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PEOPLE'S PERCEPTIONS OF THE CHANGING CLIMATE AND HUMAN INFLUENCE IN KATSINA STATE, NORTH-WESTERN NIGERIA.

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ABSTRACT
Scientists recently reach a consensus that the climate change experienced currently is an outcome of human activities and this has been proven through the tests by atmospheric models and the measurable investigations of verifiable information records. This article aimed to assess the perception of the indigenes of Katsina state on the human influence in relation to the current changing climate through a larger step to cover both the urban and rural areas. 100 Questionnaire and/or a checklist interview were conducted from two sources (local government headquarter and weekly markets) in the seven oldest local governments of the state leaving us with 1387 respondents. Results on the observed changes revealed that reduction in the amount of rainfall received per year has the highest mean score of 56.7 while the increase in temperature has the lowest mean score value of 30.1. the view on presumable causes of climate change revealed that respondents with the opinion that climate change is a natural process destined by God has the highest mean score of 58.4, followed by those with the view of technological development through emissions from engines having a mean score of 55.7. Deforestation and Urbanisation have the mean score of 52.9 and 31.1 respectively. This means a high number of people in the state are not well informed about human influence to climate change. For these reasons, government and other stakeholders should extend their climate change awareness campaign deep into the rural communities where no care is given to environment sustainability issues.

Keywords: Climate change; Human Influence; Indigenes; Katsina state; Perception

INTRODUCTION

Variability in Atmospheric conditions and environmental change are thought to have been created basically by natural processes and anthropogenic (Human) activities (Hulme *et al*., 2001). The natural processes incorporates the fundamental interaction between the oceans and the environment, volcanic activities and the changes in the earth's orbital forcing which alter and causes changes in the amount of sun's energy received by the earth (Crowly, 2000). The modification and alteration impelled and propelled by humans to the natural world have helped the high increase in the rate of harmful gases into the global atmosphere, along these lines bringing on an unnatural weather and climatic change (Tunde *et al.*, 2013).

Recently, there was an agreement and consensus within the scientific community that anthropogenic activities constituted the real reason for environmental changes, these proofs originated from two sources. The examinations run by atmospheric (Climate) models on one hand and the measurable investigations of verifiable information records on the other (Kaufmann et al. 2006). For many scientists this anthropogenic period is thought to have been started about 150 to 200 years ago, when the industrial revolution in Europe started delivering and discharging gasses at rates sufficient to modify the global atmosphere (Ruddiman, 2003). Study focused around geographical and paleo-climatic information demonstrates that at present the concentrations of greenhouse gases (GHG) in the atmosphere are higher than at any period in the last 15 million years (Tripati *et al*., 2009). However, following the pre-industrial period, increase in the world's human population have been helpful in high measures of carbon dioxide (CO_2) and other greenhouse gasses in the atmosphere (Pearman *et al*, 1986).

The dense nature of carbon dioxide which is one of the most effective greenhouse gases in the global atmosphere has varied irregularly from around 180 and 310 ppm in the most recent 400,000 years (Petit et al., 1999). However, the concentration of CO_2 in the atmosphere has attained up to 405.51 part per million (ppm) in September, 2018 (http://co2now.org/) from its pre-industrial value of 278 ppm and keeps on increasing at a level of 1.8 ppm every year (Blunden and Arndt, 2013). This abnormal state of CO_2 increase in the global atmosphere has been accepted to be generally the influence of human induced climatic change (Rehan and Nehdi, 2005). Studies on the level of CO_2 density in the global atmosphere revealed that more than 350 gigatones of carbon (Gtc) which is equivalent to about 1285 billion metric tons of CO_2 have been discharged and released into the environment through human activities since the year 1959 (Ballantyne *et al*., 2012).

On the other hand, there is also another proof that methane as one of the popular and harmful greenhouse gases that traps heat in the atmosphere demonstrates an enormous and remarkable increase in density in the course of the most recent two centuries, with its density now considerably twice its pre-industrial level (Petit *et al*., 1999). Before the pre-industrial period evidence from ice core shows that methane varied irregularly between around 300 and 800 ppb and at present methane atmospheric density reach up to 1700 ppb in Southern side of the equator and 1800 ppb in the Northern part (Loulergue *et al*., 2008). The global atmospheric density of other greenhouse gases, for example, nitrous oxide and

chlorofluorocarbons have likewise experienced an increase due to the quest for development and the use of energy in the most recent two centuries and the mean density of water vapour which is an alternate key greenhouse gas in the air has never gone underneath 3,000 ppmv all through the Holocene period, the most recent 10,000 years (Loáiciga, 2003).

