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EXTENSION WORKERS' CAPACITY FOR OUTREACH TO CROP FARMERS ON CLIMATE CHANGE RESILIENCE AND ADAPTATION IN EDO STATE, NIGERIA

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ABSTRACT

The study evaluated capacity for extension workers' outreach to crop farmers on climate change resilience and adaptation in Edo State, Nigeria. The study specifically described socio-economic characteristics of the extension workers; described capacities for outreach by the extension workers; identified constraints to building capacities for outreach by the extension agents and identified strategies to building capacities of the extension workers. A multistage sampling technique was used to select 69 extension workers. Data for this study were obtained through the use of structured interview schedule. Descriptive statistics and factor analysis were employed in the analysis. The results showed that majority of the respondents (50.7%) were Extension Agent (EA) followed by 29.0% who were Block Extension Supervisors (BES). The result reveals that 34.8% of the extension staff to have attended between 1 to 4 conferences in the last three years. About 44.9% of the respondents participate in workshops, training, seminars for extension workers and farmers. Majority (82.6%) of the respondents identified bush burning, massive deforestation and excess use of agro-chemicals in farming as the major causes of climate change. A major constraints to building capacities for outreach by extension agents was absence of well-defined agricultural policy (3.254). Restructuring of extension agents' education and trainings was identified as a major strategy to building the capacities of the extension workers. It is recommended that agricultural extension policies relating to climate change need to be reviewed, among others.

Keywords: Adaptation, extension agent capacity, climate change resilience, outreach.

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INTRODUCTION

Agriculture is one of the most important sectors that contributes immensely to the economies of most African countries including Nigeria (Onoh, Erezi & Clement, 2023). About 70% of the populace depend on agriculture as a source of their livelihood (FAO, 2016; Osuafor & Nwankwo, 2017). In Nigeria, farming depends unreservedly on the quality of the rainy season, which is a situation that makes it susceptible to climate change (Elijah, Osuafor, & Edeh 2020; Odjugo, 2010). Climate change is having a greater impact on Nigeria, as seen by rising crop diseases, falling agricultural production, flooding, and the degradation of farmlands that support the country's farming population (Osuafor, Effiong, & Ude, 2021;

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Onyekwe, Osuafor, Ude & Onwuemelie, et al, 2021; Ojemade, Osuafor, Bankole, Akagbosu & Osifo, 2018). Climate change is a global issue and its impact is evident in the agricultural sector where it has a major influence on agricultural production in most developing countries (Ojemade, Osuafor & Ahaneku,2021; Elum, Modise & Marr, 2017).

As the effects of climate change intensify, crop farmers need to build resilience and adaptation to improve their capability to cope. One of the most important issues facing the world today is climate change, which has effects on both natural ecosystems and human societies. Nigeria is especially vulnerable to the effects of climate change because of its heavy reliance on agriculture and its natural resources (Onoh *et al.,* 2023; Osuafor, Ude & Ositanwosu*,* 2021). The term "adaptation" describes changes brought on by current or expected climatic changes and their repercussions in ecological, social, and economic systems. The ability to 'adapt' is one facet of resilience. In the past ten years, the concept of resilience has grown in acceptance as a comprehensive and successful strategy for addressing climate change. In light of climate change, resilience has recently gained importance (Feldmeyer, Wilden, Kind, Kaiser, Goldschmidt, Diller & Birkmann, 2019). The ability to bounce back, move forward, or do both at once to mitigate the effects of climate change are three ways that resilience manifests itself (Folke, 2016). The resilience-adaptation process heavily relies on the work of policy authorities and agricultural extensionists. However, measuring resilience and monitoring adaptation activities have received less attention in the agricultural sector. Agricultural extensionists have a vital role in efforts to increase the resilience and stability of agriculture by assisting farmers in adapting to climate change (Ezike *et al*., 2020; Olorunfemi et al., 2020). Several researchers (such as, Ojemade *et al*., 2020; Akinnagbe & Irohibe, 2018; Ali & Erenstein, 2017) have noted poor levels of acceptance and application of climate change approaches among farmers. This has been attributed to farmers lacking the capability to adapt and develop resilience to the effects of climate change. Agricultural extension agents are responsible for educating farmers about new initiatives and technologies on a global scale. (Ezike *et al*., 2020; Oladele, 2015). According to Olorunfemi *et al.* (2021; Ezike *et al*., 2020), extension agents have a responsibility to share the innovations and best practices now being created by multiple global research projects on how to increase adaptive capacity and assist in enhancing the resilience of those who are vulnerable to the effects of climate change. Consequently, for extension services to crop farmers on climate change resilience to be successful, extension specialists must be included in the process. This is especially true for climate change adaptation initiatives (Onyekwe *et al.,* 2021).

