

People's Response to Climatic Variability Awareness and Observed Changes in Three Selected Population Densities of Katsina Urban Area, Nigeria

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Abstract: *Climate change is one of the global most imperative themes in our own time due to its consequences and difficulties posed waiting for the upcoming generation. This research aimed at examining the people's level of awareness of climatic variability and the observed changes in three selected population densities in the most urban part of Katsina state (Katsina urban area). Multi stage sampling was used to carry out this research. In the first stage, stratified random sampling was used to select the three areas where interview was conducted. The areas within Katsina urban centre were stratified based on their population density i.e Low density, Medium density and High population density. One ward was selected at random from each stratum and in the second stage, simple random sampling was also adopted in selecting respondents from each ward selected for interview and questionnaire administration based on the proportion of its estimated population size. The results revealed a very high level of awareness and a very good knowledge of climatic variability based on level of educational attainment. It also revealed increase in temperature and decrease in the amount of rainfall received as the most common observed change in the study area. More research is strongly recommended especially in the rural parts of the state where the level of education is very low and people are fully engaged in the activities that leads to detrimental environmental changes such as Deforestation, over grazing and unsustainable agricultural practices.*

Keywords: Awareness, Climate Variability, Population Density, Observed Changes, Perception

1. Introduction

Globally, Climate Change is one of the most imperative themes in the history of humanity, particularly in our time due to its consequences and difficulties waiting for the upcoming generations. Changes in the use of lands and the burning of fossil fuel are accepted to have been radiating an expansive whole of hurtful and dangerous gasses (Greenhouse gasses) into the world's atmosphere (Fearnside, 2000). The IPCC report (2007) uncovered that, it is detected that the density of greenhouse gases (GHG) in the global atmosphere had increased to around 70% in the past period between 1970 and 2004. This affected the world's energy equilibrium in many diverse ways, which its implications further prompted the harmful effects to the immediate environment, regional territories and the world's climate at large (IPCC, 2013).

A consensus among scientist essentially developed as the change in climate gradually taking place and there is a strong agreement that sharp changes are expected to happen when the earth's system is stretched across thresholds (Alley, 2003). Based on the IPCC (AR4) report, the eleven years period between 1995 and 2006 was the warmest years recorded since 1850. The air temperature in 100 years between 1906 and 2005 demonstrates a direct pattern of increase of about 0.7°C [0.56-0.92] (IPCC, 2007). Many climate models based on the 35 SRES scenario anticipated a general worldwide surface temperature increase with an average of $1.4\text{-}5.8^{\circ}\text{C}$ between 1990 and 2100 (IPCC, 2001).

Numerous changes had happened in the global climate system throughout the most recent century as uncovered in

the fifth Assessment report (AR5) of the IPCC, the cold days and night numbers diminished while the warm days and nights increased comprehensively since 1950 and ocean level, ice volume and sea temperature changes are likewise observed globally (IPCC, 2013).

Atmospheric variability and changes are thought to have been created basically by natural and anthropogenic (Human) processes and activities respectively. The natural processes incorporates the fundamental interaction between the marine and the terrestrial 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 rate of activities by the humans to the natural world have helped the high increase in the rate of release of harmful gases into the global environment, along these lines bringing on an unnatural weather changes (Tunde et al. 2013).

The developing nations are viewed as the most defenceless against these environmental change generated extreme event because of their poor mitigation measures and adaptation strategies (Mirza, 2003). These has been recognized worldwide in the recent decades focused around the records of the disastrous and catastrophic events, for example, surges, droughts, storms, and cool spells or heat waves (Beniston and Stephenson, 2004). Drought spell is one of the world's costliest natural catastrophes, having a mean of about 6-8 billion dollars annually in global impairment and all in all influencing a bigger number of individuals than whatever type of natural catastrophe (Keyantash and Dracup, 2002). It practically happen in all climatic zones, for example, high and low precipitation regions and for the most part identified with the decrease in the measure of

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precipitation collected over an augmented amount of time, for example, a season or a year (Mishra and Singh, 2010). Climatic events, for example, High temperature, high winds, low humidity, rainfall intensity and duration and late beginning or early cessation of rainfall assume to be an imperative part in the event of drought. On the other hand, scientific effort recently revealed that environmental change is prone to cause a change in the worldwide pattern and severity of flood occasions, in numerous areas expanding the introduction of poplases to extreme flooding (Few, 2003).