Some of the most devastating adverse effects of climate change in the subtropical regions of the world and Nigeria in particular includes frequency of drought, increased infestation of crop by pests and diseases, increased rural-urban migration, increased biodiversity loss, depletion of wildlife and other natural resource base, changes in the vegetation type, decline in forest resources, increased health risks and the spread of infectious diseases (Abaje and Giwa, 2007) and despite the awareness of changing weather patterns, many rural people are not particularly well informed about global climate change (Maiwada, 2017). This low level of awareness of climate change is often attributed to level of educational attainment on one hand and limited awareness campaigns on the other. Rural people who are vital and active parts of many ecosystems may help to enhance the resilience of these ecosystems (Jan & Anja, 2007). Their livelihoods depend on natural resources that are directly affected by climate change, and they often inhabit economically and politically marginal areas in diverse, but fragile ecosystems. In addition, they interpret and react to climate change effects in more creative ways, drawing on traditional knowledge as well as new technologies to find solutions, which may help society at large to cope with the impending changes (Hulme *et al*., 2001).

Many researches (Adebayo and Oruonye, 2013; Abaje, *et al*., 2014; Abaje, 2016; Maiwada, 2017; Hazo, *et. al*., 2019) were conducted in relation to level of awareness, perception, effects and adaptation strategies of climate change in some parts of Katsina state and Nigeria in general. The results revealed a very high level of climate change awareness and a very good knowledge of climatic variability based on level of educational attainment. This research article aimed to assess the perception of the indigenes of Katsina state on the human influence in relation to the current changing climate through a larger step to cover both the urban and rural areas where the level of educational attainment is very low and people are unaware of the consequences of their actions.

Study Area.

Katsina as a state was created on 23rd September, 1987. Located between $11^{0}08'$N to $13^{0}22'$N of the imaginary line of equator and between $6^{0}52'$E to $9^{0}20'$E of the Greenwich meridian with an approximate land surface areas of about 3,370km^2 (Kabir and Maiwada, 2018). Katsina state is bordered to the North by Niger republic, to the East by Kano and Jigawa states, to the South by Kaduna and to the West by Zamfara state. The demographic data from the 2006 population census revealed that the state has a population of 3,753,133 people with a population density of 189 persons living per square kilometre (NPC, 2006). Katsina state inherited seven local governments from Kaduna state when the state was given. This oldest local governments are Katsina, Daura, Kankia, Mani, Dutsinma, Malumfashi and Funtua (Classified as zones in the methodology section).

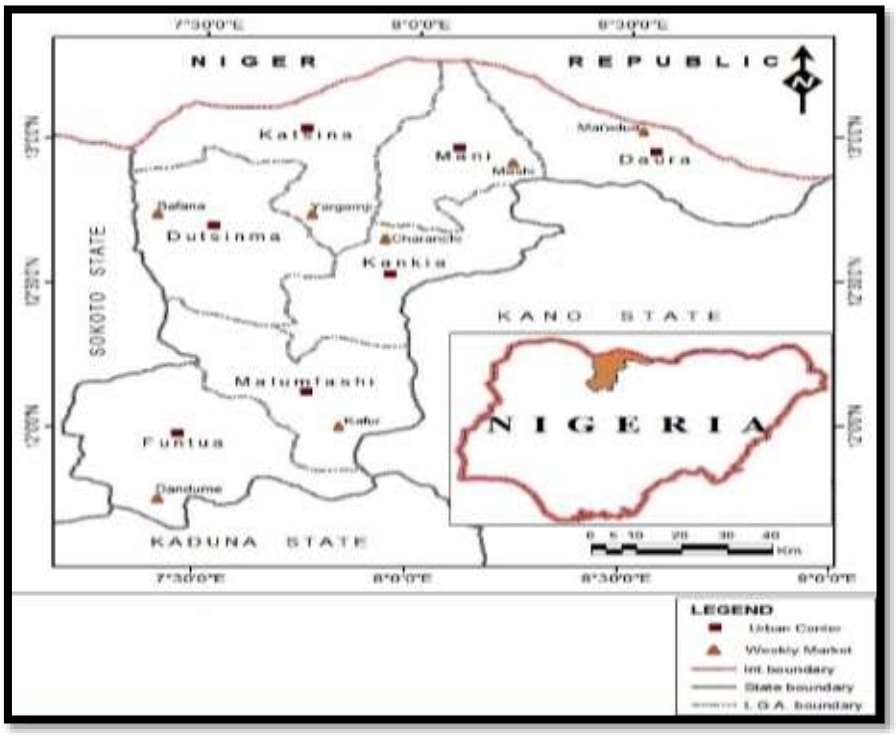

Figure 1: Map of the study area with data collection sites.
Source: Adopted from Google Earth map 2019.

