Climate Change Communication Research: Trends and Implications

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Abstract

Climate change has been identified as the biggest environmental issue of this century. Changes in climatic conditions are seriously affecting the social and economic survival of nations of Africa, and especially Nigeria, a country with reduced capacity and policy framework for climate change management. The primary role of communication researchers is to conduct research in communication and by extension, analyse research trends. Therefore, the focus of this paper was to document trends in climate change communication research conducted among farmers, with a specific focus on the themes that have dominated current studies, major research methods in use, major theories that are applied, sampling techniques that are frequently used, media of communication and methods of data analysis that are mostly used in these studies. Content analysis was adopted for gathering data from 67 national and international journal articles in the areas communication, climate change and agriculture. Data analysis shows that research efforts on climate change mitigation, adaptation and sustainable agricultural practices among farmers are few; no meta-analysis of studies on climate change communication has been conducted. Most of the studies rely on non-probability sampling techniques and first-level statistical analysis, while two out sixty-seven studies are theory-driven. These are serious methodological and theoretical weaknesses that reduce internal validity, affect the ease at which African researchers can contribute to on-going global, empirical and theory-guided conversation in their areas of specialisation, and reduce the chance of generalising findings on the greater population.

Also, quantitative methods of research featured prominently above qualitative methods. These trends also show that existing research approach, design and methods on climate change communication to farmers have been purely elitist and quantitative, which may be grossly inappropriate given the socio-cultural, economic and demographic variables of most audiences in the continent. Therefore, further studies should consider these trends and their implications as a way of bridging the gaps in climate change communication research in Nigeria.

Keywords: Climate change, Communication, Research, Media, and Farmers

Introduction

Climate change is one of the potent threats facing the world in this century. There are visible social, economic and environmental effects of climate change around us. They range from hurricanes, sandy storms, earthquakes and other destructive occurrences in the developed countries, to shortage in rainfall and food production, flooding, loss of farmland, decline in forest resources and soil conditions, desertification, loss of life, drought and starvation in the developing countries (Abaje and Giwa, 2007; Oladipo, 2010). Nigeria as a nation is highly vulnerable to the growing effects of climate change. This is because the nation seriously depends on two major economic sectors: petroleum and agriculture, which are highly vulnerable to the negative impacts of climate change (Odjugo, 2011). Furthermore, there is specific focus on agriculture in climate change studies because of the roles that agriculture plays in the economic development of a nation. For a nation such as Nigeria, there must be a stable source of food for an ever-growing population in order to prevent under-nourishment, inadequate local food production and starvation. Furthermore, many industries depend on agriculture for the production of their raw materials. When agriculture fails, those businesses collapse and this will cause mass unemployment, low standard of living and poverty. Agriculture has a big capacity to improve the living standard of the rural people by increasing their incomes. This is because people in the rural communities predominantly rely on agriculture and agro-allied businesses to make a living. Through the production of cash and food crops, rural people are able to feed themselves, produce food for sale and use the proceeds to meet their many needs (Okunmadewa, Okoruwa and Adegboye, 2005).

Changes in climatic conditions are responsible for major flooding in states like Lagos, Oyo, Benue, Kogi, Niger, Kwara, and some other coastal regions (Abaje and Giwa, 2007; Oladipo, 2010). It led to devastation in erosion and desertification prone-areas in recent years, where flood washed away farmlands, houses and industries. Many lives were lost and many women, old dependants, children, poor farmers in rural communities and poor people living in some urban centres were the worst hit. There are predictions that in years to come, severe weather events in the country will result in flooding of lowlands, increase in the rate of malaria, probable extinction of many endangered species of plants and animals and collapse of biodiversity (African Institute for Applied Economics, 2009; Oladipo, 2010). Also, studies have predicted shortage in rainfall and agricultural production leading to starvation and or drought, increased rural-to-urban migration, depletion of household assets, decline in forest resources and soil conditions (soil moisture and nutrients), serious desertification and loss of life. In Africa, climate change, according to research, is aggravated by man-made actions like uncontrolled deforestation, increased reliance on organic fuel and uptake of fossil fuels and increased use of land for agricultural and non-agricultural purposes (Reily, 1999; Abaje and Giwa, 2007; African Institute for Applied Economics, 2009; Chagutah, 2009; Oladipo, 2010).

