Original Research Article

AGED AWARENESS AND PERCEPTION OF CLIMATE VARIABILITY ~~THE AGED IN SELECTED RURAL COMMUNITIES OF~~ KANKE AND RIYOM LOCAL GOVERNMENT AREAS OF PLATEAU STATE, NIGERIA.

ABSTRACT

This study examined aged's awareness and perception of climate variability in Riyom and Kanke LGAs of Plateau State. Quantitative primary data was obtained through questionnaire administered to aged male and female in the study area. The study revealed there were more aged males than aged females. 72.7% were in the age range 60-69; more than 80% were crop farmers and about 62.6% earned less than N20,000 (56USD) per month. Also 86.3% have heard of climate change; 80.6% felt they understood climate change; while 95% felt the climatic variability was increasingly changing. The study also revealed that age and LGAs were major determinant of perception and awareness of climate change. This study therefore concluded that in order to have an effective intervention for climate change impact on the rural aged, their perception and response to climate change and also peculiarities of the areas must be taken into consideration.

Keywords: Climate variability, Climate change, Rural aged, Perception, Awareness

1.0 INTRODUCTION

Climate change is the change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer (~~Intergovernmental Panel on Climate Change (~~IPCC~~)~~, 2007). Climate variability is defined as variations in the mean state and other statistics of the climate on all temporal and spatial scales, beyond individual weather events~~.~~ (~~World Meteorological Organization,~~ WMO,).Climate change and variability ~~variability and change~~ constitute major challenges in many rural communities in Africa because of its low levels of awareness, human and financial resources and institutional and technological capabilities (IPCC, 2001). This is ~~also~~ the case in Nigeria, ~~especially~~ since a large share of the Nigerian economy is dependent on climate-sensitive natural resources (IPCC, 2001). These challenges are even more compounded in the country because of its low capacity to adapt to climate change due to low levels of awareness, human and financial resources and institutional and technological capabilities (IPCC, 2001).

In Nigeria, women, children and the elderly are the most vulnerable to climate change (DFID, 2009) with the elderly most vulnerable ~~most especially the elderly in the country who are very vulnerable~~ (~~o~~Okoye, 2011). These elderly people live mostly in rural areas in the country ~~In Nigeria, many of these elderly live in rural areas~~ (Nigeria Bureau of Statistics, 2006). Rural communities of Nigeria are increasingly populated with the very old who might be particularly

Comment [S1]: State the reason for selection of these two areas and define "aged"

Comment [S2]: State the stages of sampling procedures employed and how it was done

Comment [S3]: year

Comment [S4]: define the aged group stating their age brackets for better understanding

susceptible to the challenges of climate variability and change. The aged ~~In Nigeria, the aged are~~ are part of the disadvantaged populations in the rural areas and are~~. They are~~ very vulnerable to many of the challenges ~~in the rural areas~~ due to their physical weakness, powerlessness and isolation which continue to fortify poverty against them (Kolawole and Torimiro, 2006). In Nigeria, rural aged may face higher levels of climate variability challenges than other rural populations and their urban counterparts. This might be because of their level of awareness and perception of climate variability and low social economic status. Therefore, their awareness and perception of this variability is important.

Perception about climate change and variability ~~Peters (1997) noted that perception~~ is important in order to avoid misconception of the situation which can be serious implications (Peters, 1997). ~~Thomas *et al.*, (2007) also noted that it~~ It is important to have a good knowledge and understanding of climate and also be able to respond appropriately to it (Thomas *et al.*, ~~(~~2007). ~~Gbetibouo (2009) and Falaki1 et al, (2013) explained in their studies that t~~The first prerequisite towards adaptation ~~is to have~~ a reasonable perception of the problem (Falaki *et al.*, 2013, Gbetibouo, 2009). Falaki~~1~~ *et al*, (2013) opined that one cannot adapt to climate change in an adequate way if the present and future climate change is not perceived as a reality. Moniruzzaman (2013) also explained that by knowing the climate literacy and wisdom of vulnerable community it is easier to take sustainable measures; policy and action plan at national and international level.