Crop farmers suffer the effects of climate change due to obstacles such as their reliance on rain-fed agriculture, their limited financial resources, their inability to adapt, their inadequate infrastructure, their illiteracy, and their inability to diversify (Anarah *et al.*, 2021, Pipitpukdee *et al.,* 2020). One of the pronounced challenges is the lack of access to crucial information on climate change, which consequently affects their level of awareness and potential for resilience and adaptation. Hence, reaching out to the farmers with the accurate information is very central. This study is concerned with community outreach. It typically refers to programs or initiatives where extension agents actively engage with farmers or community to address specific needs or provide support (Ozioko, 2022).

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Access to adequate knowledge on climate change situations enhances awareness levels and the adaptive capacities of the farmers (Ojemade *et al.,* 2018). However, for some years now, awareness campaigns on climate change have increased on the radio, television, and through one-on-one visit by extension agents. Several studies (Emenyonu *et al.,* 2020;Olorunfemi *et al.,* 2020; Dimelu, 2016; Oladele, 2013) focused on the factors influencing the knowledge and competence of extension agents on climate change and its adaptation strategies. But little research has been done on the extension agents' capacity for outreach to these farmers. Thus, this paper seeks to evaluate the extension workers' capacity for outreach to crop farmers in Edo State, Nigeria. The aim of the study is to evaluate the extension agents' capacity for outreach to crop producers on climate change resilience and adaptation in Edo State, Nigeria. The specific objectives were to:

i. describe the socioeconomic characteristics of the extension agents;
ii. describe capacities for outreach by the extension agents;
iii. identify constraints to building capacities for outreach by the extension agents; and
iv. identify strategies to building capacities of the extension agents.

MATERIALS AND METHODS

The study was conducted in Edo State. Edo State is in the southern region of Nigeria. Edo State lies within the geographical coordinates of Latitudes $5^0$44'N and $7^0$34'N and Longitude $5^0$04'E and $06^0$43'E (Alakpa *et al*., 2021). The state covers an area of 17,802km^2 and has a population of 3,233,366 (Koyenikan & Omoregie, 2022). Ithas three (3) Agricultural Development Programme (ADP) zones namely Edo North, Edo Central and Edo South zones.The study population consisted of all the extension staff in the three Edo State ADP (ESADP) zones, which was 144, distributed as 41 in Edo North, 46 in Edo Central and 57 in Edo South (Idiake-Ochei, 2016). The three zones comprise of a total of 18 extension blocks or LGAs in the study area. For effective extension coverage, a sample of 50% was randomly selected from each of the three ESADP zones for the study, as follows: Edo North (20), Edo Central (23) and Edo South (28). This gave a total of 71 respondents. Validated questionnaire was used to obtain data from the extension workers. Two questionnaire in Edo South were not completely filled and were dropped. Hence, 69 respondents were used for the data analysis. The objectives were achieved using descriptive statistics.

RESULTS AND DISCUSSION

Socioeconomic Characteristics of the Extension Agents

Table 1 shows that 44 of the respondents are males while 25 are females. This result agrees with Kenneth et al.(2019) which reported that there were more male extension workers than females in Edo State. Also, most of the respondents are within the age range of 31 to 40; and 41 to 50 years. In addition, the results showed that 18.8% of people were single and 76.8% were married, while 55.1% and 36.2% had degrees. 17 years are on average spent in formal education. In terms of household size, the typical household size was 12 people, with 50.6% of households consisting of between 6 and 10 people. Based on current rank, 50.7% are extension agents, an average percentage of the respondents (50.7%) were Extension Agents

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(EA), while 29.0% are Block Extension Supervisors (BES). Majority (52.5%) identity religious group as the social organizations they belong to. In order to reflect the level of personal responsibility and the anticipated physical fitness for both farm and non-farm labor, respondents' ages (measured in years) were categorized. The results indicate that the extension agents were primarily young people, which placed them in the labor force and qualified them for strenuous exercise. For educational level, majority (55.1%) of the extension agents have completed their first degree. Education will guide extension agents to ensure extension messages are prepared in order to take care of all and sundry involved in a particular programme of development.

Capacities for Outreach by the Extension Agent

Conferences, Trainings, Workshops and Funds for Climate Change (CC) Adaptation Activities

Table 2 shows that 44.9% of the respondents participate in workshops, training, seminars for extension workers and farmers. The high degree of participation in conferences on CC might be connected with the hybrid programmes, well-executed activities, and funding of participants. This result corroborates the assertion of Rivera *et al*. (2016) who noted that hybrid workshop encourages more for public and private sector extension staff to participate.