Generally, the climate in Katsina state varies considerably according to months and seasons. They are cool dry (Hamattan) season from December to February, a hot dry season from March to May, a warm wet season from June to September and a less marked season after rains during the months of October to November, characterised by decreasing rainfall and a gradual lowering of temperature (Ruma and Sheikh, 2010). Temperature in Katsina state is uniformly high throughout the year due to the location of the state in the tropics with a mean annual temperature of about 27^0C, but often air conditions differ between seasons. The mean monthly temperature vary from 24^0C to 31^0C (Maiwada, 2017). Base on rainfall reception per annum, Katsina state is classified into two, the southern part of the state (from Funtua to Dutsinma) belongs to the tropical continental receiving a total annual rainfall figures ranging from about 1000mm around Funtua to over about 800mm around Dutsinma while the northern part of the State (from around Kankia to the extreme northeast i.e Daura) receives a total annual rainfall figures ranging from 600-700mm (Abaje *et al*., 2014).

METHODOLOGY

In this research, the data was gathered using stratified sampling method of data collection. Katsina state was divided into seven zones base on the seven oldest local government areas inherited from Kaduna state when Katsina was given a state. These zones are considered as the main urban centres in the state and to get the people's perception of Human contributions to global climate change, rural areas must be involved to cover the whole state. This prompted the use of weekly markets in each of these zones. The weekly markets were strategically selected based on their locations and how they gather people from the rural areas per and near, for example locations along the federal or state high way, their proximity to a particular area where certain unsustainable environmental activity takes place. Etc.

In each zone, the researchers with the aid of trained research assistant administered and collected the questionnaire on the spot to ensure maximum return rate and/or a checklist interview was conducted where applicable from two sources. Firstly, the zone's urban town (local government headquarter) and secondly a strategically selected weekly market in that zone. In Katsina zone, Yar gamji market was selected which operates every Saturday, Daura zone, Mai'adua market was selected which operates every Sunday, Funtua zone, Dandume market was selected which operates every Sunday, Malumfashi zone, Kafur Market was selected which operates every Sunday, Dutsinma zone, Safana market was selected which operates every Friday, Mani zone, Mashi market was selected which operates every Tuesday and in Kankia zone, Charanchi market was selected which operates every Sunday. In each zone 100 questionnaires were administered in the urban centre and 100 checklist interviews were conducted in the selected weekly market for rural people with low level of educational attainment. We lost some of our questionnaires for example in Katsina zone we lost only 1, Daura zone 4, Dutsinma zone 2, Kankia zone 2, Mani zone 3, Malumfashi zone 1 and Funtua zone none. This left us with a total number of 1387 respondents having only 13 questionnaires lost from the 1400 initially planned. The data generated from the study were analysed using statistical package for social science (spss) version 25 and mean score was used.

RESULTS AND DISCUSSION

Table 1 Present the result of the observed changes cause by the climate change among the respondents. Data of four parameters was gathered. These include increase in temperature, reduction in the amount of rainfall, increase drought and shift in rainfall onset and offset.

Table 1: Observed Changes of climate change by the Katsina state indigenes.

Observed changes	Katsina Zone		Daura Zone		Dutsinma Zone		Kankia Zone		Mani Zone		Malumfashi Zone		Funtua Zone		Total		Mean Score	Rank
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%		
Increase in Temperature	28	15	36	18	39	20	32	16	20	11	34	17	22	11	211	14	30.1	4
Reduction in amount of rainfall	65	33	46	24	42	21	48	24	57	29	71	35	68	34	397	29	56.7	1
Increased drought	55	27	62	32	52	26	65	33	52	26	47	24	49	24	386	28	55.1	3
Change in rainfall onset & cessation dates	51	25	52	26	65	33	53	27	68	34	47	24	61	31	393	29	56.1	2
Total	199	100	196	100	198	100	198	100	197	100	199	100	200	100	1387	100		

Source: Field survey, 2018.