Issues associated with climate change and variability ~~have~~has generated massive attention in research. To exemplify, scholars have analyzed climate change in terms of its **Causes** (IPCC, 2007; Karl et al, 2009; Odjugo, 2010; Bray, 2010); **Impact** (Deressa, 2007; Boko et al., 2007; Yesuf *et al.*, 2008; Deressa, Hassen, and Ringler, 2008; Muamba and Kraybill, 2010; Jianjun *et al*., 2015); **Responses** (Deressa *et al*., 2009; Smith and Olesen, 2010; Piya *et al*., 2012; McNeely, 2012~~;~~ ~~)~~; and **Awareness and Perception** (Deressa et al, 2009; Tologbonse *et al*., 2010;Sofoluwe *et al*., 2011; Mandleni and Anim, 2011; Iwuchukwu and Onyeme, 2012; Falaki~~1~~, *et al*., 2013; Amdu *et al*., 2013; Olajide O. Adeola, 2014; Abid *et al*., 2015; Allahyari et al., 2016). These studies ~~commonality with these studies is that they~~ did not address the~~se~~ issues in relation to the situation of the rural aged. ~~For instance, Falaki *et al*., 2013 examined the demographic determinants of farmers' perception and adaptation to climate change in North Central Nigeria. The study revealed that Age, sex education and household size had significant impacts on the farmers' perception of climate change effect on social, biological and eco system functions. Also, Ochenje et al. (2016) assesses farmers' climate change perceptions on water resources at farm level in Kakamega County, Kenya. The study indicated that gender, farm size, distance to the main water source, extension services, access to climate change information and wealth status significantly explained levels of farmers' perception of climate change based on water resources. Although these studies were covering perceptual aspects, their focus was not on the rural aged.~~ It showed ~~This shows that there is~~ dearth in studies on awareness and perception of climate variability by the rural aged population. This study therefore raised a need for perception and awareness of climate change to be considered in relation to the rural aged. ~~In line with this, I examined awareness and perception of climate variability of the rural aged populations in the Kanke and Riyom local government areas of Plateau State, Nigeria. In doing so, I seek to provide answers to the following questions: 1. how do the rural aged perceive climate variability and how many of the aged are aware of it 2. what are the main determinants of their perception and awareness of CV 3. what is the source of awareness of CV of the aged in the study area~~.

Formatted: Font: Italic

Formatted: Font: Italic

Formatted: Font: Italic

Formatted: Font: Italic

Formatted: Font: Italic

Formatted: Font: Italic

Formatted: Font: Italic

Formatted: Font: Italic

Formatted: Font: Italic

Comment [S5]: why the choice of these two local governments? State briefly here.

Formatted: Font: Italic

2.0 MATERIALS AND METHOD

2.1 Study Area

Plateau State is situated in the central belt of Nigeria lying between~~The State lies between~~ latitude 8°30' and 10°30' North, longitude 7°30' and 8°37' East of the Equator.. It is bordered by Bauchi to the ~~n~~North-~~w~~West and Kaduna to the N~~n~~orth E~~e~~ast, Nasarawa to the S~~s~~outh-~~w~~West and Taraba to the S~~s~~outh-~~e~~East~~,~~ (~~as shown in~~ Figure 1). ~~The State lies between latitude 8°30' and 10°30' North, longitude 7°30' and 8°37' East of the Equator.~~ The state has 17 Local Government Areas: Barikin Ladi, Bassa, Bokkos, Jos East, Jos North, Jos South, Kanam, Kanke, Langtang North, Langtang South, Mangu, Mikang, Pankshin, Qua'an Pan, Riyom, Shendam, Wase (www.plateaustate.gov.org) out of which Kanke and Riyom local government areas were selected for this study (~~as shown in~~ Figure 2). Plateau State has an almost temperate climate. It has a mean temperature that range between 18°C and 22°C. The state has its warmest temperature in the dry season in the months of March and April and its cold season between December and February. Also the highest rainfall is recorded in the wet season in the months of July and August. The state average annual rainfall varies from 131.75 cm (52 in) in the ~~s~~Southern part to 146 cm (57 in) on the Plateau (The Official Website of Plateau State).

Comment [S6]: Why? Because of.....

Comment [S7]: ????

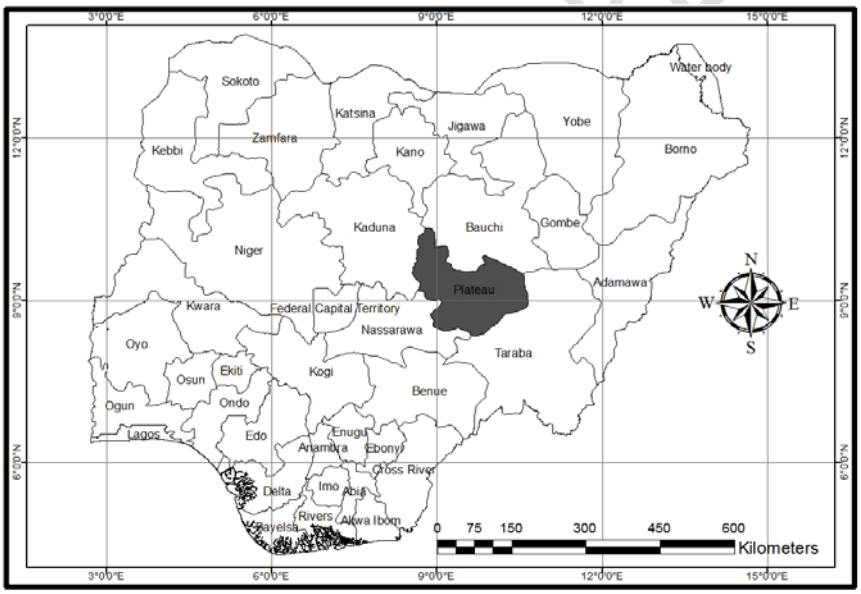

Fig.1. Map of Nigeria illustrating the ~~showing Plateau State the~~ Study Area

According to the 2006 census, Plateau State had a population of 3,206,531 (1,598,998 males and 1,607,533 females). Riyom LGA of Plateau State had a population of 131,778 in 2006 (NPC, 2006) and in 2016, the projected population was 172,600. Also Kanke LGA population was 124,268 in 2006 (NPC, 2006) and 2016 projected population was 162,800. Riyom local government area has its headquarters in Riyom town while Kanke local government area has its

headquarters in Kwal town. There are several Districts & rural communities under Riyom and Kanke local government area. The aged in the selected rural communities of the two LGAs (Riyom and Kanke were few in number) especially in Kanke LGA where the numbers of the aged were extremely very few in number.