Research is a global empirical conversation among scholars; and findings of a singular study in a particular location in the world cannot single-handedly have global meaning since a statement of fact made by one researcher must be independently verifiable to other researchers in the same field (Nunnally and Berstein, 1994). This brings order and consistency among the findings of research since it is a cumulative process. Therefore, to determine the similarities and differences in findings of similar studies from different researchers worldwide, meta-analysis of these studies is conducted. It is an approved and quantitative method, used in integrating documented studies on a topic into a general finding (Rosenthal, 1991). Meta analysis is often called research summaries because findings of many studies are analysed (Wimmer and Dominick, 2011). The replication of a topic research topic by researchers in different locations under varying environmental, social and economic situations allows researchers to make empirical comparison, especially on the issues of research design, sample size, sampling techniques and methods of data analysis. Since it is a systematic analysis of methodological appropriateness of each research design and the quality of its execution, a global, transparent, precise and objective statement of fact on a topic can be made. Furthermore, this

statement is expected to guide present and future researchers on trends in the field and recommend areas of focus. This study is therefore apt as it investigates the methodological, theoretical and thematic trends in studies on climate change communication, with a view to making a statement of fact that can guide future studies in the area.

Statement of the problem

As nascent as climate change study is in Africa, its multidisciplinary nature is responsible for substantial research efforts recorded so far. Ejembi and Alfa (2012) investigated the awareness and knowledge about climate change among farmers in Africa; the study conducted by Ukonu, Akpan and Anorue (2012) was a quantitative content analysis of the coverage of climate change by *The Guardian, Daily Sun, ThisDay,* and *Vanguard* Newspapers in Nigeria. Batta, Ashong and Bashir (2013) also investigated press coverage of climate change issues and its implication for public participation opportunities in Nigeria, while Bello, Salau, Galadima and Ali (2013) assessed the knowledge, perception and adaptation strategies adopted by farmers in central Nigeria to manage climate change. In another study by Famuyide, Adebayo, Ajayi, Olugbire and Jaiyesimi (2013), the researchers examined the influence of the mass media in Osun State on community perceived attitude to forest related environmental issues. Studies on climate change communication have also been conducted by Odjugo (2011), Chagutah (2009), Boykoff and Roberts (2007) and other researchers both within and outside the country.

Climate change is an emerging and growing field in research. Therefore, studies must contribute to the growing stock of literature in the field and the sub-field of climate change communication. After a careful review of these and many existing studies in the area, it is clear that no meta-analysis of studies in climate change communication has been conducted in Africa. Media coverage of climate change issues and their awareness among various audiences have dominated research in recent years; none of the studies actually presented a summary of research findings and trends in the area. It has been established earlier that meta-analysis of studies in this area will assist the researcher in summarizing findings and making empirical comparison as a way of documenting trends and guiding future studies. Based on this understanding, the focus of this paper is to document trends in climate change communication research among farmers, with a specific focus on the themes that have dominated current studies, major research methods in use, major theories that are

being applied, sampling techniques that are frequently used, media of communication and methods of data analysis that are mostly used in these studies. The question is this: many scholars in Africa and the world in general have published scholarly articles on climate change communication to farmers and its influence on sustainable agricultural development, what major trends have characterised these research efforts? This is the question this study seeks to address.

Research questions

The research seeks to address the following questions: What major themes/subject matters dominate the studies; which dominant research methods are adopted in the studies; which sampling techniques are mostly used for data gathering in the studies; which methods of data analysis are frequently used in the studies; which media of communication are frequently used by the researchers; and which are the dominant theories of communication applied by the researchers in their studies?

Methodology

The study adopted content analysis for the purpose of gathering, presenting and analysing data from journal articles relevant to climate change communication. Relevant sampled articles were content analysed in order to answer the research questions.