Climate Changes that have taken place in the state within the last Five Years

In Table 3, high temperature is reported by 24.6% (2016-2017), pollution, global warming and drought is reported by 26.1%, 24.6% and 24.6% respectively (2017-2018), change in plant was reported by 24.6% between 2018 and 2019 while between 2019 and 2020, 8.7% reported flood.

Knowledge of Climate Change among the Extension Agents

The knowledge level of Extension Agents on CC is presented in Table 4. On the causes of climate change, majority (92.8%) of the respondents are aware that bush burning leads to climate change. On the effects of climate change, 84.1% are aware that CC will bring about delayed onset of rain fall.

Constraints to Building Capacities for Outreach by Extension Agents

Constraints to building capacities for outreach by extension agents as indicated on Table 5were: lack of distinct agricultural policy (3.254), use of obsolete facilities (3.13), weak staff training on climate change (3.059), meagre funding of rural development program (3.07), and lack of equipment to implement skills learnt at training (2.82).This result agrees with Onoh et al. (2023) who affirmed that limited access to resources, lack of education and training opportunities are key barriers to building capacity of women in agriculture. This result is also in line with the findings of Ozioko *et al.* (2022) who found that absence of well-defined agricultural policy, poor funding of rural development program, lack of human resources and poor staff training are the major constraints to building capacities for outreach by extension agents.

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Strategies to Building Capacities of the Extension Agents

In Table 5, the most accepted strategies identified to strengthen capacities of the extension agents are: appraisal of the agricultural extension policies (3.716), restructuring of extension agents' education and trainings (3.618), adequate resourcing of coordination mechanism and supervision (3.250), appropriate funding of extension activities (3.559), giving incentives to motivate extension workers (3.397), planning of seminars and workshops to enhance the extension agents' proficiency (3.294). This finding corresponds with the report of Ozioko *et al.* (2022) who identified strategies for building capacities as review of agricultural extension policies, reformation of basic education to boost job motivation, and organization of conferences and seminars to increase competence of extension agents.

CONCLUSION AND RECOMMENDATIONS

The study concludes that extension agents were fairly exposed to workshops, training and seminars on climate change resilience and adaptation but there were no known investment on equipment within three years with regards to climate change. Based on the findings of the study, it is recommended that agricultural extension policies relating to climate change need to be reviewed, extension agents' need to be engaged in trainings and workshops in order to increase their skills in order to educate and guide the farmers on climate change resilience and adaptation.

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APPENDICES

Table 1: Percentage distribution of Extension Agents based on Socio-Economic characteristics

Variables	Frequency (N=69)	Percentage (%)	Mean
Sex			
Male	44	63.8	
Female	25	36.2	
Age (years)			40.13
21 – 30	9	13.0	
31 – 40	18	26.1	
41 – 50	29	42.0	
51 – 60	13	18.8	
Marital status			
Single	13	18.8	
Married	53	76.8	
Widowed	1	1.4	
Divorced	1	1.4	
Educational Level			
Secondary	5	7.2	
First Degree	38	55.1	
M.Sc	25	36.2	
Ph.D	1	1.4	
Years spent in formal education			16.61
1 – 6	24	34.6	
7 – 12	44	63.8	
13 – 18	1	1.4	
Household size			5.67
0-5	31	44.8	
6-10	36	50.6	
11 – 12	3	4.3	
Number of years spent in extension work			11.74
0-9	39	56.3	
10-20	11	15.8	
21-30	17	20.1	
31 and above	2	5.7	
Present rank			
Subject matter specialist	13	18.8	
Block extension supervisors	20	29.0	
Block extension agent	1	1.4	
Extension agent	35	50.7	
Belonging to a social organization			
Yes	48	69.6	
Religious group	36	52.2	
Cooperative society	6	8.7	
Political group	6	8.7	
Community association	2	2.9	

Field Survey Data, 2021

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Table 2: Distribution of Extension Agents based on the conferences, trainings, workshops and funds for CC adaptation activities attended

Variables	Frequency N=69	Percentage %	Mean
Number of conferences attended on CC in the last three years			
1 – 4	24	34.8	
5 – 8	4	15.9	
9 and above	2	2.8	
Training, seminars, field trips or farm visit on cc for extension agent	31	44.9	
Workshops, training, seminars on cc adaptation for farmers	31	44.9	
Number of training organized by LGA			
1 – 4	20	28.9	
5 – 8	5	7.2	
9 and above	3	4.3	4.29
Sources of Funds for CC adaptation activities			
Government	21	30.4	
Farmers representatives in the training on CC	30	43.5	
LGA collaboration with CSOs on CC	32	46.4	
LGA representatives in the training on CC	31	44.9	

