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INVESTIGATING THE USE OF THE MEDIA IN DISSEMINATING INFORMATION ON CLIMATE CHANGE IN NORTH CENTRAL NIGERIA

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ABSTRACT

Information dissemination through the use of media technology is important to understanding the threat, impact and adaptation options that climate change poses regarding the livelihood of farmers in Nigeria specifically and the entire world generally. This study investigates the use of media in disseminating information on climate change and the constraints limiting climate change adaptation in north central Nigeria. An interviewer-administered questionnaire was used to obtain data from 411 farmers in the study area. A multi-stage sampling technique was used in selecting the respondents, and the data collected was analysed using descriptive and inferential statistical tools. The mean age of the farmers was 52 years.The mean years of farming experience was 33 years.51.3% of the farmers were females. Their literacy level was low (30.6% had secondary education). The most common household appliances among the respondents were radio sets (77.6%), motor cycles (55%) and mobile telephones (30.6%). 59.4% received information from extension agentsbetween 2008 and 2011; only about half of them received information (temperature and rainfall) on climate change from this source. Extension agents and battery-operated radios were ranked as the leading sources of information on climate change. Inadequate information due to inadequate media coverage of climate change in Nigeria in particular and the low literacy level were the principal constraints on climate change adaptation. It was recommended that the literacy level of the respondents be improved through the establishment of adult education or literacy classes in the study area so that they can benefit from print media.It was further recommended that timely and adequate information to rural farmers on climate

change should be given via media technologies available to them (such as battery-powered radiosand mobile phones among others.) and that extension agents should be properly equipped to give information on climate change to the farmers.

Keywords: *climate change, farmers, information, media.*

I. Introduction

Media are the channels through which a large number of people receive information generally. Specifically, they refer to information dissemination about climate change via devices such as television, radio, newspapers, mobile phones, extension agents/services, posters, bulletins, and so on (Adegbija, 2001). They provide easy-to-understand information on climate change and global warming (Boykoff, 2010). Climate change, on the other hand, has been defined by the Intergovernmental Panel on Climate Change (IPCC) as a change in the state of the climate whether as a result of human activity or due to natural variability, that can be identified (by using statistical tests), by changes in the mean and/or the variability of its properties, and that persists for an extended period typically decades or longer (IPCC, 2007). The United Nations Framework Convention on Climate Change (UNFCCC), however, in its definition, attributes climate change directly or indirectly to human activities (UNFCCC, 1992).

Two main responses to climate change have been identified: (i) mitigation of climate change by reducing green-house gases emission and enhancing sinks, and (ii) adaptation to the impacts of climate change, by engaging in coping mechanisms that assist in preparedness measures or adjusting to the impact (Klein, Hug, Denton, Downing, Richels, Robinson & Toth, 2007). While mitigation seeks to avoid the unmanageable, adaptation focuses on managing the unavoidable. The best response to

climate change is a combination of these two strategies. Human societies and activities are sensitive to climate in some way or another. Where people live and the way they generate their livelihood are influenced by the ambient climate.

Risk perception and accuracy of knowledge are strong predictors of climate change mitigation attitudes, but as with most science-based issues, the information about climate change that reaches the public passes first through the mass media. Although undoubtedly necessary, this indirect dissemination probably increases the potential for the introduction of skewed or improperly weighted information into the discourse, whereas information that is found to be more credible is more likely to result in behaviour change (Coleman, 1993). Because climate change is a scientific process, the information that reaches the general public must be translated into lay terms. In most countries, this role is filled naturally by the mass media. In addition to shaping understanding of climate-change science, the media has the power to shape people's impressions of their fate: a doomsday story may resign its audience to passivity while a piece emphasizing the real but not inevitable devastation from climate change may incite action.