Study population and sample size

The study population were all national and international journals in the areas of journalism, mass media, agriculture, environment, development, agricultural research and extension, climate change, geography and other communication and climate change-related areas. Some of these journals are Global Media Journal, Canadian Journal of Communication, Global Environmental Change, Climatic Change, African Journal of Agric. Research, Journal of Sustainable Development, American Journal of Social and Management Sciences, International Journal of Physical and Human Geography, Journal of Media and Communication Studies, International Journal of Agricultural Economics and Rural Development, Journal of Science Communication, International Journal of Communication, Civil and Environmental Research, and Sustainable Environmental Development. *O*ut of 159 journal articles observed page to page in order to identify those with the relevant unit of analysis, only 67 articles relevant to the study were noted on the coding sheets.

Sampling Procedure: All editions of the study population which were available and published between 2005 and 2014 were sampled.

Method of Data analysis: This study adopted simple percentage and frequency counts of occurrence for measurement. In other words, descriptive statistics was adopted for data analysis.

Results and discussion

What dominant themes/subject matters dominate the study?

Climate change discourse is always predicated on issues that are germane to the prevention of its negative effects (if possible); control of its effects and adaptation to the conditions it creates in the environment. These expected activities (mitigation and adaptation) are discussed in various fora using themes. These themes help in presenting and understanding the specific climate change management actions being recommended for a particular society or community. A review of these themes will show whether the actions being suggested are deemed appropriate or not. As a result of the global concern about climate change and especially its effects on agriculture, themes such as mitigation, adaptation, motivation, awareness, knowledge and beliefs, cultural beliefs and practices feature prominently in climate change discourses.

Table 1: Themes on climate change communication to farmers

Themes	Frequency	Percentage
Adaptation	20	29.8%
Mitigation	1	1.5%
Risk/Danger	2	2.9%
Disaster	1	1.5%
Perception	12	17.9%
Coverage and Framing	2	2.9%
Farmers' Behaviours	1	1.5%
Roles of Media	2	2.9%
Challenges Facing Farmers	4	5.9%
Farmers' Participation	2	2.9%
Agricultural Sustainability	1	1.5%
Dissemination of Information	5	7.5%
Awareness	3	4.5
Attitude and Beliefs	5	7.5%
Knowledge	5	7.5%
Motivation	1	1.5%
Total	67	100%

However, Table 1 above shows that after adaptation, perception ranked second, followed by attitude and beliefs and dissemination of information in descending order. This may be connected to the fact that the researchers identified perception, attitude and beliefs as important variables that must be addressed before mitigation and adaptation can be successful among farmers. This position is corroborated and modified by Lewin (1999), cited by Chaiklin (2011), that for behaviour to change, attitude must first of all change. "Behaviour is a direct attitude manifestation. Thus, one can only know a person's true attitude by the action he or she takes" (Chaiklin, 2011:34-35). Based on current studies (Grothmann and Patt, 2003; IPCC, 2007; Abaje and Giwa, 2007; Chagutah, 2009; Oladipo, 2010), mitigation and adaptation are the two basic variables important to climate change research. As a matter of fact, studies on climate change and sustainable agriculture have concentrated on the capacity of farmers to mitigate and adapt to the situations created by climate change (Odjugo, 2011; Ifeanyi-obi, et al, 2012; Batta, Ashong and Bashir, 2013).

Which dominant research methods are adopted in the studies?

There is a general understanding in research that for the right data and findings to be generated, appropriate method(s) must be adopted. As a matter of fact, it will be difficult to generalise the findings of a study on the selected population if the methodology is not appropriate (Wimmer and Dominick, 2011). Therefore, it is important to ascertain the research methods adopted by researchers to ascertain whether they satisfied the requirements stated here or not.

