individual questionnaire. Therefore, this research was undertaken to empower data gathering from widespread respondents on the climate change causes, effects and mitigation in study area. This would support in analyzing obtained responses on causes, effects and mitigations within the study area.

Study Design: Prospective open label observational study

Study Location: The Warri city is an oil producing area located in south-south (Niger Delta) region of Nigeria and houses an annex of the Delta State Government House. It served as the capital of the then Warri province during colonial masters. It shares borders with Ughelli/Agbarho, Okpe, Sapele, Uvwie and Udu although most of these places, notably Udu, Okpe and Uvwie, have been unified to the larger cosmopolitan Warri. Osubi houses an airport that serves the city. Effurun considered as the entryway to and the economic nerve of the city (Eddy, 2007).

Study Duration: November 2019 to September 2021.

Sample size: 307 Respondents.

Sample size calculation: The sample extent and the possibility of the questionnaire were primarily on climate change (causes, effects and mitigation) from Warri metropolis inhabitants. According to national population

census figures for (2006) Warri has population of 311,970. So, some fragments of the population were used to denote the total sample population.

Subjects & selection method: The technique deployed for sampling in this study was simple random sampling method, because it offered the parameter an accidental selective respondent in the study area and the questionnaires was focused to them.

Respondent Demographic Characteristics:

1. Age
2. Sex
3. Occupation
4. Duration of Residency
5. Matrimonial Status
6. Learning Qualification

Respondents Insight on Climate Change:

1. Causes
2. Effects
3. Mitigations

Procedure methodology

The research procedure is projected to offer a suitable frame work for the study. It envisages questionnaire method which is a well-structured questionnaire was established to include (climate change causes, effects, and mitigation) in Warri Metropolis. Descriptive research methodology was deployed to find out the effects, causes and mitigations of climate change in study area. In this research methodology suggests a profile of described appropriate features of the phenomena of interest from the individual questionnaire. Therefore, this research was undertaken to empower data gathering from widespread respondents on the climate change causes, effects and mitigation in study area. This would support in analyzing obtained responses on causes, effects and mitigations within the study area.

Quantitative data analysis procedure was deployed for the purpose of this study. The data analysis form part of the rudimentary questions raised in the problem statement. The aspect of the climate change (causes, effects and mitigation) was evaluated, discussed, compared and compared. This data analysis was based on their data type using Excel, SPSS 23, and Office Word format. This data analysis focuses on numerical/quantitative data analysis.

Statistical analysis

The data was analyzed with IBM SPSS V23 software on Windows 10, the result from software was compared with the results of different variables used in the research questionnaires. Microsoft Excel was deployed to summarize the data collected from the Warri Metropolis.

IV. Result

The Respondent Demographic Characteristics

The respondent's demographic characteristics is well thought-out in this research work consist of age, sex, occupation, duration of residency, matrimonial status, and learning qualification.

Table no1: Shows the complete descriptive Statistical illustration of the demographic characteristics of the respondent.

Statistics

		Age	Sex	Occupation	Duration of Stay	Marital Status	Family Size	Education Qualification	Name of the Area	Date
	Valid	307	307	307	307	307	307	307	307	307
	Missing	0	0	0	0	0	0	0	0	0

The table no1above shows the complete descriptive Statistical illustration of the demographic characteristics of the respondent in which the three vital data; age, duration of stay in the study area and educational qualification of the respondent were shown and discuss below.

Table no2: Shows the age range of the respondent in form of frequency, percent, valid percent and cumulative percent.

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-30	149	48.5	48.5	48.5
	31-40	97	31.6	31.6	80.1
	41-50	57	18.6	18.6	98.7
	51-60	4	1.3	1.3	100.0
	Total	307	100.0	100.0	

The result from the Table no2 above indicate that 48.5% of the respondent are within the range of 20-30 years, 31.6% are within the range of 31-40 years, 18.6% are at the range of 41-50 years and 1.3% are at range of 51-60 years. This shows that population of the people of Warri are mostly youths with low proportion of old aged people and this can help to support/validate the data of this research that their age can be a reason to tell their experience of the climate change in the area.

Table no3: Shows the frequency, percent, valid percent and cumulative percent of the duration stay of the respondent in the study area.

Duration of Stay

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-5 Years	114	37.1	37.1	37.1
	6-10 Years	144	46.9	46.9	84.0
	11-15 Years	28	9.1	9.1	93.2
	16-20 Years	12	3.9	3.9	97.1
	21-25 Years	6	2.0	2.0	99.0
	26-30 Years	1	.3	.3	99.3
	31-35 Years	1	.3	.3	99.7
	46-50 Years	1	.3	.3	100.0
	Total	307	100.0	100.0	

Table no3 above shows the duration years of the respondents, which shows the large percent of stay in the study area, is 46.9% within the range of 6-10 years, 37.1% within the range of 1-5 years follows by 11-15 years 9.1%, 16-20 years 3.9%, 21-25 years 2.0% and the remaining are below 1%. This is very significance in this study, as it helps the researcher to ascertain the number of years the respondent spent in the study area and also how differences he experience in the climate change in area.

Table no4: Shows educational qualification of the respondent in the form of frequency, percent, valid percent and cumulative percent.

