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## Capability of Extension Agents in Disseminating Climate Change Information in Delta State Nigeria

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## Abstract

*The study assessed the capability of extension agents in disseminating Climate Change (CC) information in Delta State, Nigeria. A multi-stage procedure was used in selecting 60 respondents. Data were collected on respondents' capacity for outreach to farmers; existence of linkage on CC and sources of information on CC, constraints to building capacities for outreach and strategies to strengthen capacities. Mean, percentage, were used for analysis. Findings showed the existence of training on CC (23.3%) and practical learning experience on CC adaptation (20.0%). Lack of human resources ( $\bar{x}$ = 3.30) and*

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*training programmes on CC ( $\bar{x}$ = 3.23) were constraints to building capacities for outreach. Organization of seminars, workshops ( $\bar{x}$ = 3.58), proper staffing ( $\bar{x}$ = 3.57), provision of incentives ( $\bar{x}$ = 3.55) were suggested as strategies to strengthen capacity for outreach. Extension agents in the state lack the requisite facilities for outreach to farmers on climate change agricultural adaptation. Also, there are inadequate human and material resources necessary for effective coverage of the farming population. Government and development organizations should hire qualified extension personnel and provide weather observatory for CC outreach in Delta State.*

**Keywords:** Climate change outreach capacity, agricultural, extension agents

## Introduction

The negative effects of climate change are already identified in all sectors but with more impacts on agriculture (Olorunfemi., et al.,2019, Ekemini, et al., 2019). Agricultural production is threatened through extreme weather events such as drought and flood with adverse effects on fertility of the soil and crop productivity. The food security of nations has been threatened by this change on farms (Olorunfemi, et al., 2019). As a result of decreased rainfall, increased relative humidity, and rising temperatures in Nigeria, these threats have resulted in diminishing crop yields and crop production (Ekemini, et al., 2019).

Agriculture output is already under tremendous strain from climate change, and its consequences are anticipated to worsen with time (Ekemini, *et al.*, 2019). The fact that so many farmers lack knowledge about climate change and potential adoption strategies raises serious concerns (Anabaraonye, et al., 2019).

Simplified information about the causes of climate change, its effects, and mitigation and a daptation measures must be made available through all available media including: outreach visits, field trips, radio, television, newspapers, magazines, seminars, workshops, and manuals (Anabaraonye et al., 2019).

In order to ensure sustainable and equitable agricultural growth among Nigerian farmers, it is essential to increase the outreach capability of extension agents. Farmers' ability to adapt to climate change is highly dependent on information availability. However, due to the disconnect that exist between extension and farmers as a result of dysfunctional extension outlook in Nigeria, a widening gap continues to exist between these two divides. In order to tackle the issue of climate change, concrete efforts need to be made at individual, organizational and institutional levels to boost capacity.

Technically, such capacities should include: skills/knowledge and competencies, science-based knowledge, resources (institutional and human) required for generating, innovating, and accelerating the dissemination of knowledge, and technology for climate change adaptation. widening gap continues to exist between these two divides. In order to tackle the issue of climate change, concrete efforts need to be made at individual, organizational and institutional levels to boost capacity. Technically, such capacities should include skills/knowledge and competencies, science-based knowledge, resources (institutional and human) required for generating, innovating, and accelerating the dissemination of

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knowledge, technology, for climate change adaptation. Programmes for extension outreach and education are essential for the dissemination of information to key stakeholders. Farmers still prefer one-on-one engagement with extension agents to get knowledge, despite the availability of other information sources. However, group outreach strategy is what will practically bridge the widening gap between farmers' demand on extension services and lack of adequate extension workers for the teeming farming population. In order to help communities comprehend the economic and environmental effects of climatic changes and how to adapt, extension educators and other outreach agents can actively participate in creating and carrying out training initiatives; bringing together relevant stakeholders.

The study assessed the capability of extension agents in disseminating climate change information in Delta State Nigeria. Specifically, the study sought to: identify the capacity for outreach of extension agent to farmers in the area; ascertain the existence of linkage of climate change by extension agents; ascertain the sources of information on climate change; identify constraints to building capacities for outreach of extension agents; and identify strategies to strengthen capacity building among extension agents in the area.