Researches mentioned earlier reported that climatic variability is caused through natural and human activities. The human activities are rampantly undertaken by people. In Katsina state, these activities range from bush burning and clearing (deforestation) to industrialisation among others (Ruma and Sheikh, 2010). Unfortunately, majority of people engaged in such acts are not aware of the consequences of their ignorant act, many people identified deforestation as a mean of livelihood. It is in view of this background that the study aimed at examining the people's level of awareness of climatic variability and the observed changes in three selected population densities in the most urban part of Katsina state (Katsina urban area).

2. Study Area

Katsina urban area lies within the geographical grids of 11°08'N to 13°22'N latitude and 6°52'E- 9°20'E longitudes covering a total land area of about 3, 370 sq.km (Danjuma, 2012). The climate of the area has a distinct wet and dry season with rainfall only received in few months normally

between May and September, having an annual average of about 70cm (Abaje et al., 2014). The relative humidity of the atmosphere in the area is lower in February with a figure 20-25% that is when the atmosphere is most dry compared to its higher value of 70-80% in August when the highest amount of rainfall received during the year (Ruma, 2009). Ruma and Sheikh (2010) affirmed that temperature of the area is high in almost all part of the year because of its position in the tropical region, with maximum temperature of about 38°C or higher recorded in the second quarter of the year and the minimum day temperature of about 22°C or lower in the late fourth quarter and the beginning of the first quarter of the year.

The vegetation of the area is the Sudan Savannah vegetation. This reflects the amount and duration of the rainfall received in the area. With scattered trees, shrubs and grasses, the vegetation illuminate a large extent of modification as a result of several decades or centuries of bush burning, cultivation, animal grazing as well as fuel wood exploitation all in the name of development. Although, much of the indigenous species of plant in the areas almost disappeared, several exotic trees species like Neem (*Azadiracta indica*) have been planted to tackle the effect of degradation and encroachment by the desert (Ruma, 2009).

The Katsina Urban area has a fairly large human population, the National population commission (NPC) in its 2006 census, revealed that Area has a population of 327,787 people, and this population figure has further being projected to be 413,642 in the year 2015 with an annual growth rate is 3% (NPC, 2006).

