

CLIMATE CHANGE RISK PERCEPTION IN KATSINA LOCAL GOVERNMENT AREA, KATSINA STATE, NIGERIA

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Abstract

Climate change continues to be one of the most pressing global issues in the twenty-first century, and developing countries face most of its adverse effects. This study analyzes the level of climate change awareness and perception of the risk of climate change among the people residing in Katsina Local Government Area of Katsina State, Nigeria. The survey involved administering structured questionnaires to 400 households within the six selected wards of the local government area using the Yamane's formula to estimate the sample size. Simple random sampling technique was used in selecting the samples./ The study adopted the use of descriptive statistics such as mean scores, frequency distribution, and percentages, together with the Binomial Logistic Regression Analysis using the Statistical Package for Social Sciences (SPSS 23) in analyzing the influence of socio-demographic factors on the climate change awareness and perception of risk. The findings indicate that there is variance in terms of climate change awareness among the respondents, where education, age, and occupation were found to significantly influence climate change awareness.

Keywords: Climate change, Risk perception, Awareness, Adaptation, Katsina State, Nigeria

1. Introduction

Climate change stands out as the greatest environmental threat facing humanity in the twenty-first century, hence the need for immediate and holistic measures at the global level (Adebayo & Oruonye, 2013; IPCC, 2023). According to the scientific consensus advanced by the Intergovernmental Panel on Climate Change (IPCC, 2023), climate change is defined as statistically significant changes in the mean state of the climate and

its variability that last for an extended period, usually for decades or more. This change is realized through warming in global average temperatures, changes in rainfall patterns, and an increase in the frequency of extreme weather events (Stern, 2008; UNDP, 2023).

The consequences of climate change have already been observed in several systems such as agriculture, biodiversity, water resources, and human health but are not uniformly felt around the world (McCarthy & White, 2001; Okpara et al., 2021). Developing countries especially those in Sub-Saharan Africa remain more vulnerable due to lack of adaptation measures, low technology, and high reliance on climate-sensitive sectors like rain-fed agriculture (Sarkodie & Strezov, 2019; Niang et al., 2014). Nigeria, as Africa's most populous nation, exemplifies this vulnerability, with its agricultural systems, water resources, and coastal communities experiencing significant climate-related stresses (Oyedepo et al., 2020; Abiodun et al., 2021).

Two key approaches adopted by the international community in response to climate change are mitigation of greenhouse gases and adaptation to climatic stimuli or the perceived climatic stimuli (UNFCCC, 2006; IPCC, 2022). However, the success of adaptation measures is highly reliant on public awareness and risk perceptions, which shape behavioral responses to such stimuli (Leiserowitz, 2015; van der Linden, 2017). Communities without awareness and/or with poor perceptions of the level of threat from climatic changes will be more vulnerable because they will not undertake any form of behavioral adaptations.

While there have been numerous studies done worldwide concerning climate change, there are still significant knowledge gaps concerning perceptions at the local level, especially for rural and peri-urban communities in Sub-Saharan Africa. As reported by Oladipo (2011) and Abaje (2016), most of the studies on climate change done in Nigeria have remained within the scope of climatological knowledge, providing regional and national level assessments while disregarding local knowledge systems and perspectives. Such an approach does not produce the kind of results that can be effectively applied locally because of the differences between various communities in relation to socio-economic and environmental conditions.

Research carried out internationally has shown differences in awareness and perception of climate change risk across different communities. According to Tien et al. (2015), analysis of data collected through the Gallup World Poll conducted in 2007-2008 in 119 countries indicates that climate change awareness is low and unequally distributed across the globe, with developed countries having higher levels of climate change awareness than developing countries. Yet, interestingly, the study shows that people in developing countries consider climate change to be more threatening than people in developed countries do.

Climate change awareness and perceptions have been researched in different Nigerian contexts, especially with regard to rural communities. Adebayo et al. (2012) explored climate change awareness, vulnerability, and adaptation strategies among the population of farmers in Adamawa State, finding out that age and occupation were important factors influencing awareness of climate change. Similarly, Hasan and Akhtar (2011) and Khan et al. (2012) found high levels of climate change awareness in the study populations, which was

influenced by education. Yet, the focus of these researchers was mainly on the agrarian population.