Field Survey Data, 2021; CC= Climate change; LGA=Local Government Area; CSO=Central Statistical Organisation

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Table 3: Climate Changes that have taken place in the LGA within the last five years

Duration (years)	Frequency	Percentage
2016 – 2017		
Irregular rainfall	1	1.4
Solar intensity	1	1.4
High temperature	1	24.6
Change of ecosystem	1	1.4
Drought	2	2.9
Heat wave	1.4	1.4
Higher ocean temp	16	23.2
Increase in heavy precipitation	1.4	1.4
Heavy rainfall and hail	4	5.8
2017 -2018		
Pollution	1	26.1
No rainfall	1	1.4
Irrigation	1	1.4
Prolong rainfall	1	1.4
Global warming	1	24.6
Drought	2	24.6
2018-2019		
Striking glacier	17	24.6
Drought	11	15.9
Rising maximum temp	7	10.1
2019-2020	1	1.4
Environmental degradation	1	1.4
Soil degradation	2	2.9
Carbondioxide accumulation in our atmosphere	1	1.4
No rainfall	1	1.4
Flood	6	8.7
Heavy rain and hail	1	1.4
Late planting due delay in rainfall pattern	3	4.3
Irrigation	1.4	1.4
Training received on CC	23	33.3
List of training received		
Weather forecast	9	13.0
Global warming	3	4.3
Adaptation to climate change	4	5.8
Control of floods	4	5.8
Climate change mitigation	5	7.2
Excess use of agro chemicals	3	4.3

Field Survey Data, 2021

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Table 4: Knowledge Level of Causes and Effects of climate change (CC) among the Extension Agents

Variables	Frequency N=69	Percentage (%)
Causes of Climate Change		
Bush burning	64	92.8
Massive deforestation	57	82.6
Excess use of agro-chemicals in farming	57	82.6
Massive urbanization	51	73.9
Human population explosion	50	72.5
Release of chlorofluoro carbons (Green House gases)	51	73.9
Exploration of natural resources such as petroleum, coal burning etc.	46	66.7
Massive agricultural mechanization	39	56.5
Massive industrialization	49	71.0
Effects of Climate Change		
Prolonged rainfall	53	76.8
Irregular rainfall pattern and distribution	51	75.0
Delayed onset of rain fall	58	84.1
Increased erosion of soil	48	69.6
Loss of farmlands and houses due to flooding	45	65.2
Rivers and streams are drying up. These resources initially provided water for agricultural and household use	43	62.3
Low rain fall intensity	48	69.6
High rain fall intensity	50	72.5
Increased temperature (solar intensity)	48	69.6
Too much wind storms	55	79.7
Increased wild fires	57	82.6
Proliferation of crop pests and animal diseases	41	59.4
Increase in invasive weed infestation	37	53.6
Increased postharvest losses of crops	32	46.4
Increased mortality rates	28	40.6

Field Survey Data, 2021; *Multiple responses recorded

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

Constraints	Mean	Standard deviation
Lack of distinct agricultural policy	3.25	1.06
Poor knowledge and skills on climate change management	2.76	1.08
Weak staff training on climate change	3.05	1.00
Lack of professionalism(certification and regulation) in extension service	2.88	1.09
Failure to pay training allowances	2.70	1.15
Lack of equipment to implement skills learnt at training	2.82	1.07
Meagre funding of rural development program	3.07	1.07
Weak linkages among extension organizations	2.72	1.01
Lack of reliable weather forecasts/climate information	2.53	1.06
Poor harmonization and supervision of extension staffs	2.44	1.09
Use of obsolete facilities	3.13	1.08
Inconsistent policies and programs	2.47	1.08

Field Survey Data, 2021; Mean cut off point ≥3.0=Accept; <3.0=Reject

Table 6: Strategies to Building Capacities of the Extension Agents

Strategies	Mean	Standard deviation	Decision
Appraisal of the agricultural extension policies	3.716	0.6921	Accept
restructuring of extension agents' education and trainings	3.618	0.6236	Accept
Adequate resourcing of coordination mechanism and supervision	3.250	0.8530	Accept
Appropriate funding of extension activities	3.559	0.7408	Accept
planning of seminars and workshops to enhance the extension agents' proficiency	3.294	0.7929	Accept
Giving incentives to motivate extension workers	3.397	0.7153	Accept
Creation of operative linkages between extension and research activities	3.288	0.7798	Accept
Privatizing extension service	2.523	1.1607	Reject
Regular assessment of extension services	3.059	1.0911	Accept
Proper staffing of extension personnel	3.588	0.6519	Accept

Field Survey Data, 2021. Mean cut off point ≥3.0=Accept; <3.0=Reject