Journal of Agricultural Extension
Vol. 26 (2) April, 2022
ISSN(e): 24086851; ISSN(Print); 1119944X
Website: https://journal.aesonnigeria.org; https://www.ajol.info/index.php/jae
Email: editorinchief@aesonnigeria.org;agricultural.extension.nigeria@gmail.com

Perceived Capacities of Public Extension Personnel for Climate Information Dissemination to Farmers in Cross River State, Nigeria

https://dx.doi.org/10.4314/jae.v26i2.5
Received: 11th November, 2021
Revision: 6th December, 2021
Accepted: 17th January, 2022
Published: 13th April, 2022

Eta, Hilda C.
Department of Agricultural Extension and Rural Sociology,
University of Calabar, Calabar, Nigeria
Email: hildajens@yahoo.com
Phone number: +2347030974231
https://orcid.org/0000-0002-0926-4913

Yekinni, Oyedeji T.
Department of Agricultural Extension and Rural Development,
University of Ibadan
Phone: +2348035905311
https://orcid.org/0000-0002-9786-4408

Elemi, Ginini F.
Department of Agricultural Extension and Rural Sociology,
University of Calabar, Calabar, Nigeria
Phone: +2347034986159
https://orcid.org/0000-0003-3739-1079

Abstract
The study examined the perceived capacities of public extension personnel for climate information dissemination to farmers in Cross River State, Nigeria. A multistage sampling procedure was used to select 72 extension agents. Data were collected using structured questionnaire and were analysed using a multinomial logistic regression at 5% level of significance. Some of the climate information disseminated were information on appropriate measures to take to prevent water shortage due to adverse weather conditions (75%) and early warning signs on events such as drought, flooding etc. (70.8%). Radio and/or television (68.1%), and the Ministries of Agriculture and Natural Resources (68.1%) were the main sources of climate information. Respondents perceived that they had low capacities for producing and airing radio and television messages on climate change (15.3%) and carrying out impact analysis of climate change effects on farmers (18%). Results of the multinomial logistic regression analysis showed that years of experience (x^2 =6.244; p = 0.044); and highest educational qualification (x^2 =11.021; p = 0.088) had positively significant effects on capacity to disseminate climate information. Extension staff should be encouraged to go for specialized studies on climate change and be trained to interpret and disseminate agro-meteorological data and information

Keywords: Climate change; climate information dissemination; public extension personnel; Capacity

Introduction

The economies of most countries in sub–Saharan Africa are driven by agriculture. The sector contributes about 15% to the region's Gross Domestic Product (GDP), providing employment for over 65% of the workforce, and plays a significant role in ensuring food security (Serdeczny, Adams, Baarsch, and Coumou, 2017). However, activities of the sector are highly climate sensitive as the effects of climate variability and change are visible throughout agricultural value chains. In the Niger Delta region of Nigeria, climate variability and change have altered rainfall patterns leading to change in time of planting crop harvests (Chukwuezie, Nwakuba, Nwaigwe, and Asoegwu, 2016). Rain and windstorms destroyed crop produce and other assets costing more than $720 million and leaving more than 80,000 people homeless by the end of the year 2009 (Chukuezie *et al*., 2016). It is therefore vital that unwavering efforts be made to help citizens of the region (most of whom are smallholder farmers) to adapt to the adverse effects of climate change.

Increasingly, climate information services are becoming important and gaining recognition as critical to farmers and other decision makers to manage climate risks and adapt to changing climatic conditions (Hansen *et al*., 2019). Vincent, Dougill, Dixon, Stringer, and Cull (2017) citing Vaughan and Dessai expatiated that climate information services 'provide people and organisations with timely, tailored climate-related knowledge and information that they can use to reduce climate-related losses and enhance benefits, including the protection of lives, livelihoods, and property'. Climate information will aid farmers to tactically plan and adopt farm operations that enhance their adaptive capacity in the event of adverse climatic conditions and risks (Partey *et al.*, 2018). Hence, the place of climate information services in helping small scale farmers cope with climate change cannot be overstated.

Climate information service provision requires expertise and is usually provided by stakeholders in the private and public sectors (Cortekara, Themesslb, and Lamicha, 2020). In Nigeria, staff of Agricultural Development Programmes, who are charged with the responsibility of public extension service delivery to farmers, provide these services, although this is greatly handicapped by limited resources and insufficient capacities of the staff (World Meteorological Organization-WMO, 2019). Several research on climate change and extension have been conducted in the south-south region of Nigeria. For instance, Ifeanyi-Obia, Togun, Lamboll , Adesope and Arokoyu (2017) examined 'Challenges faced by cocoyam farmers in adapting to climate change in Southeast Nigeria'; Ogogo, Ekong and Ifebueme (2018) explored on 'Climate Change Awareness and Adaptation Measures among Farmers in Cross River and Akwa Ibom States Nigeria'; Osuji, Okwara, Essien, Agu, and Oguegbuchulam (2019) investigated the 'Sustainability of Climate Change Adaptation Measures in South-South, Nigeria'; and Onyeneke, Igberi, Aligbe, Iruo, Amadi, Iheanacho, Osuji, Munonye, and Uwadoka (2019) examined 'Climate change adaptation actions by fish farmers: evidence from the Niger Delta region of Nigeria.' Most of these studies dwelled more on farmers' awareness of climate change, their adaptation strategies, and constraints to climate change adaptation. Furthermore, they placed very little emphasis on the capacities of extension professionals to