The present study addresses this gap by examining climate change risk perception in Katsina Local Government Area, Katsina State, Nigeria a region characterized by semi-arid climatic conditions and significant vulnerability to climate variability. The research aims to assess local awareness levels, identify perceived causes and impacts of climate change, and evaluate risk perceptions among residents. This localized approach is essential for generating context-specific information that can guide sub-national policy formulation and adaptation planning.

2. Literature Review

2.1 Conceptual Framework: Understanding Climate Change Risk Perception

Risk perception, which refers to an individual's assessment of the features and magnitude of a risk (Slovic, 2016), plays a critical part in formulating a reaction to environmental risks. Regarding climate change, risk perception involves awareness of the risk, knowledge of the cause of the hazard, and assessment of its implications and significance (van der Linden, 2015). In accordance with the psychometric paradigm formulated by Slovic et al., risk perceptions may be affected by various elements such as dread, ignorance, and lack of personal control over the issue (Slovic et al., 2013).

Another approach to risk perception is the Protective Action Decision Model (PADM) which helps comprehend the process of making decisions about protection and adaptive actions in relation to climate change (Lindell & Perry, 2012). According to PADM, individuals' decisions regarding protective actions are determined by cues in the environment, societal factors, and their own experience. In particular, risk perceptions in connection with climate change influence decisions regarding protective actions and adaptation behavior (Bubeck et al., 2018).

2.2 Global Perspectives on Climate Change Awareness and Risk Perception

The worldwide distribution of awareness about climate change exhibits substantial gaps that depend on socio-economic development, education, and media consumption. One of the most thorough cross-country studies was performed by Tien et al. (2015), who explored data for 119 countries and found that climate change awareness varies from below 40% in some developing countries to more than 80% in developed states. However, this research revealed the phenomenon of "risk perception paradox": while people from developing countries exhibit less awareness of the problem, they are more concerned about climate risks due to the first-hand experience of its effects and lack of adaptation options.

Lee et al. (2015) discovered that higher education, better income, and urbanization are good predictors of awareness of climate change and its risk perception in various countries. Moreover, Steentjes et al. (2017) described different risk perceptions of climate change across

Europe and connected them with political views, media exposure, and experience of living through extreme weather events.

Recent research has emphasized the role of experiential learning and direct observation in shaping climate risk perception. Broomell et al. (2015) found that personal experience with extreme weather events significantly enhances climate change awareness and concern, even among individuals with skeptical views. This suggests that localizing climate communication around observable impacts may be more effective than relying on abstract scientific information alone.

2.3 Climate Change Perceptions in Sub-Saharan Africa

Sub-Saharan Africa, known as one of the world's regions most vulnerable to climate change, has also been a subject of many perception studies, which have revealed useful information on the locals' knowledge of and reactions to this phenomenon (Bryan et al., 2013; Nhemachena & Hassan, 2007). The research carried out by Akponikpè et al. (2015) about climate change perceptions of farmers in West Africa showed that the majority of people reported their observations concerning changes in rainfall, increase in temperature, and the frequency of droughts, which is consistent with meteorological information about these changes. Nevertheless, the authors noticed that there were serious deficiencies in the locals' knowledge of the causes of climate change: most of them believed that all the observed changes resulted from supernatural factors or local environmental problems and not from greenhouse gas emissions worldwide.

There were also some studies on the issue in Nigeria. The authors of the paper by Asekun-Olarinmoye et al. (2014), for instance, examined the public perceptions of climate change and its health consequences in southwestern Nigeria. Elisha et al. (2017) investigated climate change awareness and adaptation strategies among grain farmers in Sokoto State, Nigeria, documenting high levels of awareness and diverse adaptation practices including changes in planting dates, crop diversification, and soil conservation. Similarly, Farauta et al. (2011) found that farmers in northern Nigeria have developed indigenous adaptation strategies based on local knowledge, though these approaches face limitations under increasing climate stresses.