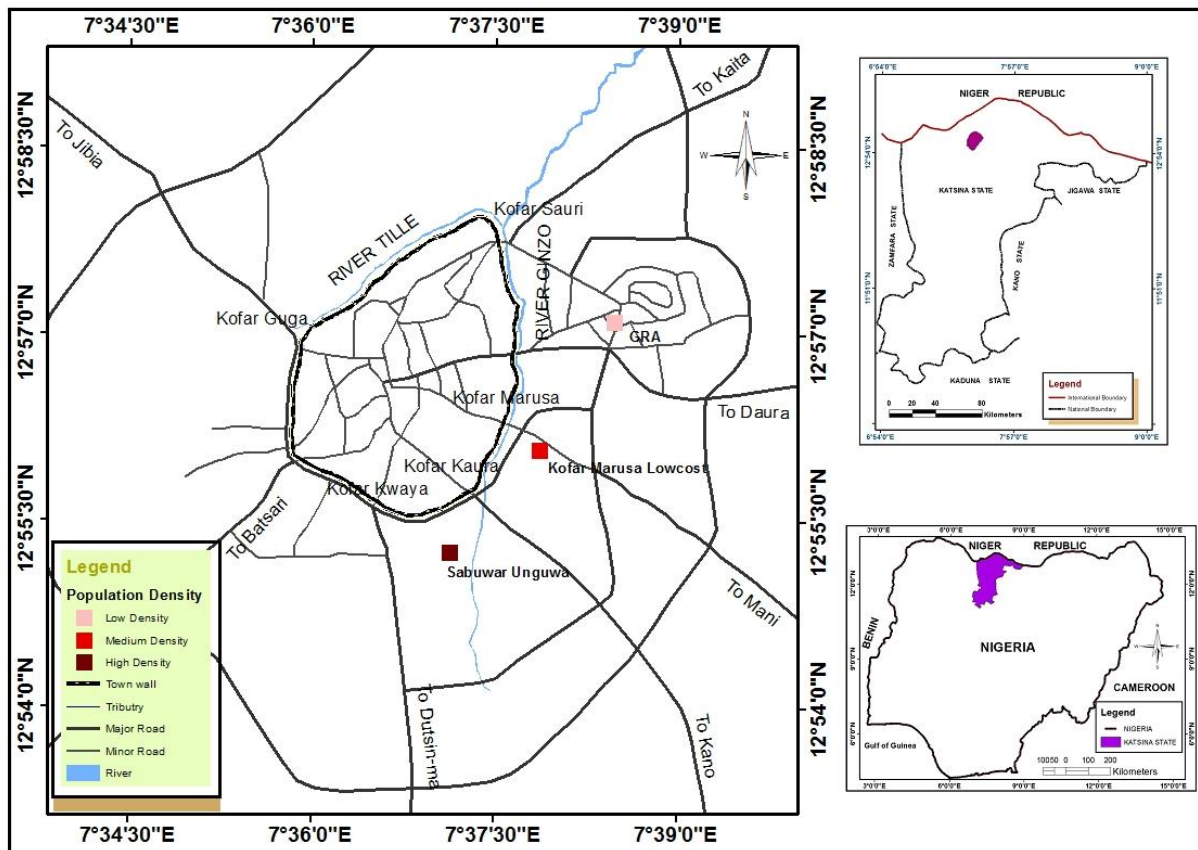


Figure 1: Map of Katsina Urban area showing Data collection points

3. Methodology

Multi stage sampling was used to carry out this research work. In the first stage, stratified random sampling was used to select the three different population density areas where interview was conducted, Hence, the areas within Katsina urban centre were stratified based on their population density i.e Low density, Medium density and High population density. One ward was selected at random from each stratum giving the three areas for the study. In the second stage, simple random sampling was also adopted in selecting respondents from each ward selected for interview and questionnaire administration based on the proportion of its population density. 40 respondents were selected randomly in the low density area (GRA). This was doubled

to 80 in the medium density area (kofar Marusa Lowcost) and also doubled to 180 in the high density area (sabuwar Unguwa) so as to get a reasonable number of respondents to represent the whole population.

Table 1: Sampling frame of the study.

Population Density	Area selected	Sample size
Low Density	GRA	40
Medium Density	Kofar Marusa Lowcost	80
High Density	Sabuwar Unguwa	160
Total		280

4. Results and Discussion

Socioeconomic characteristics of the respondents

Tables 2: Socioeconomic characteristics of the respondents in the study area.

Gender	Low Density (GRA)		Medium Density (Kofar Marusa Low cost)		High Density (Sabuwar Unguwa)		Total	
	Number	%	Number	%	Number	%	Number	%
Male	24	60	46	57	122	59	192	69
Female	16	40	34	43	38	41	88	31
Total	40	100	80	100	160	100	280	100
Age	Number	%	Number	%	Number	%	Number	%
<25	6	15	14	17	38	24	58	21
26-40	16	40	32	40	64	40	112	40
41-55	14	35	22	28	54	34	90	32
56-70	4	10	12	15	4	2.5	20	7
Total	40	100	80	100	160	100	280	100
Educational attainment	Number	%	Number	%	Number	%	Number	%
Primary	0	0	0	0	16	10	16	6
Secondary	3	7.5	4	5	44	27.5	55	19
Tertiary	34	85	64	80	62	39	160	57
Informal	3	7.5	12	15	38	24	49	18
Total	40	100	80	100	160	100	280	100
Occupation	Number	%	Number	%	Number	%	Number	%
Businessman	6	15	10	12.5	82	51	98	35
Farmer	8	20	14	17.5	28	17.5	50	18
Civil servant	24	60	50	62.5	34	21	108	38
Others*	2	5	6	7.5	16	10	24	9
Total	40	100	80	100	160	100	280	100