Educational Qualification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Primary	3	1.0	1.0	1.0
	Secondary	43	14.0	14.0	15.0
	Tertiary	253	82.4	82.4	97.4
	Non Formal Education	8	2.6	2.6	100.0
	Total	307	100.0	100.0	

The educational qualification of the respondent in the study area is 82.4% Tertiary, 14.0% Secondary, 2.6% Non-Formal and 1.0% with primary education. This result aid the researcher to ascertain the literacy level of the respondents. Thus as illustrated in the table no4 above it shows that Warri is a literate city as only 2.6% of the respondents are without any form of formal education. And the level of education is likely to determine the perception and understanding of the causes, effects and mitigation of climate change in the study area.

Descriptive Statistical Illustration of the Responses on the Causes, Effects and Mitigations of Climate Change in the Warri Metropolis

The results that are presented were carefully based on responses of the populace in the research area, in line with the research objectives as follows.

Causes of Climate Change

Table no5: Shows the responses of the respondent as Industrial Activity is part of the causes of climate change in the form of frequency, percent, valid percent and cumulative percent.

Do you Believe Climate Change in Warri is Cause by Industrial Activities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	75	24.4	24.4	24.4
	Agree	133	43.3	43.3	67.8
	Disagree	73	23.8	23.8	91.5
	Strongly Disagree	26	8.5	8.5	100.0
	Total	307	100.0	100.0	

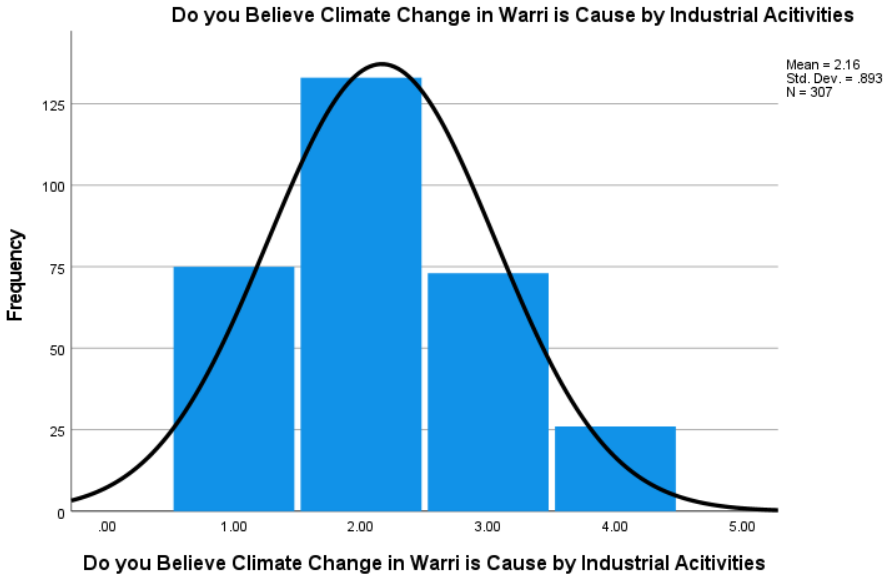

Figure 1.0 Symmetrical Distribution Curve on responses of the respondent as Industrial Activity is part of the causes of climate change

The histogram above shows the distribution of responses on a scale of 1 to 5 ranging from strongly agree, agree, disagree to strongly disagree. The distribution mean is 2.16 and standard deviation is 0.893which shows a normal distribution having high number of agreed (both strong and weak believes), followed by disagree (both weakly and strongly) with the statement given on the cause of climate change in the study area. And the Skewness curve shows the data has symmetrical distribution. This implies that most people believed that an industrial activity is among the major causes of climate change in the area. This can be attributed to high number of industries in the area as the place housed the famous Nigerian petroleum Industry.

Table no6: Shows the responses of the respondent as carbon dioxide is part of the causes of climate change in the form of frequency, percent, valid percent and cumulative percent.

Do you Believe Climate Change in Warri is Cause by Carbon Dioxide

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	49	16.0	16.0	16.0
	Agree	171	55.7	55.7	71.7
	Disagree	67	21.8	21.8	93.5
	Strongly Disagree	20	6.5	6.5	100.0
	Total	307	100.0	100.0	