Comment [S8]: Why did you select a local government with few aged people? What informed your choice of local govt selections in the first place? If that can b e justified then the number of aged may be irrelievant

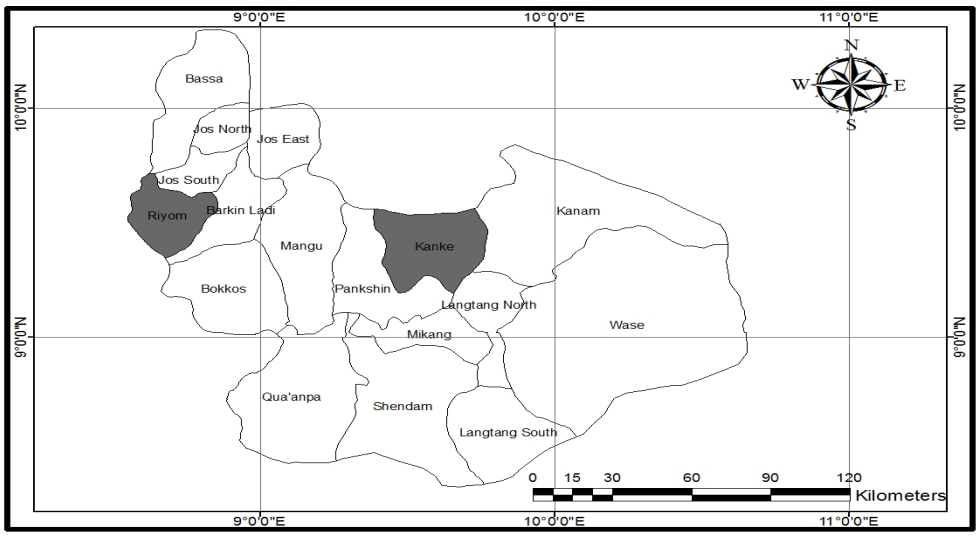

Fig.2. Map of Plateau State showing the Kanke and Riyom Local Government Area as the Study Area

2.2 Data collection ~~METHODOLOGY~~

~~In this research, quantitative primary data was used. The q~~Quantitative primary data was obtained through structured questionnaires and distributed to an aged male and aged female (60 years and above) available in the selected rural communities of the Kanke and Riyom local government areas of Plateau State, Nigeria. Where there was no combination of ~~the two (~~aged men and aged women~~)~~, either of the two was seen as sufficient. ~~Aged people refer to age 60 years and over.~~

Formatted: Normal, Indent: Left: 0", Don't adjust space between Latin and Asian text, Don't adjust space between Asian text and numbers

The initial stage involved the random selection of one local government area in the upper plateau (Kanke LGA) and one local government area in the lower plain of the plateau (Riyom LGA). This was done because the upland and lower areas of Plateau state has a constrasting climate because the state is ~~upland area of Plateau state has contrasting climate from that of lowland Plateau. In other words, climate of Plateau state is~~ dominantly influenced by its relief (Sanni, 2015). The second stage involved the selection of three rural settlements from each of the local government areas which was done by the simple random selection process. The fourth stage is the identification of the houses where the rural aged resides. This was done using a snow ball approach in the respective settlements selected for this research. Where there was no combination of the two (aged men and aged women), either of the two was also sufficient.

Data obtained was analyzed using a number of analytic methods from SPSS package ~~like;~~ descriptive statistics (frequencies and percentages) was used to examine the socio-economic characteristics of the rural aged population. A~~lso a~~wareness, source of awareness and perceived climate variability indicators were created using the descriptive statistics (frequencies, percentages and likert scale). Principal component analysis was used to determine the perception index of climate variability. This was created through Principal Component Extraction estimated from standardized indicator values. Bi-variate Correlation Analysis was used to determine factors influencing perception of climate variability of the rural aged while C~~e~~hi-Square analysis was used to determine the factors influencing awareness of climate variability.

3.0 RESULTSAND DISCUSSION

3.1 Socio-economic characteristics of the Aged

Table 1 shows the socio-economic characteristics of the aged in selected rural settlements of Kanke and Riyom local government areas of Plateau State. The study reveals that there were 51.8% aged males and 48.2% aged females. The majority of the respondents (72.7%) are in the age range 60-69 years with more than 70% of the respondents married and about 26.6% widowed. The study also revealed that 64.7% had no formal education; more than 30% had either primary or secondary education while 3.6% had post secondary education. Also, more than 80% of the respondents are crop farmers and about 3.6% of the respondents are retired civil servants. Majority of the respondents (62.6%) earned less than N20000 (56USD) per month.