*Other activities such as Gateman, vigilante etc

The socio economic characteristics of the respondents are examined in this section as shown in table 2. It is revealed that a total number of 192 (69%) males and 88 (39%) females were interviewed in the in the three selected areas for this study. Male gender has the highest number of respondents with 24 (60%) in GRA, 46 (57%) in Kofar Marusa Low-cost and 122 (59%) in Sabuwar Unguwa respectively. In the age distribution the age brackets of 26-40 and 41-55 has the highest number of respondents with 122 (40%) and 90 (32%) respectively. This is an indication that about 70% of the respondents in this study are old enough to recognise the change that happened in the area in the last few decades.

Most of the respondents interviewed in all the tree areas attended education up to tertiary level with about 57% of all

the population interviewed living with only 19% and 18% for those who attended secondary levels and those with informal education respectively. The occupational distribution of the respondents in this study revealed that civil servants and business men has the highest percentage of 38 and 35 respectively unlike 18% and 9% for farmers and others (people that engaged in other activities apart from the once mentioned). This can be attributed to the high level of education of the respondents which means a considerable number of them can understand some of the terminologies associated with climatic variability and environmental changes.

Awareness and the Level of awareness

Table 3: Awareness and the Level of awareness of the respondents on climatic variability

Awareness of climate change	Low density (GRA)		Medium Density (Kofar Marusa Low-cost)		High Density (Sabuwar Unguwa)		Total	
	Number	%	Number	%	Number	%	Number	%
Aware	32	80	64	80	104	65	100	71
Not Aware	8	20	16	20	56	35	40	29
Total	40	100	80	100	160	100	280	100
Level of Awareness	Number	%	Number	%	Number	%	Number	%
Very good	24	81	50	78	50	35	100	36
Average	12	13	20	16	90	50	150	54
Poor	4	6	10	6	20	15	30	10
Total	40	100	80	100	160	100	280	100