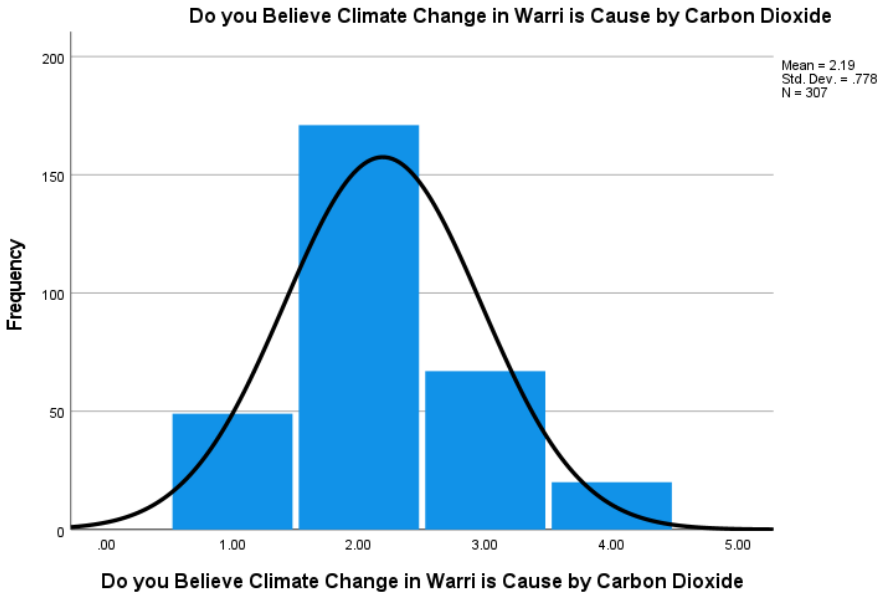

Figure 2.0 Symmetrical Distribution Curve on responses of the respondent as carbon dioxide is part of the causes of climate change

The histogram above shows the distribution of responses on a scale of 1 to 5. The distribution mean is 2.19 and standard deviation is 0.778 which is said to be normal with a very much number of number of agreed, followed by a small number of disagreed, strongly agreed and a very few strongly disagreed. The curve hence shows symmetrical distribution having both tale looks equal. This tells researcher that, huge number of the respondent agreed carbon dioxide is part of the causes of climate change in Warri Metropolis. These result evident to finding in journal of public perception of environmental pollution in Warri, Nigeria by akinbosola, B M et al., 2012.

Table no7: Shows the responses of the respondent as Human Activates is part of the causes of climate change in the form of frequency, percent, valid percent and cumulative percent.

Do you Believe Climate Change in Warri is Cause by Human Activities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	54	17.6	17.6	17.6
	Agree	137	44.6	44.6	62.2
	Disagree	95	30.9	30.9	93.2
	Strongly Disagree	21	6.8	6.8	100.0
	Total	307	100.0	100.0	

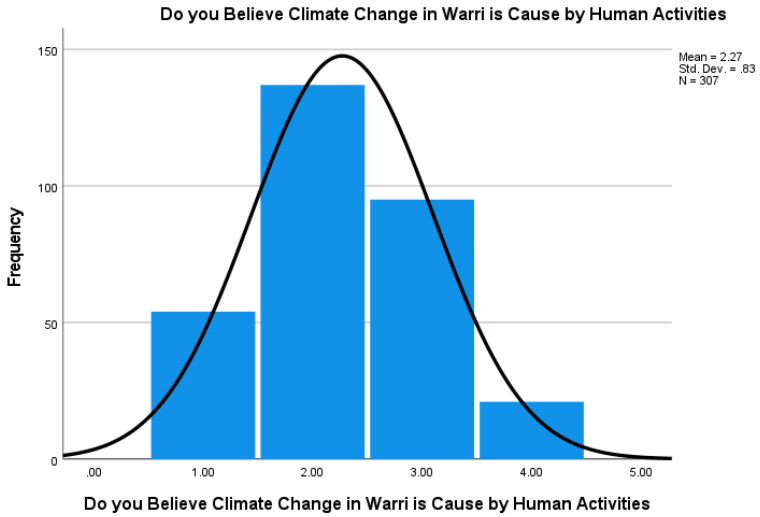

Figure 3.0 Symmetrical Distribution Curve on responses of the respondent as Human Activates is part of the causes of climate change

From the chart above (histogram) it shows a normal distribution having a higher number of agreed, follow by disagree, strongly agree and a very small numbers of strongly disagree. It indicates that, most people believe human activities are part of the causes of climate change in Warri but also some people don't believe. The curve shape shows symmetrical distribution and the distribution mean is 2.27 and standard deviation is 0.83. Therefore, this can be due to different perception of the respondent on type of the human activities that can cause the climate change in the area. This can be reference to IPCC fifth assessment report which said ''Humans emissions and activities have caused around 100% of the warming observed since 1950''.

Effect of Climate Changes

Table no8: Shows the responses of the respondent as Rising Maximum Temperature is part of the effects of climate change in the form of frequency, percent, valid percent and cumulative percent.

Do you Believe Rising Maximum Temperature is Part of Effect of Climate Change in Warri

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	69	22.5	22.5	22.5
	Agree	153	49.8	49.8	72.3
	Disagree	75	24.4	24.4	96.7
	Strongly Disagree	10	3.3	3.3	100.0
	Total	307	100.0	100.0	