3.2 Awareness of climate Variability by the Aged

Table 2 revealed the analysis of the Awareness of climate Variability by the rural Aged in Plateau State. From the table, 86.3% said they have heard of climate change/variability; 80.6% felt they understood what is meant by climate change/variability; while 95% felt the pattern of weather is changing; 20.9% could not recall their source of information on climate change.

3.3 Sources of Information on Climate Variability by the Aged

Table 3 revealed the analysis on multiple responses of sources of information on climate variability by the rural aged in Plateau State. The table showed that the highest number of the respondents (49.6%) got the awareness from friends and neighbors; 17.3% became aware of climate variability from television and radio; 10.8% knew about climate change from Newspaper and magazine while the remaining 2.8 got theirs from Interment and government agencies.

Table I: Socio-economic characteristics of the Aged

Socio-economic characteristics	Value label	Local Government Areas		Total N=139
		Kanke N= 46	Riyom N= 93	
Gender	Male	54.3%	50.5%	51.8%
	Female	45.7%	49.5%	48.2%
Age	60-64	47.8%	47.3%	47.5%
	65-69	19.6%	28.0%	25.2%

	70-74	13.0%	14.0%	13.7%
	75-79	8.7%	8.6%	8.6%
	80+	10.9%	2.2%	5.0%
Educational level	No Formal Education	60.9%	66.7%	64.7%
	Primary	21.7%	25.8%	24.5%
	Secondary	13.0%	4.3%	7.2%
	NCE/OND	2.2%	2.2%	2.2%
	HND/BSc	2.2%	0.0%	0.7%
	Postgraduate	0.0%	1.1%	0.7%
Marital status	Married or living together	71.7%	69.9%	70.5%
	Never married or Single	2.2%	2.2%	2.2%
	Widowed	23.9%	28.0%	26.6%
	Divorced	2.2%	0.0%	0.7%
Occupation	Crop production	93.5%	84.9%	87.8%
	Cattle rearing	2.2%	0.0%	0.7%
	Trading	2.2%	0.0%	0.7%
	Transportation	2.2%	7.5%	5.8%
	Others	0.0%	5.4%	3.6%
Income	< 20,000	60.9%	63.4%	62.6%
	20001-30000	19.6%	20.4%	20.1%
	30001-40000	4.3%	6.5%	5.8%
	40001-50000	15.2%	9.7%	11.5%

Table 2: Awareness of Climate Variability by the Aged

Awareness of climate Variability Variables	**Value Labels**	**Local Government Areas**		**Total N= 139**
		Kanke N= 46	**Riyom N= 93**	
Do you understand what is meant by climate change/variability	No	13.0%	5.4%	7.9%
	Yes	69.6%	86.0%	80.6%
	Not sure	17.4%	8.6%	11.5%
Do you think the pattern of weather is changing	No	2.2%	0.0%	0.7%
	Yes	89.1%	97.8%	95.0%
	Not sure	8.7%	2.2%	4.3%

Have you heard of climate change/variability	No	21.7%	9.7%	13.7%
	Yes	78.3%	90.3%	86.3%

Table 3: Sources of Awareness on Climate Variability by the Aged

Sources of Information on Climate Variability	Local Government Areas		Total N= 139
	Kanke N= 46	Riyom N= 93	
Television/Radio	2.2%	24.7%	17.3%
Friends/Neighbor/Colleagues	30.4%	59.1%	49.6%
Internet/Web	0.0%	2.2%	1.4%
Mobile phone/SMS alerts	0.0%	3.2%	2.2%
Newspapers and magazines	0.0%	16.1%	10.8%
Government Agency	0.0%	2.2%	1.4%
Cannot recall source	30.4%	16.1%	20.9%

Source: Author's Field Survey, 2017

3.4 Perception of Climate Variability by the Aged

Table 4 shows Ageds' perception of climate variability.79.1% of the aged population perceived climate variability as Flooding; this is followed by 76.3% who perceived it to be Harmattan and Haze. 73.4% felt sees climate variability to mean heavy storm. 68.3% felt its heavy rainfall, 66.2% perceived it to be delayed onset of rain; 60.4% sees it as short rainy season, 56.8% perceived it as drought, while 48.9% sees it as earlier onset of rain.

Table 4: Perception of Climate Variability by the Aged

Perceived Indicators of Climate Variability	Kanke N= 46	Riyom N= 93	Total N= 139
Heavy Rainfall	12.9	55.4	68.3
Flood	29.4	59.7	79.1
Drought	12.9	43.9	56.8
higher temperature/heat	15.8	59.0	74.8
Delayed onset of rain	16.5	49.6	66.2
Earlier onset of rain	18.0	30.9	48.9
Short rainy season	13.7	46.8	60.4

Formatted Table

Harmattan /Haze	19.4	56.8	76.3
Storm	16.5	56.8	73.4

Source: Author's Field Survey, 2017

3.5. Creating Composite Perception Index

Aged's perception of climate variability indicators (heavy rainfall, flood, drought, higher temperature and heat, delayed onset of rain, earlier onset of rain, short rainy season, harmattan/haze and storm) were converted to Composite Perception Index using Principal Component Analysis. The Perception Index was created through Principal Component Extraction estimated from standardized indicator values. This standardization was performed automatically by SPSS before running PCA. SPSS was used to generate a PCA model for the perception index. The perception index created was also in standardized form.