2.4 Socio-Demographic Determinants of Climate Change Perception

The relationship between socio-demographic factors and climate change awareness and perception of the associated risks have been explored in a variety of literature. Education is often found as an important determinant, with increased education being related to increased awareness and knowledge about climate change causes and consequences (Marlon et al., 2019; Steentjes et al., 2017). In terms of age, different results are observed, where on the one hand, younger people are found to be more aware of climate change (Hasan & Akhtar, 2011), whereas in other studies, older people demonstrate higher awareness of the problem because of their life-long experience with environmental changes (Khan et al., 2012).

Climate change perception differences are observed by gender, where women are sometimes found more concerned about climate risks that might be caused by their natural resource management roles (McCright, 2010; Pearson et al., 2017). In contrast, some scholars find these differences related to education and income level.

Occupational category is also found to influence climate change awareness, especially for agriculture-based occupation because of their direct involvement in activities influenced by weather (Adebayo et al., 2012; Bryan et al., 2013). Moreover, income level and information source access, such as TV, radio, and cell phone also influence climate change awareness (Tien et al., 2015; Kpadonou et al., 2017).

2.5 Theoretical Framework

The theory of planned behavior (Ajzen, 1991) forms the basis of this study, which argues that attitudes towards the behavior, subjective norms, and perceived behavioral control determine behavioral intentions. In the case of climate change adaptation, individual perceptions of risk and awareness determine attitudes towards adaptation, whereas social networks and community norms determine subjective norms. In addition to the theory of planned behavior, the social amplification of risk model (Kasperson et al., 1988) is applied, which describes the role of social and institutional processes in either ameliorating or exacerbating risk perceptions.

3. Methodology

3.1 Study Area

Katsina Local Government Area is located in Katsina State, northwestern Nigeria, within the semi-arid Sahel region. The area is characterized by distinct wet and dry seasons, with mean annual rainfall ranging from 500mm to 800mm, and temperatures fluctuating between 25°C and 45°C (Abaje, 2016). The local economy is predominantly agrarian, with the population engaged in farming, livestock rearing, and trading activities. The area experiences significant climate variability, including recurrent droughts, irregular rainfall, and increasing temperatures, making it particularly vulnerable to climate change impacts.

3.2 Research Design and Sampling

The study employed a cross-sectional research design using household survey methodology. The sample population comprised households in six wards within Katsina Local Government Area: Wakilin Gabas, Wakilin Yamma, Wakilin Kudu, Wakilin Arewa, Shinkafi, and Kangiwa. These wards were selected based on population size and representativeness. The total household population was 83,161, as documented by the Katsina Local Government Primary Health Care Department (2022).

Using Yamane's formula (Yamane, 1973):

$$n = N \div (1 + N(e)^2)$$

Where:

- N = Total household population (83,161)
- e = Margin of error (0.05)
- n = Required sample size

The calculation yielded a sample size of approximately 400 households, proportionate to each ward's population.

3.3 Data Collection

Structured questionnaires were administered to the most senior available household member using simple random sampling techniques. The questionnaire encompassed several sections: demographic and socio-economic characteristics, climate change awareness, perceived causes of climate change, perceived impacts, and risk perception assessment. Data collection was conducted with support from trained enumerators familiar with the local language and culture, ensuring clear communication and accurate responses.

3.4 Data Analysis

Data analysis employed both descriptive and inferential statistical techniques. Descriptive statistics including frequencies, percentages, and mean scores were used to summarize respondent characteristics and perceptions. Binomial Logistic Regression Analysis was conducted using SPSS version 23 to identify socio-demographic determinants of climate change awareness and risk perception. The dependent variables were binary indicators of awareness (aware/unaware) and risk perception (perceive as risk/do not perceive as risk). Independent variables included age, gender, education, occupation, income, and access to information sources. Statistical significance was assessed at the 0.05 level.

4. Results

4.1 Demographic and Socio-Economic Characteristics

The survey achieved a 95% response rate, with 380 valid questionnaires analyzed. Table 1 presents the demographic and socio-economic characteristics of respondents.