Table 2: Research methods adopted

Method	Frequency	Percentage
Content Analysis	4	5.9%
Survey (Questionnaire)	32	47.8%
Field Observation	2	2.9%
FGD	4	5.9%
Longitudinal Study	1	1.5%
In-Depth Interview	10	14.9%
Semi-Structured Interview	5	7.5%
Case Study	2	2.9%
Interview and Survey	3	4.5%
Interview, Survey and FGD	2	2.9%
Desk Review	2	2.9%
Total	67	100%

From Table 2 above, it is clear that the survey method (47.8%) was predominantly used by the researchers. This was followed by in-depth interview (14.9%) and semi-structured interview (7.5%). In all, four of the studies adopted each of FGD and content analysis as research methods. Other methods like desk review, field observation and case study were adopted in two journal articles each. Three journal articles combined interview and survey, while two journal articles combined interview, survey and FGD as research methods. None of the researchers adopted experiment as a research method. This shows that most of the researchers adopted quantitative research methods in gathering data since in more than eighty percent of the articles; survey method (especially the use of questionnaire) was adopted in gathering data. Each method of research has its own strength and weaknesses; a combination of methods usually offers reliable results. This is because one method would offer strengths where the other is weak. This is called triangulation (Wimmer and Dominick, 2011).

Quantitative methods of research reduce perception, attitude, beliefs, opinions and ideas to figures; they offer no serious explanations for reasons behind the figures or numbers. The sample size is however larger in quantitative methods than in qualitative methods (Baran, 2002). It is important to note that illiteracy among farmers in many rural and even urban communities may limit the effectiveness of questionnaire in gathering data. If most of the farmers are not literate in their mother tongue, asking them to fill copies of the questionnaire may be unrealistic. Usually, researchers themselves read questions to, tick and write for the respondents in such cases.

Which sampling techniques are mostly used for data gathering in the studies?

There are probability and non-probability sampling techniques for conducting scientific research. The probability sampling techniques are more reliable; they are more scientific, and they reduce incidence of bias on the part of the researcher. If findings of a study will be generalised on the total population and used to influence policies, probability sampling techniques are usually appropriate (Wimmer and Dominick, 2011).

Table 3: Sampling techniques used

Sampling Technique	Frequency	Percentage
Simple Random/Random	37	55.2%
Systematic	1	1.5%
Stratified	3	4.5%
Multi-Stage	13	19.4%
Purposive	12	17.9%
Convenience	1	1.5%
Total	67	100%

Information in Table 3 above shows that none of the researchers used cluster, quota, available and snowball sampling techniques in their studies. Simple random sampling technique (55.2%) was mostly used or adopted by the researchers. This is not unconnected to the fact that the method is possibly the most adopted and quoted sampling technique by researchers (Baran, 2002). The multi-stage (19.4%) and purposive sampling (17.9%) techniques followed the simple random sampling technique in the order of usage by the researchers. In all, probability sampling techniques were prominent in the studies than non-probability sampling techniques. The nature of the study, the characteristics of the study population, the objectives of the study and the size of the population usually determine the sampling technique(s) to be adopted, and whether or not a combination of methods will be required (Wimmer and Dominick, 2011; Baran, 2002).

Which methods of data analysis are frequently used in the studies?

Table 4: Methods of data analysis used

Method	Frequency	Percentage
Descriptive Statistics	39	58.2%
Higher Statistical Analysis	4	5.9%
Inferential Statistics	5	7.5%
Constant Comparative Analysis	1	1.5%
Pattern Matching/Explanation Building	4	5.9%
Discourse Analysis	5	7.5%
Logit Model	1	1.5%
Thematic Analysis	1	1.5%
Unspecified	7	10.4%
Total	67	100%

Table 4 shows that descriptive statistics, inferential statistics and discourse analysis are the most frequently used methods of data analysis in the studies. Descriptive statistics (58.2%) presented the highest of 39 out of the total 67 articles sampled. This shows that most of the studies relied

purely on quantitative methods of frequency and percentage in analysing data. This is against the conclusion of Graber and Smith (2003) that researchers now prefer qualitative methods to quantitative methods of data analysis. Though qualitative methods of data analysis are being used and emphasized, majority of researchers still rely on quantification in data gathering and analysis. However, over-dependence on first-level statistical analysis (non-probabilistic methods) increases the chances of error and over-simplifies the data and findings (Wimmer and Dominick, 2011). Also, while unspecified methods accounted for 7 articles (10.4%), logit model, constant comparative analysis and thematic analysis were used in one article each. In most cases, researchers are officially encouraged to use higher, probability statistics in data analysis; this is to ensure internal validity and reliability (Wimmer and Dominick, 2011).