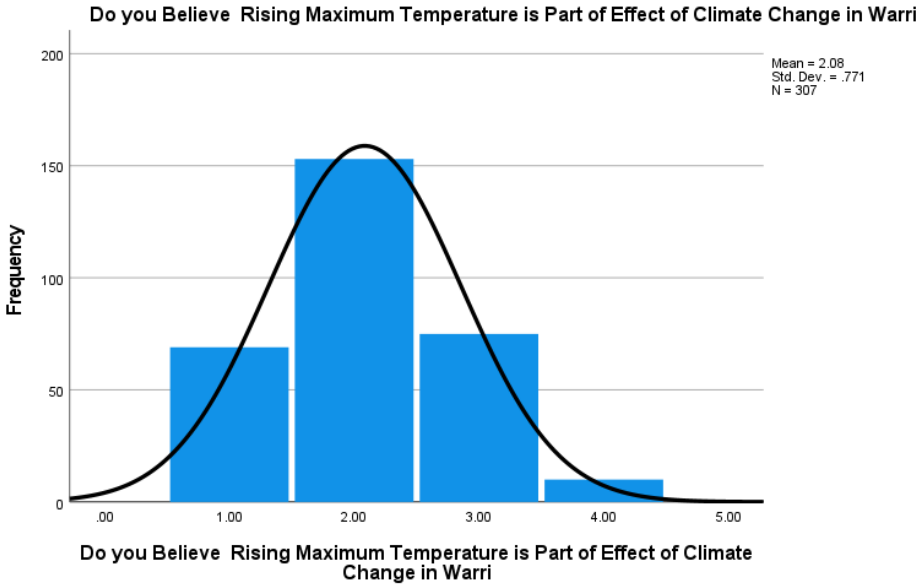

Figure 4.0 Symmetrical Distribution Curve on responses of the respondent as Rising Maximum Temperature is part of the effects of climate change

The histogram above reveals a normal distribution as the respondent answered agreed are very high, followed by few disagreed, strongly agreed and very few strongly disagreed. The distributions mean 2.08 and standard deviation of 0.771. Also the curve is symmetrical distribution. From the respondent responses the researcher can said the people in the study area believe rising in the maximum temperature is part of the effect of climate change in the area. This result can be evident to the finding by ''Journal on Determining Temperature Extreme in Warri City, Niger-Delta Region, Nigeria'' that said rising temperature have taken center stage in international concerns on climate change and global warming (Onifade and Olaseni, 2019).

Table no9: Shows the responses of the respondent as raising sea level is part of the effects of climate change in the form of frequency, percent, valid percent and cumulative percent.

Do you Believe Rising Sea Level is Part of Effect of Climate Change in Warri

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	62	20.2	20.2	20.2
	Agree	135	44.0	44.0	64.2
	Disagree	84	27.4	27.4	91.5
	Strongly Disagree	26	8.5	8.5	100.0
	Total	307	100.0	100.0	

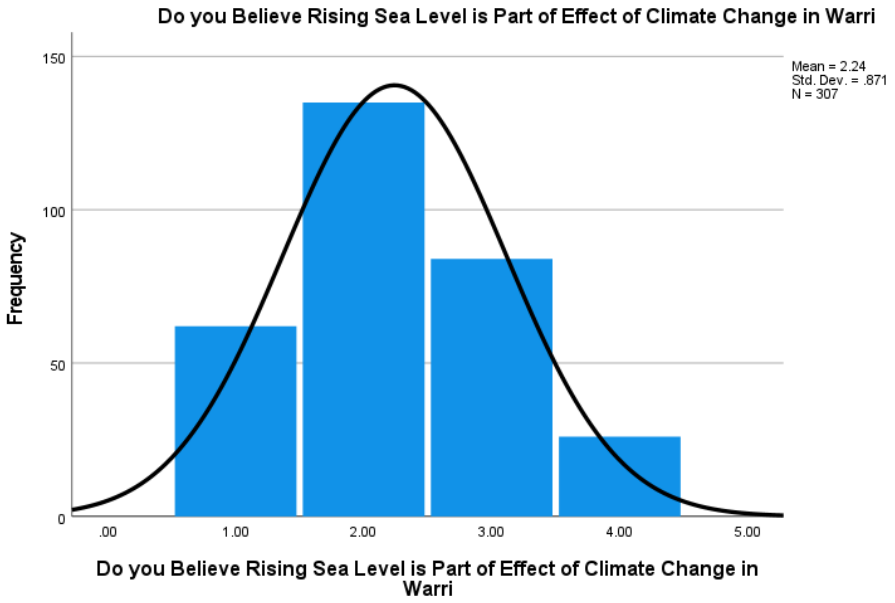

Figure 5.0 Symmetrical Distribution Curve on responses of the respondent as raising sea level is part of the effects of climate change

Histogram above shows a normal distribution as the responses of agreed is very high followed by disagreed strongly agreed and strongly disagreed. The result mean is 2.24 and standard deviation of 0.871. And the distribution curve is symmetrical as distribution is at the center. Therefore, this implies rising of sea level is part of the climate change the study is experiencing. It also corresponds to the fact that Warri is a swamplands receive large volume of floodwaters through numerous distributaries and creeks of the River Niger flowing through the ocean (Nigeria Climate Review Bulletin 2007).

Table no10: Shows the responses of the respondent as loss of biodiversity is part of the effects of climate change in the form of frequency, percent, valid percent and cumulative percent.