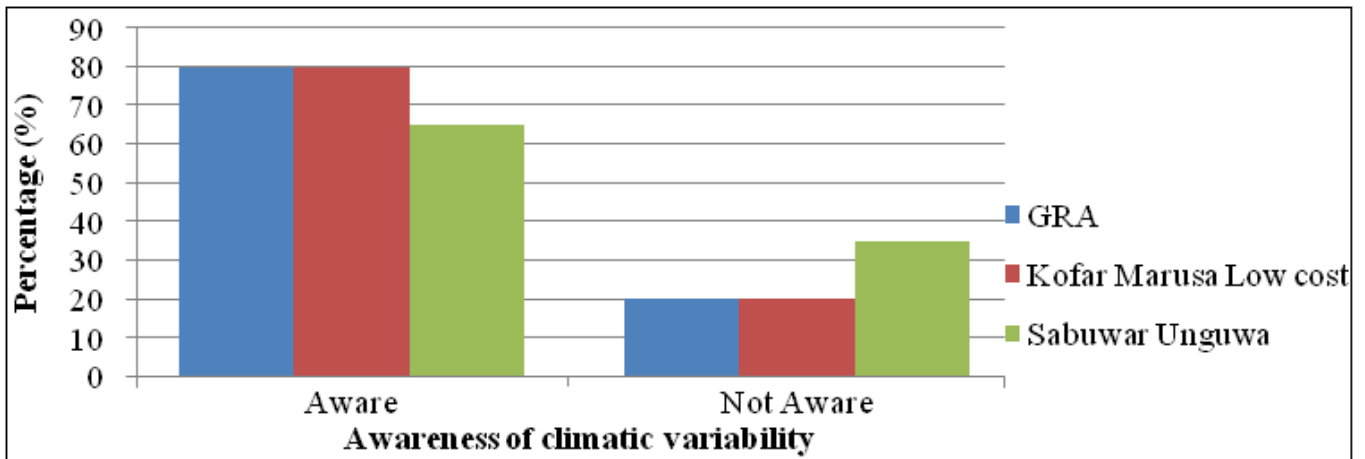


Figure 2: Awareness of climatic variability

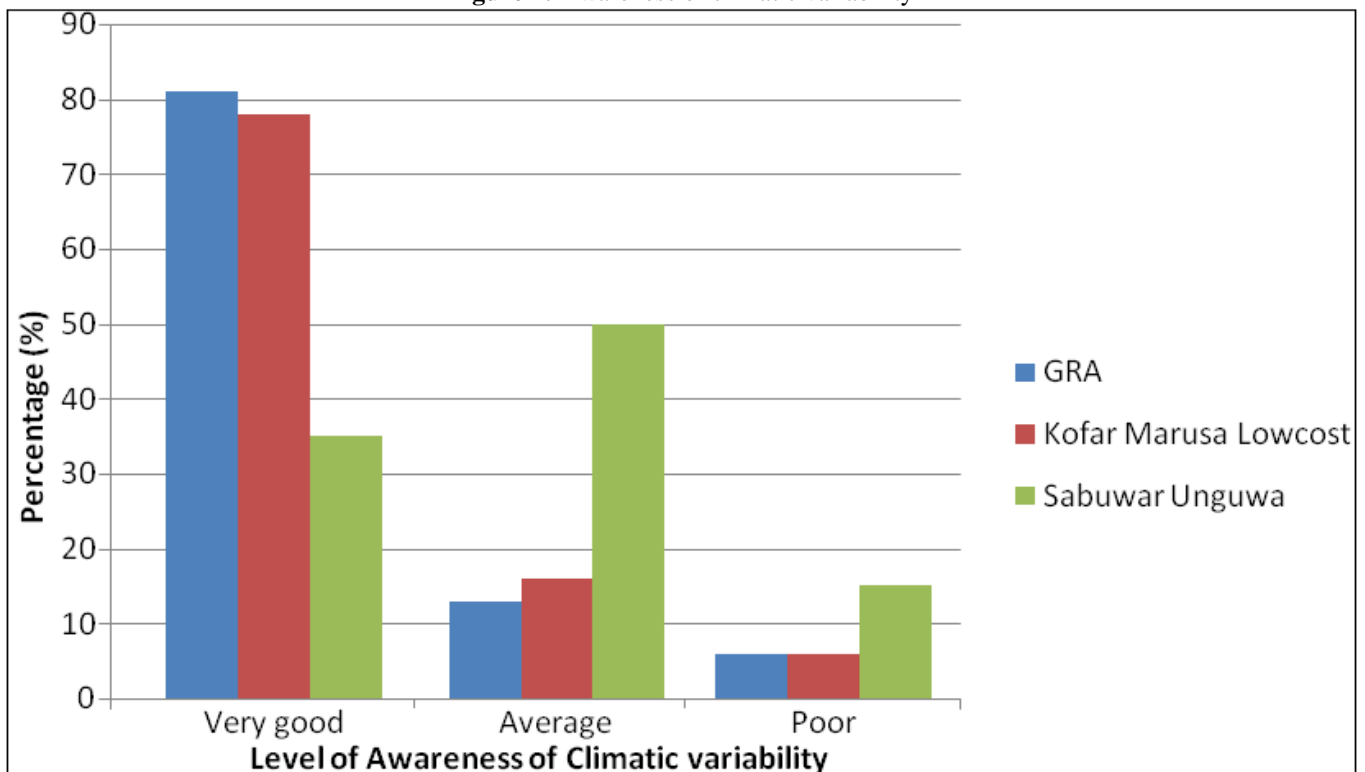


Figure 3: Level of awareness of climatic variability

In order to effectively assess the people’s awareness and its level on climatic variability across these three population densities in Katsina urban area, the respondents were asked if they are aware of climatic change and to what level. This is in line with Adebayo et al (2013) and Ishaya, and Abaje (2008) who also studied awareness and people’s perception on climate change and adaptation strategies in Adamawa

state and Jama’a local government of Kaduna state respectively.

About 71% of the total respondents in all three population densities show that they are aware of the climate change in the area. In the low population density area (GRA) it was found that out of the 40 respondents interviewed, 32 which

represents 80% of the respondents are aware of the climate change, this could also be attributed to their level of educational attainment in the area. In the medium density areas (Kofar Marusa Low-cost), out of 80 respondents interviewed 62 (80%) are also aware of climate change in the areas and in Sabuwar Unguwa (High density area) the number of respondents that are aware of climate change is 104 (65%) out of the total number of 160 respondents interviewed (Figure 1). There is no doubt that awareness of climate change is higher in Katsina urban area due to the fact that most of the respondents interviewed attended tertiary stage of the western education. It is also observed that awareness of climate change among respondents decrease from low density area (GRA) to the high density