Risk communication is an area of risk perception which examines the assessment of the intentional distribution of messages of risks between risk assessors and lay people (Smith & Johnson, 1988; Plough & Kirmsky, 1987). The information provides guidance to policy-makers and institutions that seek to distribute risk information with the motive of trying to correct individuals' risk perception biases. The format in which the information is distributed does make a difference. Information that is presented in a quantitative form with probabilistic probabilities will reduce one's risk perception compared with a qualitative approach (Smith, *et al.* 1990). The theory of risk communication depends not only on the individuals understanding the

information conveyed to them, but accepting it as important to their own circumstance (Fischoff, 1998).

Changes in Temperature and Rainfall in North Central Nigeria

Falaki (2012) analyzed thirty years (1980 – 2009) temperature and rainfall data of the Benue and Plateau meteorological stations in North Central Nigeria using regression analysis. The study found that the minimum temperature in Makurdi and Jos increased by 0.10^{o}C and 0.58^{o}C while maximum temperature increased by 0.49^{o}C and 0.55^{o}C respectively. The study further revealed that rainfall increased in Makurdi by 46.4mm/30 years but decreased in Jos by 8.48mm/30 years, with the rainfall pattern becoming increasingly unpredictable.

According to the study by the Department for International Development (DFID) (2009), under best estimate scenario, there is a projected increase in average temperature in Nigeria of 0.8^{0}C and 1.8^{0}C for the years 2020 and 2050 respectively. Under a low scenario, the average temperature rise in Nigeria will be 0.5^{0}C and 1.0^{0}C by the years 2020 and 2050 respectively. Under a high scenario, however, the projected increase in average temperature in Nigeria will be 1.3^{0}C and 3.2^{0}C by 2020 and 2050 respectively. For projections on precipitation, under best estimate, an average increase of 6mm and 14mm is projected by the years 2020 and 2050 respectively. Low scenario estimates for precipitation increase by the years 2020 and 2050 were given as 4mm and 8mm respectively, while high scenario estimates were projected to be 9mm and 19mm for the same two years respectively. DFID (2009) stated that it should be noted that although average precipitation is expected to increase in Nigeria, different zones will experience varying effects, with some areas becoming increasingly desertified while others will likely suffer increased

precipitation. The values shown here are thus country-wide averages. It should also be noted that predictions are calculated on the basis of observed historical data, and different models will produce varied results.

The implications of climate change in Nigeria include frequent drought and desertification. Odjugo and Ikhuoria (2003) observe that Nigeria north of 12^{o}N is under severe threat of desert encroachment, and sand dunes have buried large expanses of arable lands, thus reducing viable agricultural lands and crop production. This has prompted massive emigration and resettlement of people to areas less threatened by desertification. Such emigration gives rise to social effects like loss of dignity and social values. It often results in increasing spates of communal clashes among herdsmen and farmers. Such clashes resulted in the death of 186 people in six northern states of Nigeria between 1998 and 2006 (Yugunda, 2002 & Yaqub, 2007). Akonga (2001) also shows that most of the destitute that emigrated as a result of drought and desertification usually move to nearby urban areas to beg for alms thereby compounding the already tense urbanization problems in Nigeria.

In addition, many rivers in Nigeria have been reported to have dried up or are becoming more seasonally navigable, including Lake Chad, which shrank in area from 22,902 km^2 in 1963 to a mere 1,304 km^2 in 2000 (Odjugo, 2007). The water scarcity will create the tendency for the concentration of users around the remaining limited sources of water. Under such circumstances, there is an increased possibility of additional contamination of the limited sources of water and the transmission of water-borne diseases like cholera, typhoid fever, guinea worm infection and river blindness.

Moreover, the frequent droughts and infrequent rains have started shortening the growing season, thereby causing crop failure and food shortage. Odjugo and Ikhuoria

(2003) as well as Ayuba, Maryah and Gwary (2007) have shown that drought, desert encroachment and coastal inundation have started affecting the country's ecosystem leading to ecological destabilization due to climate-change impact in the semi-arid region of northern Nigeria.