Do you Believe Loss of Biodiversity is Part of Effect of Climate Change in Warri

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	54	17.6	17.9	17.9
	Agree	146	47.6	48.3	66.2
	Disagree	78	25.4	25.8	92.1
	Strongly Disagree	24	7.8	7.9	100.0
	Total	302	98.4	100.0	
Missing	System	5	1.6		
Total		307	100.0		

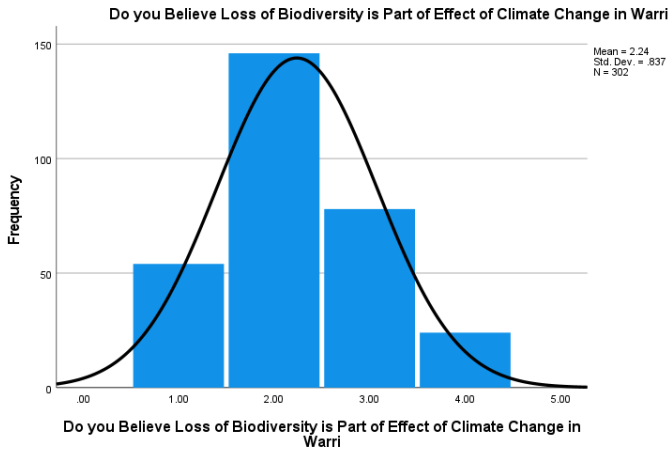

Figure 6.0 Symmetrical Distribution Curve on responses of the respondent as loss of biodiversity is part of the effects of climate change

From the histogram above, it shows a normal distribution from the responses of the respondent starting from the high agreed followed by disagreed, strongly agreed and strongly disagreed. The distribution mean is 2.24 and standard deviation is 0.837 it also shows symmetrical distribution from the curve line. So this can be clearly stated by the researcher, loss of biodiversity is part of effect of climate change in the study area. The result of this findings is also corresponding to the finding in international journal of Avian and Wildlife Biology which stated, some biodiversity of global importance is found in Delta State (Nduka JO, *et.*, al 2018).

Mitigations of Climate Changes

Table no11: Shows the responses of the respondent as renewable energies is part of the mitigations of climate change in the form of frequency, percent, valid percent and cumulative percent.

Do you Believe Renewable Energies is Part of Mitigation of Climate Change in Warri

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	83	27.0	27.1	27.1
	Agree	137	44.6	44.8	71.9
	Disagree	70	22.8	22.9	94.8
	Strongly Disagree	16	5.2	5.2	100.0
	Total	306	99.7	100.0	
Missing	System	1	.3		
Total		307	100.0		

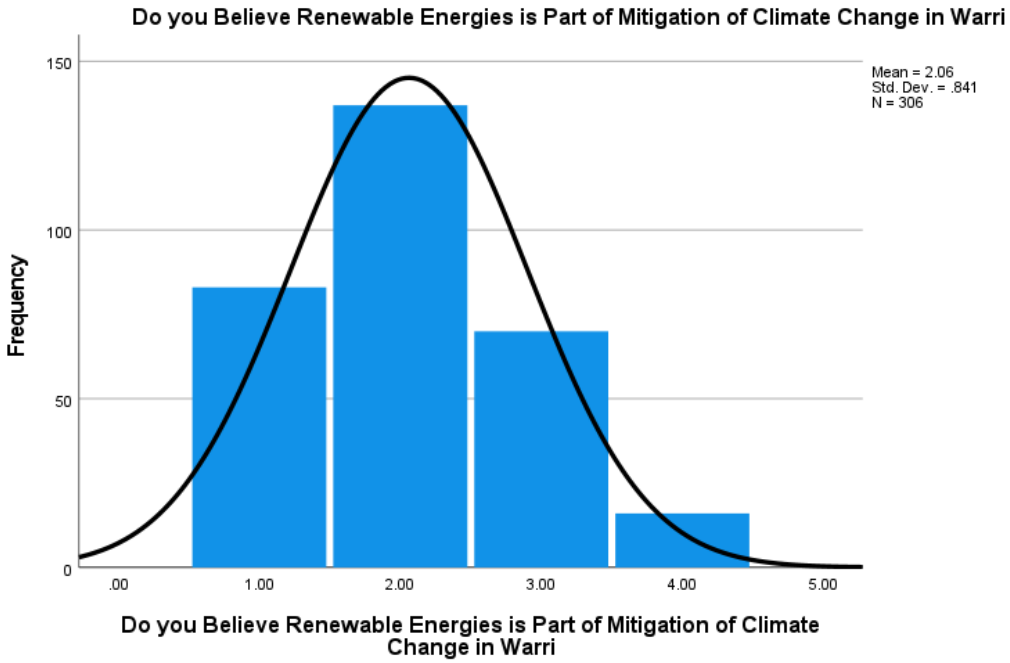

Figure 7.0 Symmetrical Distribution Curve on responses of the respondent as renewable energies is part of the mitigations of climate change

From the histogram above it shows a clear normal distribution of the responses starting from the high which are agreed followed by strongly agreed, disagreed and strongly disagreed. It also shows a symmetrical distribution curve with mean 2.06 and standard deviation 0.841. The responses clearly show the people in the study believe use of renewable energies can help in bringing solution to climate change. This is relevant to the finding in journal of renewable energy resources by Twidell and Weir, 2015 that Renewable energy supplies reduce the emission of greenhouse gases drastically if replaced with fossil fuels.

Table no12: Shows the responses of the respondent as Efficient Consumption and Recycling is part of the mitigations of climate change in the form of frequency, percent, valid percent and cumulative percent.