The view of the respondents in table 1 above revealed that in all the seven zones of the state, reduction in the amount of rainfall received per year has the highest mean score of 56.7 and having the highest rank of 1 while the increase in

temperature has the lowest mean score value of 30.1 having the rank of 4. The change in rainfall onset and cessation dates and increased drought has the mean score of 56.1 and 55.1 with rank 2 and 3 respectively. Out of the seven zones, Dutsinma zone has the highest percentage (20%) of respondents with the view of increase in temperature as the observed changes. Malumfashi zone has the highest percentage (35%) with the view of reduction in the amount of rainfall received followed by Funtua zone (34%). For the increased frequency of drought, Kankia zone is the highest with 33% followed by Daura zone with 32%. Mani zone and Dutsinma zone have the highest number of respondents that have the view of rainfall onset and offset shift with 34% and 33% respectively. Collectively, out of the 1387 respondents, 397 respondents are of the opinion that the amount of rainfall received has decreased over the last few decades, 393 respondents agreed that rainfall onset and offset is unstable and constantly shifting compared to the previous decades, 386 respondents believed that increased drought frequency is the main observed change and only 211 respondents agreed that the temperature is increasing, this may be due to their level of education or the their level of awareness of the subject matter.

Table 2: Presumable causes of climate change in Katsina state.

Presumable causes	Katsina Zone		Daura Zone		Dutsinma Zone		Kankia Zone		Mani Zone		Malumfashi Zone		Funtua Zone		Total		Mean Score	Rank
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%		
Natural process from God	33	16	62	32	55	28	66	34	73	37	69	35	51	25	409	29	58.4	1
Emissions from Engines	65	33	55	28	59	30	52	26	43	22	54	27	62	32	390	28	55.7	2
Deforestation	59	30	53	27	55	28	52	26	50	25	43	22	58	29	370	27	52.9	3
Urbanization	42	21	26	13	29	14	28	14	31	16	33	16	29	14	218	16	31.1	4
Total	199	100	196	100	198	100	198	100	197	100	199	100	200	100	1387	100		

Source: Field survey, 2018.

Table 2 above presents the presumable causes of climate change, base on the data gathered on four parameters (Natural process from God, emissions from engines, Deforestation and Urbanisation). In this context the result revealed that respondents with the opinion that climate change is a natural process destined by God has the highest mean score of 58.4 with rank number 1, followed by those with the view of technological development through emissions from engines having a mean score of 55.7 ranking 2. The 4th ranked of the presumable causes of climate change is urbanisation having the mean score of 31.1 which is under the Deforestation having the 3rd rank and a mean score of 52.9. According to zones of the state, highest percentages of 37% and 35% respondents from Mani and Malumfashi zones respectively believed that climate change is a natural process from God Almighty. Katsina zone 33% followed by 32% from Funtua zones has the highest number of respondents with opinion that climate change is caused by emissions from engines. For the respondents that agreed that deforestation is the main cause of climate change in the state, Katsina zone has the highest percentage of 30% while Malumfashi zone has the lowest percentage of 22%. For urbanisation as a cause of climate change, Katsina zone has the highest percentage of 21% followed by Mani and Malumfashi zones with 16% each. This people believed that population boom in the state and the quest for shelter is enough to be a cause for the changing climate. Overall in Katsina state out of the 1387 respondents, highest number of respondents (409) believed that climate change is a natural process destined by Almighty God, followed by those with the opinion of emissions from engines and other machines (390), others are respondents with the view of deforestation having 370 and last and the least are those with view of urbanisation as the cause of climate change having the remaining 218 respondents. This is critically in line with the conclusion of Maiwada (2017) that level of educational attainment play a vital role in understanding the presumable causes of the changing climate. In the whole state 29% of the respondents believed that climate change is from God, this is a clear view of the rural people with no western education.

CONCLUSION

Despite the knowledge of the changing weather pattern in urban and rural communities of the state. It is clear that lack of climate change awareness campaign play a vital role to the understanding of the subject matter. Close to one third of our whole state's respondents believed that climate change is not in any way related or the consequence of human action but rather a natural process destined by the Almighty God. For this reason alone, government at all levels, Nongovernmental organisations (both local and International) and other stakeholders should join hands and extend their climate change awareness campaign deep into the rural communities

where no attention and /or care is given to environment sustainability issues.

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