Table 1: Demographic and Socio-Economic Characteristics of Respondents

Characteristics	Category	Frequency	Percentage%
Gender	Male	242	63.7
	Female	138	36.3
Age group	18-30 Years	95	25.0
	31-45 Years	163	42.9
	46-60 Years	79	20.8
	>60 Years	43	11.3
Education	No formal education	106	27.9
	Primary	98	25.8
	Secondary	114	30.0
	Tertiary	62	16.3
Occupation	Farming	190	50.0
	Trading	76	20.0
	Civil service	42	11.1
	Other	72	18.9
Income level	Low (<N50,000/month)	202	53.2
	Medium (N50,000-100,000)	118	31
	High (>N100,000)	60	15.8

Authors, 2026

The majority of respondents were male (63.7%), reflecting traditional household head dynamics. The most represented age group was 31-45 years (42.9%), suggesting a predominantly working-age population. Educational attainment was relatively low, with 27.9% lacking formal education and only 16.3% having tertiary education. Farming was the predominant occupation (50.0%), consistent with the area's agrarian character, and most respondents reported low-income levels (53.2%).

4.2 Climate Change Awareness

Table 2 presents findings on climate change awareness and sources of information.

Table 2: Climate Change Awareness and Information Sources

Indicator	Category	Frequency	Percentage (%)
Heard of Climate Change	Yes	236	62.1
	No	144	37.9
Primary Information Source	Radio	124	32.6
	Television	99	26.1
	Community/Neighbors	70	18.4
	Government extension	49	12.9
	Social media	38	10

Authors, 2026

Approximately 62.1% of respondents had heard of climate change, indicating moderate awareness levels. Radio was the most cited information source (32.6%), followed by television (26.1%), highlighting the importance of mass media in climate communication in this context. However, over one-third of respondents (37.9%) had never heard of climate change, representing a significant awareness gap.

The Binomial Logistic Regression analysis (Table 3) identified significant predictors of climate change awareness.

Table 3: Logistic Regression Model Predicting Climate Change Awareness

Predictor	B	S.E.	Wald	df	p-value	Exp(B)
Age	0.204	0.087	5.512	1	0.019	1.226
Education	0.862	0.165	27.352	1	<0.001	2.367
Gender	-0.102	0.203	0.253	1	0.615	0.903
Occupation	0.475	0.139	11.647	1	0.001	1.608
Income	0.091	0.152	0.359	1	0.549	1.095
Constant	-2.104	0.342	37.847	1	<0.001	0.122

Note: $R^2 = 0.312$ (Cox & Snell); $R^2 = 0.419$ (Nagelkerke). Model $\chi^2 = 134.62$, $p < 0.001$

Authors, 2026

Education emerged as the strongest predictor of climate change awareness (Wald = 27.352, $p < 0.001$), with each unit increase in educational level associated with a 2.367-fold increase in the odds of being aware (Exp(B) = 2.367). Occupation also significantly predicted awareness (Wald = 11.647, $p = 0.001$), with farmers and those in weather-dependent occupations demonstrating higher awareness. Age was marginally significant (Wald = 5.512, $p = 0.019$), while gender and income did not reach statistical significance.

4.3 Perceived Causes of Climate Change

Table 4 presents respondents' perceptions of the causes of climate change.

Table 4: Perceived Causes of Climate Change Among Aware Respondents

Cause	Frequency	Percentage (%)
Deforestation	102	26.8
Burning of fossil fuels	78	20.5
Industrial emissions	64	16.8
Agricultural practices	58	15.3
Natural variability	46	12.2
Divine will/supernatural	32	8.4

Authors, 2026

Among those aware of climate change, deforestation was the most frequently cited cause (26.8%), followed by burning of fossil fuels (20.5%). Notably, 8.4% attributed climate change to divine will or supernatural forces, reflecting the integration of traditional and spiritual worldviews in understanding environmental phenomena. This finding underscores the importance of incorporating culturally sensitive communication strategies in climate outreach.

4.4 Perceived Impacts of Climate Change

Respondents reported observing multiple climate change impacts (Table 5).