Do you Believe Efficient Consumption and Recycling is Part of Mitigation of Climate Change in Warri

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	90	29.3	29.3	29.3
	Agree	129	42.0	42.0	71.3
	Disagree	77	25.1	25.1	96.4
	Strongly Disagree	11	3.6	3.6	100.0

	Total	307	100.0	100.0	

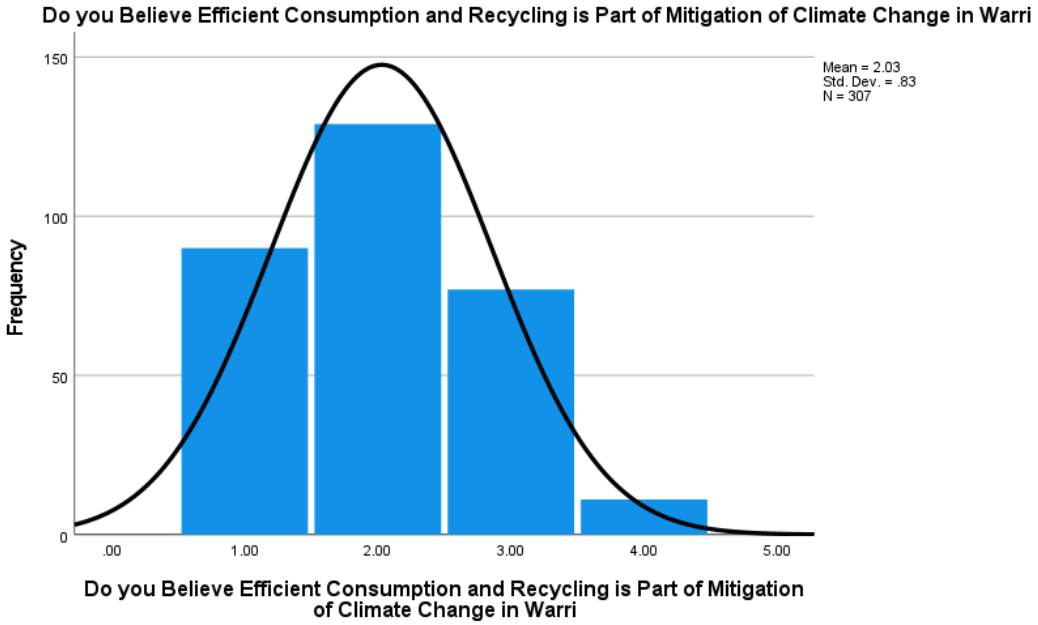

Figure 8.0 Symmetrical Distribution Curve on responses of the respondent as Efficient Consumption and Recycling is part of the mitigations of climate change

The histogram above shows the distribution of responses from the respondent ranging from the much number of respondents with choice of agreed followed by strongly agreed, disagreed and strongly disagreed. The curve line of the distribution shows a symmetrical distribution and also shows mean 2.03 and standard deviation 0.83. Therefore, the result tells the researcher efficient consumption and recycling is agreed by the respondent as part of the mitigation of climate change in the study area. This reference to the finding in research ‘‘Journal of Environmental and Earth Sciences’’ that energy savings through recycling are of important environmental benefit (Eneh and Oluigbo, 2012).

Table no13: Shows the responses of the respondent as Reforestation is part of the mitigations of climate change in the form of frequency, percent, valid percent and cumulative percent.

Do you Believe Reforestation is Part of Mitigation of Climate Change in Warri

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	91	29.6	29.6	29.6
	Agree	142	46.3	46.3	75.9
	Disagree	67	21.8	21.8	97.7
	Strongly Disagree	7	2.3	2.3	100.0
	Total	307	100.0	100.0	

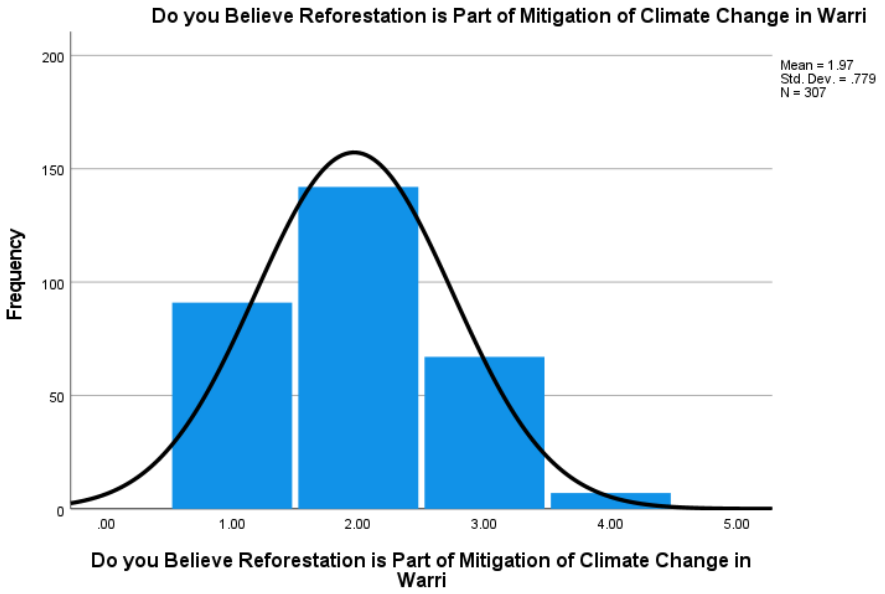

Figure 9.0 Symmetrical Distribution Curve on responses of the respondent as Reforestation is part of the mitigations of climate change