The need thus arises for targeting interventions to reduce the adverse impacts of climate change and to enhance adaptive capacity. Adaptive capacity is determined by the complex inter-relationships of a number of factors at different scales. A range of factors – as identified by the IPCC (2007) including wealth, technology, education, information, skills, infrastructure, access to resources, and various psychological factors and management capabilities – can modify adaptive capacity. Vincent (2009) observes that at the household level, whether or not a person can adapt to climate change depends on such factors as their knowledge base, which may enable them to anticipate change and identify new or modified livelihood opportunities, and their access to further resources required to achieve this. This knowledge base requires recognition of the necessity to adapt, knowledge about available options, the capacity to assess them, and the ability to implement the most suitable ones.

In their study, Gupta and Hisschemöller (1997) conclude that it is important to ensure that systems are in place for the dissemination of climate-change and adaptation information nationally and regionally, and that there are forums for discussion and innovation of adaptation strategies at various levels. Nigeria Environmental Study/Action Team (NEST) and Global Change Strategies International (GCSI) (2004) list the main obstacles to adaptation in Nigeria, and they include lack of information (awareness) and knowledge (education) of the phenomenon of climate change. For example, Boykoff (2010) analyzed newspaper coverage of climate change across twenty countries and six continents such as *The*

Age (Australia), *Wall Street Journal*(U.S.A), *Globe and Mail* (Canada), *Business Day* (South Africa), etc. but did not identify any newspaper from Nigeria which specifically deals with media coverage of climate change. Though there are weather-related reports by the meteorological stations of Nigeria, there is no specific media coverage of climate change. The exception is whenever there is going to be flooding or other weather-related disasters. The media will cover such but will not use the occurrence to educate the people on what could be responsible for the sudden extreme weather experiences we now have in the country.

However, as with most science-based issues, the skeletal information about climate change that reaches the public passes first through the mass media, especially the radio and government sources such as the extension agents and village heads, etc. Although undoubtedly necessary, this indirect dissemination probably increases the potential for the introduction of skewed or improperly weighted information into the discourse. In addition to shaping understanding of climate change science, the media have the power to shape people's impressions of their fate; a doomsday story may resign its audience to passivity, while a piece emphasizing the real but not inevitable devastation from climate change may incite action.

Most studies on climate change and agriculture have concentrated on economics, the social infrastructure, and institutional and technological aspects of adaptive capacity (Burton, Smith,& Lenhart, 1998; Kates, 2000; Scheraga & Grambsch, 1998; Magadza, 2000). Little attention has been given to how farmers access information on climate change. This poor attention has limited the farmers' understanding of climate change and how to cope with it. This calls for more empirical information that will assist farmers, development practitioners, information professionals, and planners in policy decision making.

II. Purpose of the Study/Research Questions

This study specifically investigated the use of media in the dissemination of information on climate change to farmers in north central Nigeria. In order to achieve the purpose of the study, the following research questions were addressed:

- How do farmers' personal characteristics affect the use of media in disseminating information on climate change?
- How do the farmers' household assets affect their accessibility to information on climate change?
- What are the types of media used by the farmers to receive information on climate change?
- What are the farmers' constraints in receiving information for coping with climate change?

III. Material and Methods

The study was carried out in farming communities in Benue, Nasarawa and Plateau states. These states are located in the north central region of Nigeria and extend roughly from latitude 6^0 50'N to 9^0 30'N of the Equator and longitude 7^0 30'E to 10^0 00'E of the Prime Meridian. This area is largely located in the savannah zone of Nigeria with its northern edge lying on the border of the Sahel and its southern edge lying on the border of the rain forest of Nigeria. It is an ecological transition zone between the arid north and the moist south with temperatures fluctuating between 18^0C – 37^0C in the year and a rainfall of 1000mm to 1500mm annually (Areola & Mamman, 1999). The main occupation of the people is predominantly subsistence agriculture. This area is the nation's acclaimed *food basket* because of its rich

agricultural produce, which includes yams, rice, beans, cassava, maize, soybeans, sorghum, millet and cocoyam.