## Methodology

The study was carried out in Delta State, Nigeria with an estimated population of 4,112,445 (males: 2,069,309; females: 2,043,136) in 2006 with a landmass of about 18,050 km<sup>2</sup>. The state lies approximately between Longitudes 5°00 and 6°.45' East and Latitudes 5°00 and 6°.30' North. The State is characterized by mangrove swamps along the coast to rain-forest in the central part and a derived savannah (grassland, wooded shrub land and immature forest) in the northern stretch.

The population of the study constituted all public extension workers in Delta State, Nigeria. Multistage sampling procedure was used to select extension workers. In the first stage, 3 out of the 6 agricultural zones in the State were purposively selected because of pre-dominance of agricultural activities.

To establish a total of 6 extension blocks in the second stage, two blocks were randomly chosen from each of the zones. Twenty extension workers were randomly selected from the 6 blocks from a list of 120 extension workers. In the third stage, table of random number was used to randomly select 10 respondents from each of the 6 selected blocks based on the compiled list by the researchers. This gave a total of 60 extension workers for the work.

Data were collected using semi-structured interview schedules. The instruments for data collection were subdivided into six sections based on the objectives of the study. Information on the capacity for outreach of the extension agents, a list of questions premising on training, availability of climate materials for outreach, and conferences were provided and respondents indicated "yes= 1" or "no= 0". To elicit information on linkage on climate change by extension agents, respondents were requested to indicate their linkages with governmental firms, research institutes, and non-governmental firms to extension. They indicated "yes/no" to organizations that have link with them on climate change. To identify the constraints militating against the capacities for outreach by extension agents, a list of

constraining factors was provided for the respondents to indicate the seriousness of each constraint on a four-point Likert-type scale of very serious (4), serious (3), a little serious (2), not serious (1) were used to measure the constraints. The cut-off mean was 2.5. To obtain information on the strategies to strengthen capacity building among extension agents, respondents were required to rate their suggestions on a four-point Likert-type scale of; to a great extent (4), to some extent (3), to a little extent (2), to no extent (1). The cut-off mean was 2.5. Data were analysed using percentage, mean and standard deviation. The IBM-SPSS statistical package version 22 was used for data analysis.

## Results and Discussions

### Capacity for Outreach of Extension Agents to Farmers

Table 1 shows that extension agents had on the average attended conferences on climate change only 1.09 times in the last three years. This shows a very poor exposure to the subject matter and agrees with the findings of Zikhali, et al. (2020) that the majority of extension agents had not received any in-service training since their employment. This clearly depicts the level of apathy the extension agents had shown to the issues of climate change. This could be as a result of lack of financial incentives and logistics support for extension. Also, only 23.3% of the respondents expressed that their zone organized trainings, seminars, field trips or farm visit on climate change adaptation for the extension agents. About 26.7% expressed that their zone organized workshops, training, and seminars on climate change adaptation for farmers. This reveals inadequate training of extension agents and professional development of the staff in the systems. In other words, requisite in-service trainings and composite impact of the extension agents in the agricultural productivity chain will be hindered by the paucity of training.

This result is consistent with the findings of Camillone, et al., (2020) which noted that financial support from the government remains insufficient to sustain and institutionalize successful extension activities nationwide. About 37% of the extension agents expressed that their local government had funds for climate change adaptation activities out of which the majority (77.27%) of the funds were from private organization, about 36.36% from the government, and 9.09% from individual. This is in line with the findings of Yakubu, et al. (2019) that most climate adaptation programmes were donor funded and managed by NGO. Due to this, it is challenging to continue such initiatives once donor support has ceased.

This shows that in order to significantly contribute to the capacity-building of extension agents, consideration must be given to all stakeholders within the agricultural system, in making significant contribution towards building the extension agents' capabilities. Also, the majority (70%) of the extension agents had no farmer representatives in their training, only 28.3% collaboration with CSOs on climate change was noted by respondents while 18.3% of the extension agents expressed that the state government had representatives in climate change trainings organized for the agents.