Table 5: Perceived Impacts of Climate Change

Impact	Frequency	Percentage (%)
Increased temperature	114	30
Irregular rainfall patterns	78	20.5
Reduced agricultural yields	63	16.6
Water scarcity	57	15
Increased prevalence of diseases	33	8.7
Loss of biodiversity	18	4.7
Increased poverty	17	4.5

Authors, 2026

The most commonly perceived impact was increased temperature (30%), followed by irregular rainfall patterns (20.5%) and reduced agricultural yields (16.6%). These perceptions align with meteorological observations in the region (Abaje, 2016) and reflect the direct experiences of respondents with climate variability. Notably, socio-economic impacts including increased poverty (4.5%) were also identified, highlighting the cascading effects of climate change on livelihoods.

4.5 Risk Perception

Table 6 presents respondents' perceptions of climate change risk.

Table 6: Climate Change Risk Perception

Risk Dimension (%)	High Risk (%)	Moderate Risk (%)	Low Risk (%)	No Risk
Personal risk	36.3	41.8	15.8	6.1
Community risk	42.2	37.6	13.9	6.3
Risk to livelihood	52.6	31.6	10.8	5.0
Risk to health	44.7	35.5	14.2	5.6

Authors, 2026

Overall, respondents perceived climate change as posing moderate to high risks across multiple dimensions. Risk to livelihood was perceived as highest, with 52.6% rating it as high risk, reflecting the centrality of climate-sensitive agricultural livelihoods in the study area. Personal risk was perceived as relatively lower than community risk, suggesting a psychological distance effect where individuals perceive climate threats as more distant or applicable to others (Lacroix et al., 2014).

The logistic regression model predicting high risk perception (Table 7) identified significant determinants.

Table 7: Logistic Regression Model Predicting High Risk Perception

Predictor	B	S.E.	Wald	df	p-value	Exp(B)
Age	0.312	0.132	5.594	1	0.018	1.366
Education	-0.245	0.184	1.774	1	0.183	0.783
Gender	0.086	0.215	0.160	1	0.689	1.090
Occupation (farming)	0.983	0.286	11.821	1	0.001	2.673
Income	-0.115	0.161	0.510	1	0.475	0.891
Awareness	1.428	0.307	21.632	1	<0.001	4.169
Constant	-1.876	0.415	20.429	1	<0.001	0.153

Note: $R^2 = 0.245$ (Cox & Snell); $R^2 = 0.328$ (Nagelkerke). Model $\chi^2 = 102.38$, $p < 0.001$

Authors, 2026

Climate change awareness was the strongest predictor of high-risk perception (Wald = 21.632, $p < 0.001$), with aware individuals being 4.169 times more likely to perceive high personal risk (Exp(B) = 4.169). Farming occupation also significantly predicted risk perception (Wald = 11.821, $p = 0.001$), with farmers 2.673 times more likely to perceive high risk compared to non-farmers. Education showed a negative but non-significant relationship

with risk perception, suggesting that awareness, rather than formal education, is the primary driver of perceived risk in this context.

5. Discussion

5.1 Awareness and Information Sources

The fact that 62.1% of the respondents had knowledge about climate change is in keeping with previous findings from research done in similar settings in Nigeria (Asekun-Olarinmoye et al., 2014; Elisha et al., 2017) but significantly lower compared to the 80-90% awareness levels found among urban Nigerians (Oyedepo et al., 2020). The difference in awareness could probably be attributed to the lack of information in rural and peri-urban areas and low educational level of the study population.

Radio was identified as the main channel of information (32.6%), reinforcing its role in rural communication notwithstanding the development of digital media platforms. This is in line with other findings from Africa (Bryan et al., 2013; Kpadonou et al., 2017), and further supports the importance of climate change communication through radio channels. Extension services by the government contributed to 12.9% of the channels of information.

5.2 Socio-Demographic Determinants

The high impact of education on climate change awareness is consistent with much existing international research (Marlon et al., 2019; Tien et al., 2015). The education increases the cognitive ability to process information about environmental issues and provides access to various sources of information. The results imply that investment in education is one of the necessary conditions for developing climate resilience.