area (Sabuwar Unguwa) this could also be attributed to the level of education and occupational status.

The level of awareness is also very high in low density (GRA) and medium density (Kofar Marusa Low-cost) with 81% and 78% having a very good level of awareness respectively (Figure 2). In the high population density area (Sabuwar Unguwa) people with very good level of awareness of climate change are not as much as those with the average which is 50% (90) respondents out of 160. The people with poor level of awareness are also higher here with 15% among other densities having 6% each.

Observed changes and Presumable causes

Table 4: Observed changes and Presumable causes of climate variability in the area

Observed changes	Low density (GRA)		Medium Density (Kofar marusa Low-cost)		High Density (Sabuwar Unguwa)		Total	
	Number	%	Number	%	Number	%	Number	%
Temperature Increase	20	50	38	48	66	41	124	44
Reduce amount of rainfall received	6	15	22	28	42	26	70	25
Increase in incidences of drought	4	10	6	7	26	16	36	13
Change in rainfall onset and offset	10	25	14	17	26	16	50	18
Total	40	100	80	100	160	100	280	100
Presumable causes	Number	%	Number	%	Number	%	Number	%
Natural process destined by God	8	20	26	30	82	51	118	42
Emission from vehicle/industries	14	35	30	38	30	19	68	24
Deforestation	12	30	14	17	26	16	52	19
Urbanization	6	15	12	15	22	14	42	15
Total	40	100	80	100	160	100	280	100