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**Table 1: Capacity of extension agents outreach to farmers**

Variables	Percentage	Mean	Standard. Deviation
Number of climate change conferences/training attended in the last three years		1.09	0.80
Organization of training, seminars, field trips or farm visit on Climate Change adaptation for agents	23.3		
Organization of training, seminars, field trips or farm visit on Climate Change adaptation for farmers	26.7		
		1.75	0.53
Number of conferences, training and seminars on Climate Change organized in the last three years for farmers			
Availability of fund for Climate Change adaptation activities	36.7		
Government	36.36		
Individuals	9.09		
Private organizations	77.27		
Farmers representatives in Zonal training	30		
Collaborations with CSOs on Climate Change	28.3		
Zonal representatives in climate change training	18.3		

Source: Field Survey, 2021

## Availability of Materials for Climate Change Outreach to Farmers

Results in Table 2 show percentage availability of the various material resources for outreach by the extension agents. Results show that half (50%) of the respondents expressed that magazine on climate change were available while 46.7% affirmed that teaching/lecture notes on climate change were available at the zonal headquarters. About 45% of the extension agents confirmed the availability of journals on climate change while 40% confirmed the availability of articles on climate change and agricultural adaptation. It can be inferred that the quantity and availability of outreach materials to farmers is abysmal and the materials whose availability were high cannot be easily accessed and effectively utilized by farmers due to their level of literacy. For instance, the level of literacy required to fully understand the contents of magazine, lecture notes, and journal articles is very high and local farmers do not have the wherewithal to effectively utilize these outreach materials.

The result shows that the majority (80%) of the extension agent had little or no practical teaching programmes which could help acquire the necessary experience on climate change needed to enhance adaptation. Results also show that greater proportion (86.7%) of the respondents did not receive any training on climate change. This means that the majority of the extension agents were not well trained which could lead to inefficiency in

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handling and disseminating global warming information. Contrary to what Antwi-Agyei and Stringer (2021) reported in Ghana, that the majority of extension agents required additional opportunities for capacity building if they were to successfully deliver extension services related to climate change. The extension agents' capacity requirements include instruction in the proper interpretation of climatic data, weather forecasts, technical proficiency, and the capacity to interact with farmers using efficient extended outreach techniques.

In the past three years, 10% of the extension agents recount that their zone made investment in equipment with regards to climate change. This is self-limiting as the extension agents will not be able to provide accurate and actionable weather information for the clientele thereby exacerbating the devastating effect of climate change on farmers and food systems.

**Table 2: Availability of outreach materials for farmers on Climate Change adaptation**

Teaching Materials	Percentage
Text books on Climate Change	26.7
Journals on Climate Change and agricultural adaptation	45.0
Conference proceedings on Climate Change and agricultural adaptation	20.0
Articles on Climate Change and agricultural adaptation	40.0
Magazines on Climate Change	50
Training manuals on Climate Change	30
Teaching/Lecture notes on Climate Change	46.7
Internet facilities for teaching Climate Change	20.0
Pictures/pictorials for teaching Climate Change	31.7
Teaching modules on Climate Change	30
Newsletters on Climate Change	38.3
Availability of practical teaching/learning experience on climate change	20.0
Hands-on activities	
Film shows on climate change	16.67
Excursions to climate change impact areas	33.33
Field trips	50
Sight seeing	41.67
Pictorial slide shows on climate change	75
Outreach Methods	
Use of audio visual in teaching Climate Change and agricultural adaptation	18.3
Use of videos in teaching Climate Change and agricultural adaptation	13.3
Use of field trips in teaching Climate Change and agricultural adaptation	18.3
Use of lectures in teaching Climate Change and agricultural adaptation	30
Availability of functional, equipped library for Climate Change materials	1.7
Attendance of training on Climate Change	13.3
Investments made by zone within the last three years on equipment with regards to Climate Change	10
Availability facilities like weather observatory, wind vane, etc in the zone	18.3

Source: Field Survey, 2021

## Extension Agents Linkage on Climate Change

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Entries in Table 3 show that only about 33% of the respondents had links/interactions with the farmers. and only 25% of the sampled extension agents recount that their work place had links with universities or research institutes in tackling climate change adaptation. Fifteen percent of the agents had individual/departmental/inter department or local government linkage on climate change adaptation programmes in their work place. The results show that there is a poor linkage between research-extension-farmer systems which could lead to inefficiency in developing workable innovations against climate change and its anomalies. Kidane and Worth, (2017) noted that effective institutional and individual linkages play vital roles in the building of performance capacity of extension agents. In other words, when there is poor linkage of the extension institution with other actors, the performance of extension personnel will be grossly affected.