First, the perceived indicators of climate variability were input into a PCA model to detect their appropriateness for factor analysis. The outputs of the PCA model were four tables: The components matrix, the common variance, communalities table and the KMO-Barlett test. These tables were used to improve the PCA model.

Kaiser-Meyer-Olkin (KMO) was one of the outputs of PCA model used in the study to detect the appropriateness of carrying out a factor analysis. The higher the KMO value, the more appropriate to carry out the factor analysis of the variables. The KMO value for the study was 0.874 (Table 5). The value was considered very good and also within the acceptable KMO value range. This therefore implies that factor analysis is appropriate for the study and can proceed.

Table 5 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.874
Bartlett's Test of Sphericity	Approx. Chi-Square	391.037
	Df	36
	Sig.	.000

Source: Author's Survey, 2017

Another test of appropriateness of the PCA model is the size of the communalities.. Higher communalities size values means greater share of common variance explained by the extracted components while lower size values indicate smaller share of common variance explained by the extracted components. The value of communalities ranges between 0 and 1 Table6 Shows that the communalities size. The sizes range in value from 0.117 to 0.633. This is considered to fall within the acceptable range.

Table 6 Communalities

	Initial	Extraction
Heavy rainfall	1.000	.599
Floods (Frequency and intensity)	1.000	.379
More frequent drought	1.000	.444
Excessive heat/higher temperature	1.000	.479
Delayed onset of rainfall	1.000	.587
Earlier onset of rainfall	1.000	.117
Short rainy season	1.000	.518
Harmattan haze	1.000	.245
Increase in storm intensity	1.000	.633

Extraction Method: Principal Component Analysis.

Source: Author's Survey, 2017

The correlation matrix was used to extract the factors from the PCA model (Table 7). The number of factors extracted was determined by the user using the eigen value rule in SPSS. Only factors having an Eigen value of 1.0 or more were retained. Table 7 showed that only 1 factor was revealed by this data and this accounted for 44.4% of the total variance in the data. From the table, factor loadings; heavy rainfall, flood, drought, higher temperature/heat, delayed onset of rain, short rainy season, harmattan/haze and storm revealed high positive loadings while earlier onset of rain showed negative loading.

Table 7 Component Matrix

	Component
	1
Increase in storm intensity	.795
Heavy rainfall	.774
Delayed onset of rainfall	.766
Short rainy season	.719

Excessive heat/higher temperature	.692
More frequent drought	.666
Floods (Frequency and intensity)	.616
Harmattan/ haze	.495
Earlier onset of rainfall	-.342

Extraction Method: Principal Component Analysis.
a. 1 components extracted.

Table 8 (total variance explained) showed two level components of PCA with Eigen values greater 1.0 extracted using factor loading of 0.50 as the bench mark of explained common variance).The size of an Eigen value represents the amount of variance in the PCA explained by the component. Hence the larger the Eigen value, the more the component is explained by the model's indicator (Henry et al, 2003). This implies that the first two components of PCA with Eigen values greater than 1 as seen in Table 8 (total variance explained) account for high variance while those components with eigen value of less than 1 account for less variance. The total variance explained by the component extracted accounts for 44.4%. Also the cumulative percentage of variance indicated 44.4%.This shows that all variance is considered to be true and common variance.

Table 8: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.000	44.442	44.442	4.000	44.442	44.442
2	1.040	11.560	56.001			
3	.919	10.210	66.211			
4	.737	8.190	74.400			
5	.572	6.360	80.761			
6	.519	5.771	86.532			
7	.465	5.165	91.697			
8	.393	4.369	96.066			
9	.354	3.934	100.000			

Extraction Method: Principal Component Analysis.
Source: Author's Survey, 2017

After assessing the appropriateness of carrying out factor analysis, the standardized values of the component scores were saved as "perception index" a variable in the household data using the final version of the PCA model through the Factor Analysis dialogue box in SPSS. The perception index created was also in standardized form.

3.7. Creating Composite Awareness Index

Aged's awareness of climate variability indicators (heard about climate change/variability, understand the meaning of climate variability, feel the pattern of weather is changing) were converted to Composite Awareness Index using Principal Component Analysis. This was created through Principal Component Extraction estimated from standardized indicator values. This standardization was performed automatically by SPSS before running PCA. SPSS was used to generate a PCA model for the awareness index. Indicators of climate variability awareness were included into a PCA model to detect their appropriateness for factor analysis. Four tables (The components matrix, the common variance, communalities table and the KMO-Barlett test) were gotten as the outputs of the PCA model. The KMO output of the model indicated a value of 0.463 (Table 9). This was considered too weak for factor analysis to proceed. However other ~~output of the model were~~output of the model was examined.