From the above histogram it shows much number of respondents chooses agreed and strongly agreed followed with few responses with disagreed and strongly agreed. The distribution line shows a symmetrical distribution with mean 1.97 and standard deviation 0.779. This can be report that reforestation is part of mitigation of climate change in Warri Metropolis. Its relevance to the finding in a research that stated, intensive afforestation and reforestation should be put in a place to help in mitigating climate change in Nigeria (Ogunniran BI., 2018)

V. Discussion

From the field survey that was conducted via questionnaire administration within the research area, a finding reveals that a lot of factors contributing the causes and the effects of climate changes in the research area. Nevertheless, due the large quantity of the data, the major findings that are more interconnected to the objectives of this study were discussed as follows.

Causes of Climate Changes

From the IPCC Fifth Assessment Reports, 2014 confirmed that the climate changes defend on current civilization of our industrial activities, have always increases carbon dioxide levels in the atmosphere from 280 parts per million level to 414 parts per million within the last 150 years. Also the panel concluded there's better than 95% percent possibility that human-produced greenhouse gases such as methane, carbon dioxide, and nitrous oxide is the reason that leads to too much of the practical rise in Earth's temperatures for more than the past 50 years (Oreskes, 2004). Previously Table no5, 6 and 7 showed the greater part of the respondents believed that the industrial activity is part of the major causes of climate changes in Warri. This is ascribed to the high figure of industries in the research area as the place housed the prominent Nigerian petroleum Industry which is locally called 'the oil city'.

Effects of Climate Changes

There were several climate change effects recognized within the research (study) area. Mostly these effects are linked to one another and associated to one another. For example, Table no8 exposed that raising maximum temperature is in the midst of the key effects of climate change inside the research area. It also reveals that more than 70% of the questionnaire respondents agreed with it. Also the increase in temperature consequently resulted to some of the effects such as rising sea level (Table no9), loss of biodiversity (Table no10) and several health risk factors. A report according to the IPCC, a 1.5°C (2.7°F) regular increase may place 20-30% of the species at high risks of extermination. If the planet warms by more than 2°C, most ecosystems will struggle.

Table no10 showed that 17.6 and 47.6 % of the respondents alleged that the loss of biodiversity is one of the major effects of the climate change in Warri. This may perhaps be credited to the adverse increase of temperatures and the climate upheavals troubling the environment, transforming the situation and cycles of

many plant reproductions. Furthermore, scarcity of resources as the effect of the climate changes is altering living way of life and traveling cycles of animals as additional by the respondents. Departure of several varieties together with endemic species or conversely, the interference of enveloping species that terrorize crops and many other animals were previously witnessed in the study area. Hence climate change impacts biodiversity. It is also the sense of balance of biodiversity that is customized and threatened.

Henceforth, Climatologists and Meteorologists around the globe are already witnessing the climate change effects on the weather phenomena. The impact discovered were vast, starting from more or less precipitations, further heat waves and droughts, new natural disasters similar to hurricanes, floods, frost-free season, storms and wildfires, etc (IPCC, 2007). Results commencing from this research study also expose that Warri Metropolis witnessing rising sea level as results showed from Table no9.

Mitigations of Climate Changes

Promoting use of public transportation (efficient consumption and recycling) for example carpooling, is one among the mitigation measures to climate change if adopted in Warri metropolis. Table no12 showed that 29.3 and 42.0% of the respondent agreed with it as part of mitigations to climate change. 'This can certainly help out to reduce emissions of CO_2 and consequently battle global warming' another of the respondents added. Furthermore, declining the emissionsCO_2 from the buildings structures caused by heating, air conditioning, hot lighting or water is requisite both to construct fresh low energy buildings, and to renew the existing constructions were the further procedures employed.

Hence encouraging use of healthier natural resources, stopping massive deforestation and also building agriculture greener and more resourceful were or can also be in the midst of the major priority as actions or procedure to fight climate change effect apply in a lot of places globally. Table no11, 12 and 13 cumulatively showed/revealed that 71.07% of the answers from respondents maintained that renewable energies, efficient consumption and recycling and reforestation were some of the key solutions/mitigations measure to the adopted climate change in the study area (Warri Metropolis).

Mathematically:
Result from each table
Table 11
Agreed = 27.0%
Strongly agreed = 44.6%
71.6%
Table 12
Agreed = 29.3%
Strongly agreed = 42.0%
71.3%
Table 13
Agreed = 29.6%
Strongly agreed = 46.0%
75.3%
Total: 71.6%+71.3%+75.3% = 218.2/total number of the respondents * 100 percent
218.2/307*100 = 71.07%.

VI. Conclusion

As from the foundation the main aim of this research study was to assess/evaluate the Climate Change (Causes, Effects and Mitigations) level in Warri Metropolis. The present research study can be concluded that the study area (Warri Metropolis) and its entire environment are being exposed to risk of climate change of different types. Therefore, this would be definitely as a product of the activities (Causes) mentioned in the earlier part of this research study that confirmed the causes of the climate change results in the effects were the study environment are currently experiencing. Finally, the research study has also institute that the Mitigations to the present Climate Changes as well stated in the earlier chapter will in no doubt help out in bringing or coming up with solution to the Climate Changes within the study area (Warri Metropolis). Therefore, the study recommend that government should put in place and enforce powerful and effective environmental laws that will help in mitigating the climate change in the area through regulating emission of carbon dioxide (CO_2) and industrial activities and also encourage use of renewable energies.