The study is based on a survey of 411 farmers during the 2010/2011 farming season. The samples were collected from five communities (Agasha, Mbaduku, Mbayongo, Tyowanye, and Utabar) spread over four local government areas(Guma, Vandeikya, Buruku, and Gboko) in Benue state, nine communities (Ikposogye, Musha, TuduAdabu, Kirayi, Assakio, Rafinkudi, Ahenta, Ogbagi, and Gbamze West) spread over three LGAs (Obi, Lafia, and Nasarawa-Eggon) in Nasarawa state, and ten communities (Kawel, Maihakoringol, Folloh, Kunet, Kerang, Ampang, Panyam, Gohotkung, Tyop and Chanso) spread over two LGAs (Bokkos and Mangu) in Plateau state.

Purposive sampling was used to select the communities and simple random sampling was used to select respondents for the study. Proportionate representation was used to determine the number of respondents selected in each state.A pre-tested interviewer-administered questionnaire was used to elicit information from the farmers selected for the survey. Thereafter, simple random sampling was used to select respondents for the study using different sampling ratios based on the number of communities sampled in each local government. Thus, 22 respondents were selected in each of the 5 communities in Benue, 16 respondents in each of the 9 communities in Nasarawa and 18 respondents in each of the selected 10 communities in Plateau. The response rate was 100% in Benue, 95.8% in Nasarawa and 90.5% in Plateau. Accordingly, the sample size used for the study was 110 from Benue, 138 from Nasarawa, 163 from Plateau and as a whole, it was 411.Frequency counts and percentages were used for data analysis. Kruskal-Wallis One-way ANOVA was used in ranking variables for the study. The study also utilized Principal Component

Analysis (PCA), a variable reduction procedure that typically results in a relatively small number of components that account for most of the variance in a set of observed variables.

IV. Results and Discussion

Personal characteristics help to capture particular attributes of the respondents. The data analysis presented in Table 1 shows that the mean age of the respondents was 51.7 years, and the age range between 40-50 years made up 58.6%. Table 1 also shows that the mean age of farming experience is 33.1 years. Consequently, the farmers are mature and in their economically active years. The age of the farmers and the number of years of their involvement in farming represents knowledge of farming and their awareness of past and present climatic conditions as indicated by Maddison (2006); Ishaya and Abaje (2008). They are, therefore, better able to perceive climate change as they have been exposed to past and present climatic conditions over many years.

Table 1 also reveals that female respondents constitute 51.3% while male respondents constitute 48.7%. This gender distribution is also reflected in the 2006 national census in which the percentage of female was 50.2% in Plateau, 50.4% in Benue and 50.5% in Nasarawa (National Population Commission, 2006). Female-headed households are common in the middle belt of Nigeria where economically active males migrate to urban areas such as the Federal Capital Territory in search of jobs. Mainstreaming gender into climate change research is anchored on the realization that women and men perceive climate risk differently, (Hemmati, 2005) and also because of gender differentiated impact, vulnerability and adaptive capacity to climate change (Denton, 2002; Neumayer and Plumper, 2007; UNDP, 2009).

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The analysis of educational status of the respondents on Table 1 indicates that 39.7% of respondents had no formal education and 29.7% had some form of primary education. The low literacy level is an indication of the poor Human Development Index (HDI) among farmers in the region. Educational attainment is important to information-seeking behaviour, technical awareness, livelihood potential, and income level, all of which is positively correlated with the adoption of new technology and adaptation to climate change. Specifically Knight, Weir and Woldehanna (2003) found that schooling encourages farmers to adopt innovation.