Table 9 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.463
Bartlett's Test of Sphericity	Approx. Chi-Square	16.556
	Df	3
	Sig.	.001

Source: Author's Survey, 2017

The communality table is another output of the model used to test the appropriateness of factor analysis. The value of communalities ranges between 0 and 1 Table 10 revealed that the sizes ranged in value of 0.687 to 0.894. This is considered to fall within the acceptable range and therefore indicate~~d~~s the appropriateness of factor analysis and therefore can proceed.

Table 10 Communalities

	Initial	Extraction
Heard about climate change/variability	1.000	.894
Understand what is meant by climate change/variability	1.000	.687
Think the pattern of weather is changing	1.000	.766

Extraction Method: Principal Component Analysis.

Source: Author's Survey, 2017

Table 11 sShowsed the correlation matrix which is one of the output of PCA model. The output was also used to detect the appropriateness of factor analysis. The Table revealed that 2 factors were extracted. Using factor loading of 0.50, the first factor loadings had 2 high positive loadings (heard about climate change/variability and understand the meaning of climate variability). The second factor loading also showed that 'heard about climate variability and change" had high positive loadings and negative loading of changing pattern of weather. This also signifieds that factor analysis can proceed.

Table 11 : Component Matrix[a]

	Component	
	1	2
understand the meaning of climate change/variability	.828	.041
think the pattern of weather is changing	.695	-.532
Heard of climate change/variability	.390	.862

Extraction Method: Principal Component Analysis.
a. 2 components extracted.

Source: Author's Survey, 2017

Finally, Table 12 shows the total variance explained table with two level components having Eigen values greater than 1.0 extracted using factor loading of 0.50 as the bench mark of explained common variance). The first two components of the table with Eigen values greater than 1 as seen in Table 12 (total variance explained) account for high variance while those components with eEigen value of less than 1 account for less variance. The total variance explained by the first component extracted accounts for 43.99% of the total variance. The second component accounts for 34.23% of the total variance. Also the cumulative percentage of variance indicated 78.218%. This showeds that all variance is considered to be true and common variance. Therefore the factor analysis can proceed.

Table 12: Total Variance Explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.320	43.991	43.991	1.320	43.991	43.991
2	1.027	34.227	78.218	1.027	34.227	78.218
3	.653	21.782	100.000			

Extraction Method: Principal Component Analysis.

Source: Author's Survey, 2017

From the assessment of the test of appropriateness of factor analysis, all the output indicated the appropriateness of factor analysis except the KMO test which indicated otherwise because of its weak value. However, the factor analysis still proceeded. After assessing the appropriateness of carrying out factor analysis, the standardized values of the component scores were saved as "Awareness index" a variable in the household data using the final version of the

PCA model through the Factor Analysis dialogue box in SPSS. The awareness index created was also in standardized form.

3.8. Factors Influencing Aged's Perception of Climate Variability

In determining factors influencing the aged population's perception of climate variability, perception of the Aged which is the dependent variable and Ageds' socio-economic characteristics which are the independent variables were correlated and presented in Table 13. Aged's perception of climate variability indicators (heavy rainfall, flood, drought, higher temperature and heat, delayed onset of rain, earlier onset of rain, short rainy season, harmattan/haze and storm) were first converted to Composite Perception Index using Principal Component Analysis. Perception Index was created through Principal Component Extraction estimated from standardized indicator values (Refer to 3.6 Section). This standardization was performed automatically by SPSS before running PCA. The perception index created was also in standardized form. Pearson and Spearman Correlation Coefficients were used to examine the relationship between aged's socio-economic characteristics and their Perceptions. Pearson correlation was used for continuous variables and spearman correlation coefficients for ordinal variables. Results in Table 13 revealed a moderate and positive association between ageds' perception of climate variability and local government areas (r= 0.347, p = 0.000).This implieds that the ageds' perception of climate variability varies with the local government areas they reside in. This might not be far-fetched from the fact that Kanke Local government area is lowland while Riyom Local government area is upland, which according to Sanni (2015) revealed the fact that climate of Plateau state is dominantly influenced by its relief and may influence respondents' perception of climate variability. The result also revealed a weak negative relationship between the respondents perception of climate variability and their Age at (r = -0.083, p=0.332) and also a weak but positive relationship with Income at (r = 0.080, p=0.347). This means, the higher the age of the aged, the lower their level of perception and the higher their income the higher is their level of perception. However, gender, marital status, educational status and occupation did not present a meaningful relationship. Therefore they are taken to not be major determinant of perception of climate variability by the aged in Plateau State, Nigeria.