Also, the extension agents at the zonal level had few other links on climate change with various institutions, namely; research institutes/universities (61.7%), non-governmental organizations (NGOs) and farmer group (60%) among others as seen in the Table. The findings show a low level of collaboration with other stakeholders. This does not portend a good outlook for outreach on climate change adaptation to farmers.

**Table 3: Linkage on climate change by the extension agents**

Variables	Percentage (%)
Links/interactions with the farmers in tackling climate change	33.3
Links with universities or research institutes in tackling Climate change adaptation	25
Individual/departmental/inter department or local government linkage on climate change adaptation programs	15
<b>Links which your zone have with various institutions on climate change:</b>	
Research institutes/Universities	61.7
Non-governmental organizations (NGOs)	60.0
Farmer group within your Zone	60.0
Ministry of Agriculture	55.0
Financial institutions	40
Engineering firms	21.7
Donor agencies	21.7
NEMA(National Emergency Management Agency)	43.3
NESREA	46.7
Regulatory bodies such as NAFDAC/SON	48.3
Church bodies	28.3
Media houses	43.3
Community based development organizations	38.3
Civil society organizations	45.0
Personal collaboration with agencies or organizations with interest in Climate Change adaptation activities	16.7

Source: Field Survey, 2021

**Sources of Information Driving Climate Change Adaptation Capacities** Entries in Table 4 show that the majority of the extension agents sourced information from radio links ( $\bar{x}$ = 2.15), television ( $\bar{x}$ = 2.15), and newspaper ( $\bar{x}$ = 2.15). The result also revealed extension agents also sourced information and knowledge on climate change from social media (Facebook, WhatsApp, Twitter, Instagram) ( $\bar{x}$ = 2.05). The findings of Antwi-Agyei and Stringer (2021) show that extension agents in Ghana said that radio and television remained their primary sources of climate information; are supported by the results. Accessing appropriate and adequate information is critical in the process of enhancing the adaptive capacities of the rural areas to the impacts of climate change. Rural radio and print media could be used to inform farmers about the weather or cuttingedge technology. In order to reach the previously inaccessible and rural areas, the rapid expansion of mobile phones is now creating new options like social media (Facebook, WhatsApp, Twitter, and Instagram).

**Table 4: Source of information driving climate change adaptation capacities**

Medium of outreach	Mean	Std. deviation
Radio links	2.15*	0.777
Television	2.15*	0.799
Newspaper	2.15*	0.840
Fliers	1.57	0.789
Posters	1.63	0.802
Newsletters	1.53	0.791
Pamphlet	1.47	0.700
Fellow workers	1.73	0.756
Telephone	1.68	0.792
Climate change shows	1.77	0.789
Public lecture	1.77	0.767
From farmers	1.67	0.774
Social media ( Facebook, WhatsApp, Twitter, Instagram)	2.05*	0.769
Church	1.53	0.700
Personal observation	1.82	0.748
Family and friends	1.68	0.748

\*Sources of information Source: Field Survey, 2021

**Constraints to Building Capacities for Outreach** Results in Table 5 show the constraints militating against building capacities for outreach by extension agents to include lack of equipment to implement skills learnt at training ( $\bar{x}$ = 3.47), poor funding of agricultural rural development program ( $\bar{x}$ = 3.47), non-payment of training allowances ( $\bar{x}$ = 3.37), shortage of working materials and obsolete facilities ( $\bar{x}$ =3.35), bad leadership ( $\bar{x}$ = 3.35), absence of well-defined agricultural policy ( $\bar{x}$ = 3.32),lack of human resources and poor staff training on climate change ( $\bar{x}$ = 3.30) and poor awareness of available training programmes on climate change ( $\bar{x}$ = 3.23). This is consistent with the findings of Antwi-Agyei and Stringer (2021) that the main obstacle to extension agents included a lack of proper extension materials,

inadequate transportation options, high agricultural extension agent-to-farmer ratios, and a lack of funding for implementation of adaptation techniques. The following are some other constraints that extension agents noted: Poor communication skills ( $\bar{x}$ =3.15), poor knowledge of computer operation ( $\bar{x}$ = 3.13), inconsistent policies and inadequate involvement of private sectors in service delivery ( $\bar{x}$ = 3.02). These findings also agree with a previous study by Ebenehi et.al. (2018) that lack of financing prevents extension agents from using research-based adaptation solutions. In other words, capacity for adaptation on outreach by the agents is inhibited by a combination of economic, technical, infrastructural and personnel-related challenges.