Table 1

Distribution of Respondents by Personal Characteristics

Personal Characteristics	Frequency	Percentage
Age (Years)		
40-50	241	58.6
51-60	85	20.7
>60	85	20.7
Total	**411**	**100.0**
Mean		**51.7**
Gender		
Male	200	48.7
Female	211	51.3
Total	**411**	**100.0**
Educational Status		
No Formal Education	163	39.7
Primary	122	29.7
Secondary	79	19.2
Post-Secondary	47	11.4
Total	**411**	**100.0**
Farming Experience (Years)		
1-10	19	4.6
11-20	83	20.2
21-30	130	31.7
31-40	102	24.8
41-50	45	10.9
>50	36	7.8
Total	**411**	**100.0**
Mean		**33.1**

Note. Field Survey, 2011

Table 2 shows the household assets owned by the respondents. Yirga (2007) shows that household appliances ownership plays an important role as it is used as a store of value and provision of assets and resources. The most common asset is a radio, owned by 77.6% of the respondents. These are mainly hand held battery-powered radio sets. This has positive implication for information dissemination in rural areas. A motor cycle (55%) was the next common household asset. Motor cycles use 2-stroke engines that poison the atmosphere, and Nigeria is among the world's largest consumersof 2-stroke engines, with negative implication for global warming (Green Energy Society of Nigeria, 2010). The mobile phone (30.6%) also has positive implications for communication and information dissemination.

Table 2

Distribution of Respondents by Household Assets

Household Asset*	**Frequency**	**Percentage**
Fridge	14	3.4
Radio	319	77.6
Television	110	26.8
DVD Player	74	18.0
Generator	95	23.1
Mobile Phone	126	30.6
Electricity	34	8.3
Grinding Machine	49	11.9
Motor Cycle	226	55.0
Bicycle	118	28.7
Kerosene Stove	112	27.2
Fan	28	6.8
Car	27	6.6
Bank Savings	62	15.1

Note. Field Survey, 2011 *Multiple Response

Table 3 shows that 59.4% of the respondents received information through direct contact from agricultural extension agents in the 2010/2011 farming season. Agricultural extension agents educate farmers and producers about farming innovations in the field. The mean number of contacts with the agricultural extension agents during the farming season was, however, very low (3.8 times) and 92.6% of the respondents had between 1-5 contacts while only 0.8% had over 10 contacts. Non-governmental organizations (NGOs) accounted for 57.4% of the visiting agricultural extension agents. The implication of this is that farmers are not getting full benefit from the agricultural extension information services that can help improve their farming operations and production and how to monitor information on climate change for best practices. Table 3 further reveals that only 48.8% of the respondents reached by agricultural extension agents (28.9% of the total respondents) received information on expected temperature and rainfall that would help them make decisions on their farming operations. In a study by Falaki (2012), farm households' access to information on expected temperature and rainfall is significantly related to their perception of climate change.

Table 3

Distribution of Respondents by Access to Agricultural Extension Agents

	Frequency	Percentage
Information from Extension Agents		
Yes	244	59.4
No	167	40.6
Total	**411**	**100.0**
No. of Contacts with Extension Agents (Last Farming Season)		
1-5	226	92.6
6-10	16	6.6
>10	2	0.8
Total	**244**	**100.0**
Mean		**3.8**
Organization Sponsoring Extension Agent		
Research Institutes	31	12.7
NGOs	140	57.4
Agric. Departments	73	29.9
Total	**244**	**100.0**
Information on Expected Temperature/Rainfall from Extension Agents		
Yes	119	48.8
No	125	51.2
Total	**244**	**100.0**

Note. Field Survey, 2011

The result of the ranking of other sources of information on climate change besides agricultural extension agents presented in Table 4 shows that co-farmers were ranked as highest (mean score = 2302). Those who depend on personal experience were ranked second (mean score = 1639),and those who depend on electronic media (radio and television) were ranked next with a mean score of 1611. Print media, such as magazines, publications, newspapers (mean score = 1439) ranked low, possibly due to the low literacy level of the respondents. The Chi-square ($\chi 2$) is 678.935and it is statistically significant at 1% level, implying that the sources of information on climate change used by the farmers besides agricultural extension agents were significant and statistically different from one another. The implication of this finding is that information on climate change can be communicated to farmers through all the above sources, especially through contact farmers. Falaki (2012) also indicates that farmer to farmer extension had a significant relationship with perception of climate change.