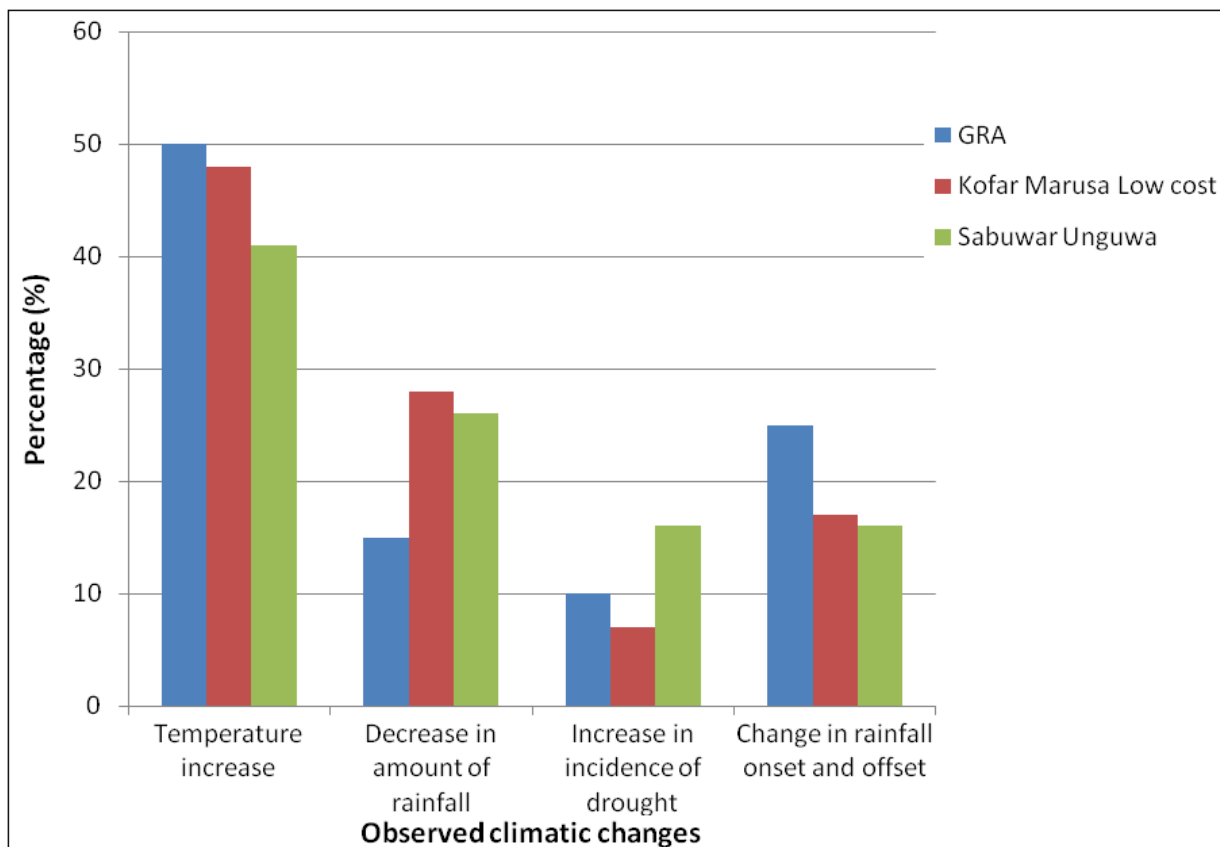


Figure 4: Observed climatic changes in the area

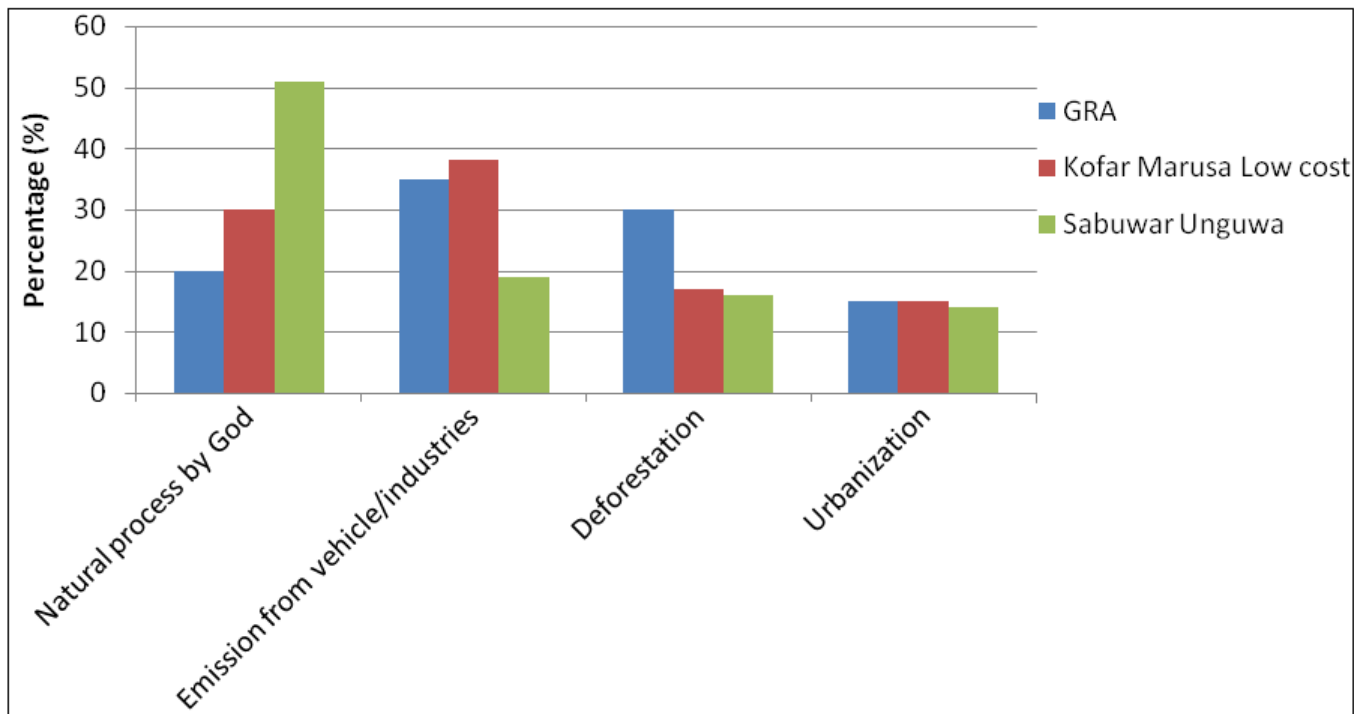


Figure 5: Presumable causes of climatic variability in the area

In view of the observed changes in the climate of the study area, this research revealed that 44% (124 people) of the whole 280 people interviewed have observed that temperature is changing and getting higher with time in comparison with the previous decades, 25% (70 people) also claimed that the amounts of rainfall received in the area has reduced considerably compared to previous decades, this was further emphasized by 18% (50 people) of the respondents that there is considerable shifts in the rainfall onset and cessation times. 13% (36 people) gave a view that there has been an increase in the incidences of drought in which must of the time people pray for rains during the wet season.

In all the three population densities studied temperature increase carried the highest number of respondents with 50% in GRA (Low density), 48% in Kofar Marusa Lowcost (Medium density) and 41% in Sabuwar Unguwa (High density) while increase in the incidences of drought carries the lowest number of respondents with 10%, 7% and 16% in GRA (Low density), GRA (Low density) and Sabuwar Unguwa (High density) respectively. This could be due to their high level of educational attainment.

The respondents view on the presumable causes of the changing climatic condition in the study area revealed that 118 people (42%) of the total 280 people interviewed believed that climate change is a natural process destined by God. This indicates that even though there is an appreciable level of awareness on the changing climate in the study area, the perspectives of most people on the phenomenon is strongly influenced by culture and tradition. 68 people (24%) attached the cause of climate change to emissions from vehicles and industries. While 52 people (19%) and 42 people (15%) attribute the causes of the change to deforestation and Urbanisation respectively.

5. Conclusion

It is crystal clear that although a very high percentage of people in the study area are aware of the basic general knowledge regarding climatic variability and the observed changes in the environment, their knowledge of it is strongly attributed to the level of educational attainment. The most common observed changes in the area are the increase in temperature and the decrease in the amount of rainfall received, which is in line with the predictions in the fifth assessment report (AR5) of the IPCC. Although climatic variability or change is a Global phenomenon, it is quite scary that the knowledge and awareness of it is very low in the high density residential urban areas where local people with less educational attainment reside. In line with this development, more research on this particular matter is strongly recommended especially in the rural parts of the state where people are fully engaged in the activities that leads to detrimental environmental changes such as Deforestation, over grazing and unsustainable agricultural practices.

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