Which media of communication are frequently focussed on by the researchers?

There are specialisations such as broadcasting (radio and television), print (newspapers, magazines, books, journals, etc.), new and social media, advertising and many others in communication studies. Communication researchers focus on these various fields while conducting their studies. The primary reason is to investigate the influence of the contents of these media on the audiences.

Table 5: Medium of communication utilised in the studies

Medium	Frequency	Percentage
Newspaper	5	19.2%
Radio	4	15.3%
Television	2	7.7%
Internet	2	7.7%
Magazines	2	7.7%
Film	1	3.8%
Extension Workers	4	15.3%
Other Interpersonal Sources	1	3.8%
Combination of two or more media	5	19.2%
Total	26	100%

It was only in twenty-six out of sixty-seven journal articles that the researchers focussed on the media of communication in their studies; most of the studies were based on adaptation, perception and attitude and beliefs. This dearth of studies on the influence of the media on climate change among farmers may be attributed to the fact that climate change is

relatively new as an area of study in Africa, and so also is its applied area of communication. The focus of the researchers was on newspaper, extension workers and radio as the most important media of communication in their studies of 'media and climate change communication to farmers'. Most importantly, the audience must be literate (even in the mother tongue) to access development messages in print. In a developing economy such as Nigeria, level of education, level of income and various other socio-economic factors determine the effectiveness of newspaper in development communication (Soola, 2002). The use of radio and extension workers in disseminating information about climate change among farmers is also very significant. The two sources of information are very close to the grassroots and have the reach and acceptance above other media for communicating development (Ojebode, 2006). However, lack of opportunities for feedback, language barrier and commercialization of radio broadcasting are negatively affecting the use and effectiveness of radio in development communication. For extension workers, personal, social, political and cultural challenges limit their effectiveness in communicating development to and with the farmers (Soola, 2002; Ojebode, 2006).

Which dominant theories of communication are applied by the researchers in their studies?

Table 6: Theories used or adopted

Theories Applied	Frequency	Percentage
Diffusion of Innovations Theory	3	13.6%
Protection Motivation Theory	3	13.6%
Transformative Learning Theory	2	9.1%
Construal Level Theory	1	4.54%
Framing Theory	2	9.1%
Attitude Change Theory	1	4.54%
Social Responsibility Theory	1	4.54%
Motivation Theory	1	4.54%
Theory of Reasoned Action	1	4.54%
Theory of Planned Behaviour	1	4.54%
Health Belief Model	1	4.54%
Social Learning Theory	1	4.54%
Development Media Theory	1	4.54%
Agenda Setting Theory	2	9.1%
Uses and Gratification Theory	1	4.54%
Total	22	100%

Table 6 shows that the diffusion of innovations theory (13.6%) and protection motivation theory (13.6%) were adopted in three studies each, while two studies each adopted the framing theory (9.1%), transformative learning theory (9.1%) and agenda setting theory (9.1%). Out of sixty-seven (67) journal articles reviewed, only twenty-two (22) were theory-driven. Therefore, most of the authors of these articles did not consider the importance of theory in research. Each of the other theories identified were used once. Theory has been described as a necessity in every scientific research since science is systematic, formal, and does not encourage guess work. Research has been described as a global, on-going conversation with laid-down procedures needed for arriving at findings and conclusions. The knowledge and application of theories help researchers to join a global discussion and meaningfully contribute to efforts aimed at solving problems with global standardized practices (Olorunnisola, 2007). Therefore, the researcher can safely conclude that since most of these journal articles have not included theories in their studies, they did not adequately follow the laid-down principles of scientific inquiry.

Conclusion

Trends and their implications

Following the data presentation and discussion of findings, the following trends are drawn from the review: No meta-analysis of research in the area was conducted before the present study. This may be associated with the fact that climate change communication research is nascent in the continent. This might have also been influenced by the drive to promote greater awareness, mitigation and adaptation among the populace. Furthermore, perception, knowledge, dissemination of information, attitude and beliefs and adaptation to climate change among farmers were the major themes that dominated scholarly publications on climate change and sustainable agricultural development. Research efforts on climate change mitigation and sustainable agricultural practices among farmers were few.