References

[1]. Watson R.T., Nobel I.R., Bolin B., Ravindranath N.H, Verardo D.J., Dokken D.J. (2002) 'Land Use, Land-Use Change, and Forestry' Special Report of the IPCC. Cambridge University Press, Cambridge, United Kindom and New York, USA, 377pp.

[2]. Ikenweiwe N.B., Davies A.O. and Idowu A.A. (2011) 'A Study of Abundance of Planktonic Organisms in Are Lake, Ogun State, Nigeria' International Formulae Group ISSN 1991-86315(5):1790-1795

[3]. Bernstein, L., Bosch, P., Canziani,O., Chen, Z., Christ, R., & Riahi, K. (2008) : Climate Change 2007: Synthesis Report. Geneva: IPCC. ISBN 2-9169-122-4

[4]. Lakeman, J.A. (1996) 'Climate Change (1995): The Science of Climate Change, Contribution of Working Group to the Second Assessment Report of the Intergovernmental Panel on Climate Change' Cambridge University Press Vol. 2:13-15.

[5]. Paolo Cianconi, Sophia Betro and Luigi Janiri. (2020). 'The Impact of Climate Change on Mental Health: A Systematic Descriptive Review' Department of Neurosciences, Institute of Psychiatric, Catholic University, Rome, Italy.

[6]. IPCC (2014): Climate Change 2014. 'Synthesis Report'. Contribution of Working Groups I, II and III to the Fifth Assessment Report.

[7]. Eddy O.W. (2007) 'History of Warri Kingdom' A Reflection of a Rich Heritage pp 1-2.

[8]. Eludoyin A.A and Akinbosola, B.M. (2012), "Public Perception on Enviromental Pollution in Warri, Nigeria. Obafemi, Department of Geopgraphy and Enviroment", University of Pot Hacourt, Port Hacourt Nigeria. J. APPI. Environmental; Management.

[9]. IPCC Fifth Assessment Report (2014). United State Global Climate Change Research Program ''Global Climate Change Impacts in the United State'' Cambridge University Press, (2009).

[10]. Onifade Y.S. and Olaseni V.B. (2019), "International Journal of Environment and Climate Change: Determining Temperature Extreme in Warri City, Niger-Delta Region, Nigeria" Department of Physics, Federal University of Petroleum Recourses. Effurun, Nigeria.

[11]. Nigeria Climate Review Bulletin (2007). Nigerian. Metrological Agency. NIMET-NOAA (2012).

[12]. Izah S.C., Aigberua A.O., Nduka J.O. et al. (2018). "International Journal of Avian and Wildlife Biology. Factors Affecting the Population Trend of Biodeversity in Niger Delta Region of Nigeria" Int. Journal Avian and Wildlife Bio.

[13]. Twidell, J. and T. Weir (2015). 'Renewable Energy Resources, Routledge'. Assessment of Hydropower Potential of Selected Rivers in North Shoa Zone, Amhara Regional State, Ethiopia. Ameriacan Journal of Energy Research. 2019; Vol. 7 No. 1, 15-18 Doi: 10.12691/ajer-7-1-2.

[14]. Anselm E.O. Eneh and Stephen N. Oluigbo. (2012). Research journal of Environmental and Earth Sciences. Mitigating the Impact of Climate Change through Waste Recycling. Department of Architecture, Ahmadu Bello University, Zaria Nigeria.

[15]. Ogunniran BI. (2018). Ozone Layer Depletion and Climate Change in Nigeria-Problems and Prospects: A Review. Global Journal of Research and Review.

[16]. Oreskes N. (2004) 'The Scientific Consensus on Climate Change' Essay on Science and Society Vol. 306 Issue 5702 DOI: 10.1126/science.1103618 pp 1686.

[17]. Press release; Intergovernmental Panel on Global Warming of 1.5^0C. Incheon, Republic of Korea: Intergovernmental Panel on Climate Change (IPCC). 2018-10-08.

[18]. Bolin B. (2007). 'International Assessments of Climate Change; Part II' IPCC United States. 21036869.

[19]. Sakamarock W.C., Joseph B.K., Jimy D., David O.G., Dale M.B., Michael G.D., Xiang-Yu H., Wei and Jordan G.P. (2008) 'A Description of the Advanced Research WRF version 3' National Center for Atmospheric Research Boulder, Colorado, USA V3:29-62.

[20]. Olaniyi, O. A., Ojekunle, Z. O., & Amujo, B. T. (2013). Review of climate change and its effect on Nigeria ecosystem. *International Journal of African and Asian Studies-An Open Access International Journal*, *1*, 57-65.

[21]. Ezeudu I. J., Ani, W. U., Ugwunta, D. O., Ezeudu, I. J., & Ugwuanyi, G. O. (2012). An empirical assessment of the determinants of bank profitability in Nigeria: Bank characteristics panel evidence. *Journal of Accounting and Taxation*, *4*(3), 38-43.

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