### Strategies to Strengthen Capacities of Extension Agents

Results in Table 6 reveal strategies identified by extension agents to strengthen their capacity for climate change outreach to include review of the agricultural extension policies to accommodate current issues such as climate change ( $\bar{x}$ =3.75), organization of conferences, seminars, workshops to increase the knowledge and competence of extension agents ( $\bar{x}$ = 3.58), hiring more extension personnel ( $\bar{x}$ = 3.57), and providing incentives such as pay raise to motivate extension workers ( $\bar{x}$ = 3.55).

**Table 5: Constraints to building capacities for outreach by extension agents**

Constraints	Mean	Std. deviation
Absence of well-defined agricultural policy	3.34*	0.940
Poor knowledge and skills on climate change management	3.32*	0.854
Lack of human resources and poor staff training on climate change	3.30*	0.809
Non-payment of training allowances	3.37*	0.843
Equipment to implement skills learnt at training not provided	3.47*	0.791
Poor funding of agricultural rural development program	3.47*	0.791
Inadequate involvement of private sectors in service delivery	3.02*	1.017
Shortage of working materials and obsolete facilities	3.35*	0.899
Poor knowledge of computer operation	3.13*	1.033
Poor communication skills	3.15*	0.971
Inconsistent policies and programmes	3.12*	0.922
Bad leadership	3.35*	1.005

Source: Field Survey, 2021; \*Constraints. Cut-off= 2.5

These are in agreement with the findings of Olorunfemi (2020) that provision of enabling working environment and good institutional framework will increase agents' motivation, boost capacity and increase overall productivity. Other strategies identified by extension agents include the following: proper funding of extension programmes through cost-sharing arrangements with several parties or other creative financing methods ( $\bar{x}$ = 3.58), establishment of effective channels/linkages between research and extension work ( $\bar{x}$ = 3.55); and privatizing extension service ( $\bar{x}$ = 3.33). These suggested strategies will definitely improve the functional effectiveness of extension agents in outreach to farmers and overall job performance; and agree with the findings of Owusu *et al.* (2020) that

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provision of enabling environment personal and professional growth of the extension personnel will boost effective service delivery.

**Table 6: Strategies to strengthen capacities of the extension agents**

Strategies	Mean	Std. Dev.
Review of the agricultural extension policies	3.75*	0.728
Reformation of basic education and training to boost abilities, research and job motivation	3.70*	0.720
Adequate resourcing of coordination mechanism and supervision	3.633*	0.7584
Proper funding of extension programmes through cost-sharing mechanisms with different parties.	3.58*	0.809
Organisation of conferences, seminars, workshops to increase the knowledge and competence of extension agents	3.58*	0.766
Providing incentives to motivate extension workers	3.55*	0.946
Provision and management of available information and communication technologies (ICTs) for the purpose of extension work	3.62*	0.825
Establishment of effective channels/linkages between research and extension	3.55*	0.910
Privatizing extension service	3.33*	0.986
Provision of means of transportation for field staffs to different locations	3.63*	0.758
Constant monitoring and evaluation of extension services	3.74*	0.766
Provision of working materials/tools for extension service	3.63*	0.748
Hiring more extension personnel for greater coverage	3.57*	0.831

\*Strategies. Cut-off= 2; Source: *Field Survey,2021*

## Conclusion and Recommendations

Extension agents in the state lack the requisite facilities for outreach to farmers on climate change agricultural adaptation. Also, there are inadequate human and material resources necessary for effective coverage of the farming population in the state. It is of utmost importance to build the capacities of the agricultural extension agents in the state in order to respond appropriately to the changing climate especially as it affects the productivity of the farmers. Partners in agricultural development (government and non government actors) should assist in providing opportunities for capacity building workshops, seminars, and field visits/tours by the agents. Public and private agricultural institutions and other relevant agencies should partner with extension to provide specific, reliable and actionable agro-meteorological services to enable farmers to make strategic climate change adaptation decisions.

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## Conflict of interest:

The authors declared no conflict of interest.

## Author contribution:

OR conceptualized the study and wrote the draft of the manuscript (24%). EK wrote the background (19%). EA collected the data (19%). OD scrutinized and improved the background (19%). NC read, corrected and improved the manuscript (19%). All the authors approved the submitted version.

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