Table 13: Correlation between Socio-Economic Characteristics and Ageds' Perception of Climate Variability

Variable 1	Variable 2	Correlation coefficient	Coefficient	P-Value	Mean	Standard Deviation
Age	Aged's perception	Pearson	-0.083	0.0332	1.99	1.192
Income	Aged's perception	Pearson	0.080w	0.347	1.66	1.018
Local Govt Area	Aged's perception	Spearman	0.347**	0.000	4.67	0.472
Gender	Aged's perception	Spearman	-0.012	0.893	1.48	0.501
Marital Status	Aged's perception	Spearman	0.007	0.938	1.58	0.909
Educational Status	Aged's perception	Spearman	-0.003	0.972	1.52	0.871

Occupation	Aged's perception	Spearman	-0.024	0.776	1.46	1.331

Source: Author's Field Survey, 2017

3.9. Chi-square Table of Relationship between Socio-economic Characteristics and Ageds' Awareness of Climate Variability

Age, income, local government areas, gender, marital status, educational status and occupation were examined to determine their influence on ageds' awareness of climate variability. First, aged's awareness of climate variability variables (heard about climate change/variability, understand the meaning of climate variability and thinking the parttern of climate is changing) were first converted to Composite Awareness Index using Principal Component Analysis. The Awareness Index was created through Principal Component Extraction estimated from standardized indicator values (Refer to 3.7 Section). Then, chi-square analysis was done between socioeconomic characteristics and the awareness index created. Result of chi-square analysis is presented in Table 14. The Table revealed that there were positive and significant relationships between awareness of climate variability index and the listed socio-economic variables namely: Marital status (X2 =113.44; p<0.05) and Occupation (X2 =151.570; p<0.05). However, Age(X2 =27.616; p>0.05), Income (X2 =21.435; p>0.05), Gender (X2 =14.847; p>0.05), Educational Status (X2 =59.075; p>0.05) and Local government Area (X2=11.443; p>0.05) were found to be positive but have no significant relationship with awareness of climate variability.

Table 14: Chi-square Table of Relationship between Socio-economic Characteristics and Ageds' Awareness of Climate Variability

Variable	X2	DF	~~5~~level of Significance
Age	27.616	40	0.931
Income	21.435	30	0.870
Local Govt Area	11.443	10	0.324
Gender	14.847	10	0.138
Marital Status	113.444	30	0.000
Educational Status	59.075	50	0.178
Occupation	151.570	50	0.000

Formatted Table

Source: Author's Field Survey, 2017

Conclusion and Recommendation

Climate variability is perceived differently by different people and this perception is based on their observations and experiences of rainfall and temperature patterns. Awareness and perception of Climate variability especially by the rural aged is very important. A good knowledge and understanding of climate change and variability will enable appropriate response to its impact. From this study, majority of the rural aged in the region are aware of climate change/variability and many of them got the awareness from friends, neighbours, television and radio. The study also revealed they understood climate change/variability and felt the pattern of weather is changing. Their understanding and perception of the reality of climate change will

help in their adaptation to the challenges of climate change~~. This is in line with Falaki1 et al, (2013) which opined that one cannot adapt to climate change in an adequate way if the present and future climate change is not perceived as a reality.~~

Result also indicated that local government area is a major determinant of the ageds' perception of climate variability. For instance, Kanke local government area is upland while Riyom Local government is lowland, therefore their perception of climate variability in the two local government areas will be different due to the peculiarity of the location of the local government areas. Therefore for effective intervention and response to climate change and variability awareness and perception, socio-economic characteristics of the people and peculiarities of the areas must be taken into consideration.

REFERENCES

Abid M., Scheffran J., Schneider U.A., Ashfaq M. (2015): Farmers' perceptions of and adaptation strategies to climate change and their determinants: the case of Punjab province, Pakistan Earth Syst. Dyn., 6, p. 225

Allahyari M.S., Ghavami S., Masuleh Z.D., Michailidis A and Nastis S.A. (2016): nderstanding Farmers' Perceptions and Adaptations to Precipitation and Temperature Variability: Evidence from Northern Iran

Amdu B, Ayehu A, Deressa A.(2013): Farmers' perception and adaptive capacity to climate change and variability in the upper catchment of Blue Nile, Ethiopia. Nairobi, Kenya: The African Technology Policy Studies Network (ATPS).

Boko M, et al. (2007) Africa. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, eds Parry ML, Canziani OF, Palutik of JP, van der Linden PJ, Hanson CE (Cambridge Univ Press, New York), pp433–467.

Bray, D. (2010): The scientific consensus on climate change revisited', *Environment Science & Policy* 13, 340-50

Deressa T., 2007. Measuring the economic impact of climate change on Ethiopian agriculture: Ricardian approach. World Bank Policy Research Paper No. 4342.World Bank, Washington, DC

Deressa T, Hassen R, Alemu T, Yesuf M, Ringler C (2008) 'Analyzing the determinants of farmers' choice of adaptation measures and perceptions of climate change in the Nile Basin of Ethiopia. International Food Policy Research Institute (IFPRI) Discussion Paper No. 00798, Washington

Deresa, T.T., R.M. Hassan, C. Ringler, T. Alemu, and M. Yesuf. (2009): Determinants of Farmers' Choice of Adaptation Methods to Climate Change in the Nile Basin of Ethiopia. *Global Environmental Change* 19: 248-255

DFID (2009): Political Economy Analysis: How To Note

Falaki A. A., Akangbe J.A. and Ayinde O.E. (2013): Analysis of climate change and rural farmers' perception in North Central Nigeria. In: Journal of Human Ecology 43 (2): 133

Gbetibouo A. G. (2009): Understanding Farmers' Perceptions and Adaptations to Climate Changeand Variability. The Case of the Limpopo Basin, South Africa. IFPRI Discussion Paper 00849.