Table 4

Rankings of Climate Change Information and Media Sources Used by Respondents based on Kruskal-Wallis One-way ANOVA Comparison

	Mean Score	**Ranking**
Co-farmers	2303.00	1
Experience	1639.00	2
Electronic Media (Radio, TV)	1611.00	3
Cooperative/Farm Association	1575.00	4
Local Market	1475.00	5
Print Media (newspapers, magazine, journals,)	1439.00	6
Television	1427.00	7
Chi-square		678.935
Degree of Freedom		7
Significance		0.0001

Note. Field Survey, 2011

The study investigated constraints limiting the respondents' ability to adapt their farming operations to climate change using the Principal Component Analysis (PCA) data reduction tool. The Kaiser-Meyer-Olkin (KMO) and Bartlett's test results (KMO = .527, Bartlett's test = .0001) for the study indicated that the data are suitable for PCA since the KMO value is greater than 0.5 and the Bartlett's p value is <0.05 (rule of thumb). The component scores and communalities are as presented in Table 5, and they show that inadequate information on climate change and inadequate knowledge of adaptation options are the principal constraints limiting the farmers' ability to adapt their farming operations to climate change. Each of these constraints weighed significantly on the respondents' climate change adaptation constraints with the highest component scores and communalities. This implies that access to informationon climate chang**e** and knowledge of adaptation strategies need to be addressed if farmers are going to adapt their farming operations to current and predicted changes in the climate system.

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Table 5

Eigenvalues, Variances, Rotated Component Score and Communalities Statistics of Respondents' Constraints to Climate Change Adaptation

	Component				Communalities
Constraints	**1**	**2**	**3**	**4**	
Inadequate Information on Weather	**.868**				**.760**
Inadequate Knowledge of Adaptation	**.819**				.723
Shortage of Farmland		.787			**.678**
Shortage of Labour		.722			.655
Inadequate Necessary Farm Inputs			.794		**.559**
Inadequate Water for Irrigation			.710		.643
Inadequate Money				**.800**	**.562**
Others				-.601	.607
Eigenvalue	1.679	1.358	1.159	1.084	
% Variance	18.660	15.093	12.873	12.050	

Note. Field Survey, 2011

V. Summary and Research Findings

The respondents' personal characteristics such as their age, gender, etc. affect their knowledge of the climate changes around them.

- The household assets such as radios, mobile phones, motor cycle, determine what type of media the respondents are exposed to.
- The level of the respondents' literacy affects the use of media. For instance, the commonest media used by the respondents are battery-powered radios (77.6%).Television is not so common (30.6%), and the print media such as newspapers, magazines, periodicals, etc are seldom used due to their low literacy level.
- The respondents depend largely on the extension agents for information on climate change.
- The respondents indicated that inadequate information on climate change, inadequate knowledge on adaptation, among others, were among their constraints limiting their ability to adapt their farming operations to climate change.

VI. Conclusion

This study establishes that the respondents (farmers) have poor access to information on climate change in particular. Battery-powered radios are the most accessible and most used media by the farmers. Other types of media, especially the print media (newspapers, magazines, etc.), are sparingly used because even though the farmers are experienced, they have low literacy level. The possession of radio sets and mobile phones can assist farmers to have access to more information on climate change. According to Adegbija (2003), globalization of agricultural information leads

to the universalization of certain agricultural practices that are of benefit to all the nations of the world. This also applies to information on climate change globally that can be disseminated via various media.

VII. Recommendations

The following recommendations are offered based on the findings of this study:

- Timely and adequate information on climate change should be given to farmers via the media technologies available to them.
- Procurement and provision of information media such as battery-operated radios, television, handsets, and so on should be provided to households and farmers for information on climate change.
- Extension workers should be well equipped with adequate information that they can use to assist the farmers who depend on them for their information.
- The government should provide literacy education in order to improve the literacy level of the rural farmers so that they can benefit from print media information on climate change.

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