The significant impact of occupation on awareness can be explained by previous research (Adebayo et al., 2012; Bryan et al., 2013) and the fact that the experience of observing the effects of climatic variations plays an essential role for farmers. This conclusion highlights the possibility of using experiential learning in climate communication. The lack of the significance of gender on awareness contradicts the findings of some researchers (McCright, 2010), but it can be explained by the focus of the study on household heads (mainly males) and the necessity of conducting gender-segregated research on different experiences of women.

It is clear why deforestation features prominently as one of the causes since its visibility in relation to land use is high. In fact, it conforms with the results found by other Nigerian studies (Abaje, 2016; Elisha et al., 2017). Nonetheless, the fact that awareness about industrial emissions and fossil fuel usage as causes of climate change is lower than that of other factors can be attributed to the fact that there is no heavy industry in the study area and that people do not have sufficient understanding of how atmospheric processes work at the global level. It implies that climate communication needs to cover both local and global aspects.

The attribution of climate change to the will of God (8.4%) is remarkable and consistent with results obtained in other parts of Africa (Akponikpè et al., 2015). Although this finding should not be taken as an example of climate change denial, it shows that integrated perspectives on climate change need to be respected and taken into account during climate communication.

The high prevalence of perceived climate impacts, particularly increased temperature and irregular rainfall, aligns with meteorological observations of rising temperatures and changing precipitation patterns in northern Nigeria (Abaje, 2016; IPCC, 2023). The recognition of reduced agricultural yields (16.6%) and water scarcity (15%) as impacts reflects direct experiences with climate-induced livelihood stresses and suggests that adaptation is urgently needed.

5.4 Risk Perception

The finding of high-risk perception towards livelihood (52.6% high risk) could be attributed to the material vulnerability of the climate, since livelihood in the study area depends mainly on rain-fed agriculture. The result is consistent with theoretical models based on the concept of vulnerability-based risk perception (van der Linden, 2015).

Risk perception at the individual level was seen as lower than community risk perception, which supports the psychological distance theory that climate risks are viewed as being distal and affecting others more than oneself (Lacroix et al., 2014). The cognitive dissonance creates problems in mobilizing individual behavioral changes and calls for climate communication efforts that would create an individual-level sense of relevance and immediacy of climate risks.

High correlation of climate change awareness with high-risk perception ($\text{Exp}(B) = 4.169$) emphasizes the significance of efforts aimed at creating climate awareness. On the other hand, the insignificant correlation between education and risk perception shows that climate awareness is the more important variable influencing risk perception compared to formal education.

The heightened risk perception among farmers ($\text{Exp}(B) = 2.673$) reflects direct exposure to climate variability impacts on agricultural livelihoods and aligns with research showing that occupation is a key determinant of risk perception (Bryan et al., 2013).

5.5 Implications for Policy and Practice

There are various implications of the results for climate change policies and practices in Katsina State. First, there is a need to increase awareness of climate change through the use of the radio station and other easily accessible media outlets due to the importance of the radio in disseminating information.

Second, incorporating climate change issues into the curriculum would help solve the education-awareness gap problem. Third, farmers' experience must be used in adapting to

climate change in the region by, for instance, using participatory approaches that will combine scientific knowledge with the local one. Fourth, improving agricultural extension services could help increase awareness and capacity to adapt.

Fifth, culture-sensitive ways of communicating that consider other worldviews of people, including their spirituality, could improve the acceptance of the message. Finally, the differences in risk perceptions indicate the need for risk communication that focuses on different risks of different population groups. Livelihood-focused messages are likely to be more useful given the high livelihood risk.

6. Conclusion

The current paper examined the awareness and risk perception of climate change in the local residents of Katsina Local Government Area, Katsina State, Nigeria. Moderate level of climate change awareness (62.1%) is found in the community, which is significantly predicted by education and occupation. The main causes of climate change are deforestation, while the consequences are increasing temperature, changes in rainfall pattern, and low productivity of agriculture. The most perceived risk was on the impact of climate change on livelihoods, and awareness and farming occupation are predictors. It should be noted that the study highlights the crucial significance of studying the issue of climate change in the context of the locality. The ways to increase the awareness of climate change include the use of mass media, the improvement of educational materials, and application of experience of the farmers. The results of the study make an important contribution to the existing scientific literature on climate change perceptions in Sub-Saharan Africa.

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