Henry, C., M. Sharma, C. Lapenu, and M. Zeller.(2003): Microfinance Poverty Assessment Tool. Technical Tools Series No. 5. Washington DC, USA: Consultative Group to Assist the Poor (CGAP)/The International Bank for Reconstruction and Development (World Bank). *(PDF)*

Intergovernmental Panel on Climate Change (IPCC) (2001): Impact, Adaptation and Vulnerability, Third Assessment Report (TAR) by Working Group II, IPCC.

Intergovernmental Panel on Climate Change (IPCC) (2007): "Contribution of working groups I, II and III to the fourth assessment report of the intergovernmental panel on climate change", Synthesis Report, IPCC, Geneva.

Iwuchukwu, J. C., and F. N. Onyeme, (2012): Awareness and perceptions of climate change among extension workers of Agricultural Development Programme (ADP) in Anambra State, Nigeria. *J. Agric. Ext*., 16**,** 104–118

Jianjun, J., Yiwei, G., Xiaomin, W. and Nam, P.K. (2015): "Farmers' risk preferences and their climate change adaptation strategies in the Yongqiao District, China", Land Use Policy, Vol.47,Pp.365-372.

Karl, T.R., Melillo, J.M., Peterson, T.C., (2009): Global Climate Change Impacts in the United States. Cambridge University Press.

Kolawole, O.D. and D.O. Torimiro (2006): 'Nigerian poor majority: Issues and challenges in the 21st Century,' *Research Journal of Social Sciences*, 1(1), pp. 11-20.

Mandleni B, Anim FDK (2011). Climate Change Awareness and Decision on Adaptation measures by Livestock Farmers, 85rd Annual Conference of the Agricultural Economics Society, Warwick University. Pp. 26.

McNeely (2012): Examining barriers and opportunities for sustainable adaptation to climate change in Interior Alaska. Climatic Change, 111, 835–857

Muamba, F., and D. Kraybill (2010): Weather Vulnerability, Climate Change, and Food Security in Mt. Kilimanjaro. Poster prepared for presentation at the Agricultural & Applied Economics Association 2010 AAEA, CAES, & WAEA Joint Annual Meeting. Denver, Colorado, 25-27

Nigeria Bureau of Statistics (2006) Population Statistics Report

Odjugo P. A. O (2010): General Overview of Climate Change Impacts in Nigeria *J Hum Ecol, 29(1): 47-55 Kamla-Raj 2010*

Okoye Uzoma O. (2011): Climate change and older people: A discourse. Paper presented at the 10th Anniversary Conference with the theme Development, Environment and Climate Change: Challenges for Nigeria holding at University Of Ibadan Conference Centre.

Olajide O. Adeola (2014): Climate Change Awareness and Its Effects on Crop Output in Oyo State. IOSR Journal of Agriculture and Veterinary Science Vol. 7. No 1, 21-26.

Peters G (1997): Risk analysis. *Technology, Law and Insurance*, 2: 97-110

Piya S., Kiminami A. and Yagi H. (2012), Comparing the tech-efficiency of rice farmers in urban and rural areas: a case study from Nepal. Trends in Agricultural Economics, 2012, Asian Network for Scientific Information, ISSN 1994-7933 /DOI: 10.3923/lae.2012

Smith P, Olesen JE (2010): Synergies between the mitigation of, and adaptation to, climate change in agriculture. *J Agric Sci 148:543–552*

Sofoluwe, N. A., Tijani, A. A. and Baruwa, O. I., (2011): Farmers' perception and adaptation to climate change in Osun State, Nigeria, *African Journal of Agricultural Research*, 6(20): 4789-4794

Thomas, D. S. G., C. Twyman, H. Osbahr, and B. Hewitson(2007): Adapting to climate change and variability in southern Africa: farmer responses to intra-seasonal precipitation trends. *Climatic Change* 83:301-322.

Tologbonse, E.B., Auta, S.J., Bidoli, T.D., Jaliya M.M., Onu, R.O. and Issa, F.O. (2010) Farmers' Perception of the Effects of Climate Change and Coping Strategies in Three Agro-Ecological Zones of Nigeria *Journal of Agricultural Extension* 14 (1): 125–136

World Meteorological Organization, WMO (2017). Commission for Climatology: Frequently Asked Questions. http://www.wmo.int/pages/prog/wcp/ccl/faqs.php. Accessed January 06, 2018.

Yesuf M., Di Falco. S., Deressa, T., Ringler. C., & Kohlin. G. (2008): The Impact of Climate Change and Adaptation on Food Production in Low-Income Countries: Evidence from the Nile Basin, Ethiopia, EDRI.