Also, in most of the studies, the questionnaire, in-depth interview and content analysis were the dominant research methods that most of the researchers adopted in conducting their studies. Though studies that adopted both qualitative and quantitative research methods also featured, they (qualitative methods) were very few in number compared to studies

that adopted quantitative methods, especially the use of questionnaire. Based on data analysis, simple random sampling, multi-stage sampling and purposive sampling techniques were the predominant techniques adopted in gathering data. Detailed explanation of the justifications for and the processes adopted in selecting the sampling techniques were not provided by the researchers. Also, descriptive statistics, inferential statistics, pattern matching/explanation building and discourse analysis are frequently used by the researchers in their studies of climate change and sustainable agricultural development among farmers.

Content analysis of newspapers' coverage of climate change and its influence on agriculture, studies on use and role of radio and extension workers in climate change communication to farmers and a combination of two or more media featured prominently in the studies reviewed. However, studies about the influence of these media on climate change mitigation, adaptation, knowledge and practices among farmers were not available, not to talk of other media like television, film, new and social media, indigenous media and Information, Education and Communication (IEC) materials. It is important to note that most of the researchers did not use or adopt theories in their studies. Again, for the very few researchers who adopted theory/theories in their studies, protection motivation theory and diffusion of innovations theory are the two theories scantly adopted. However, in two studies each, framing theory, transformative learning theory and agenda setting theory were used or adopted.

Implications

These findings have implications for research in the field and communication of climate change to specific audiences. One can possibly conclude that research in climate change communication in Africa has been largely unguarded, with no clear statement of fact about the appropriateness of the methodologies, theories and themes being adopted. More proper and constant meta-analysis of studies in this area is needed if the area of research will be built and standardized. Studies in the area can just be needlessly porous and erratic, with no tailored, guided focus for research and professional development.

Most of the studies adopted non-probability techniques and relied heavily on first-level statistical analysis. It is important that African scholars, especially researchers in the field of climate change communication focus more on probability sampling techniques and adopt

higher statistical methods for data analysis. These greatly reduce chances of bias and error, command higher degree of predictability and internal validity (Wimmer and Dominick, 2011).

The growing trend among communication researchers in Africa is to conduct studies without theoretical underpinning. This shows that these studies are not empirically guided and are not adding any meaningful empirical clout to the global conversation guided by theories. The whole essence of research is to test and build theories by applying theoretical propositions to different socio-cultural and environmental situations (Olorunnisola, 2007).

Furthermore, trends show that existing research approach, design and methods on climate change communication to farmers have been purely elitist, quantitative and not theory-driven, which may not be adequate for studies among farmers in Nigeria, considering their socio-cultural, economic and demographic variables. Therefore, further studies should consider this as a way of bridging the gap in climate change communication in Nigeria.

Suggestions for further studies

Existing research (Agwu and Adeniran, 2009; Longe and Oyekale, 2013; Adeloye and Sotomi, 2013; Ayandiji and Vera-Cruz, 2013) explores sources of information about climate change and the effectiveness of these sources among farmers. What is lacking in the frameworks of communication for development and climate change management for sustainable agricultural development is the influence of media discourse about climate change mitigation and adaptation on farmers' knowledge, attitude and agricultural practices. It is important that this gap is filled for media organisations, government, development agents and academic and research institutes to ascertain the level of success recorded in employing the media to promote behaviour change among farmers.

It is important that research efforts fill the gap in the on-going conversation on audience research, climate change and food security by investigating various mitigating and adaptive practices. These are in the form of information, that is available to farmers through the mass and indigenous media, and what these have contributed to climate change mitigation and adaptation among farmers. Furthermore, studies should also be conducted on the influences of societal, demographic, cultural,

religious and socio-economic characteristics of the farmers on the adoption of media campaigns about climate change. As a matter of fact, a lot of contribution is needed in the area of cognitive, attitude and behavioural theories. These theories can be adopted to test or investigate farmers' perception, preference and adoption of behavioural change campaigns about climate change.

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