disseminate climate information to farmers in a bid to helping them adapt to and mitigate the adverse effects of climate change.

This study examined the perceived capacities of public extension personnel for climate information dissemination to farmers in the state. Specifically, the research identified the type of climate information disseminated by extension staff to farmers, ascertained the sources of climate information used by extension staff, and examined their perceived capacities for climate information provision. The study hypothesised that extension personnel selected socioeconomic characteristics do not significantly affect their perceived capacities for climate information dissemination.

Methodology

The study was carried out in Cross River State located in the south-south geo-political zone, Nigeria. It lies between latitude 4^0 28^1 and 6^0 55^1 North of the equator and longitude 7^050^1 and 9^0 28^1 East of the Greenwich meridian. Cross River State is divided into three agricultural zones namely: Ikom agricultural zone, consisting of six blocks (Ikom, Abi, Yakurr, Obubra, Etung, and Boki); Calabar agricultural zone, covering seven blocks (Calabar Municipal, Calabar South, Bakassi, Akampka, Odukpani, Akpabuyo, and Biase); and Ogoja agricultural zone comprising five (5) blocks (Ogoja, Yala, Bekwarra, Obudu and Obanliku).

All extension staff providing public extension services to farmers in the state constituted the sample frame for the study. A multi-stage sampling procedure was used to select respondents. In the first stage, purposive sampling was used to select staff of the Cross River Agricultural Development Programme (CRADP) since it is the public institution responsible for disseminating agricultural information to farmers in the state. In the second stage, simple random sampling was used to select three blocks from each of the three agricultural zones, making a total of nine blocks. Since each block is headed by a block extension agent, the selection of nine blocks implied a selection of 9 block extension agents.

The block extension agents were selected from the following blocks: Ogoja, Bekwarra, Obudu, Yakurr, Obubra, Abi, Odukpani, Calabar south and Akpabuyo. There are eight cells in each agricultural block in the state. Each cell is covered by a village extension agent. Thus, in the third stage, simple random sampling was used to select six out of eight village extension agents from each of the selected blocks giving rise to fifty-four village extension agents. Also, the director of extension service, the deputy director, all four subject matter specialists and the three zonal extension officers of CRADP were purposively selected as they are responsible for capacity building and coordination of extension activities in the state. Hence, a total of seventy-two staff of CRADP were selected as sample for the study.

Data were collected using structured questionnaire in line with the objectives of the study. The questionnaire was partitioned into four sections to elicit information on the following: Socio-economic characteristics of the extension staff, type of climate information disseminated by extension staff to farmers, sources of climate information used by extension staff, and perceived capacities of extension professionals for climate information dissemination. The data were analysed using

percentages and means. The hypothesis was tested using a multinomial logistic regression with maximum likelihood estimation technique at 5% level of significance. To identify the types of climate information disseminated by extension staff to farmers in the state, a checklist of agricultural climate information disseminated to farmers by agro-climate information providers was obtained from literature and presented to respondents. They were requested to indicate whether such information was disseminated by them or not. Scores of 1 and 0 were assigned to 'Yes' and 'No' responses respectively. To ascertain the sources of climate information used by public extension staff in the state, a list of possible sources of climate information as obtained from literature was presented to respondents to indicate if climate information was obtained from such sources. Scores of 1 and 0 were assigned to 'Yes' and 'No' responses respectively. With respect to perceived capacities for climate information dissemination, fifteen (15) capacities required by extension personnel for climate information dissemination were obtained from literature and presented to respondents to indicate if they possessed them. A 'yes' was scored 1 and a 'No' was scored 0. Extension staff were then grouped into three levels of capacity as follows: low capacity (i.e., those who had capacity scores of between 0 and 5), moderate capacity (i.e., those who with capacity scores of between 6 and 10) and high capacity (i.e., those with capacity scores ranging from 11 to 15)

Results and Discussion

Type of Climate Information Disseminated by Extension Staff to Farmers

Results on Table 1 show the types of climate information disseminated by extension staff to farmers. A large proportion (75%) of public extension staff disseminated information on appropriate measures to take to prevent water shortage due to adverse weather conditions. Furthermore, 70.8% of the extension workers provided information on early warning signs on events such as drought, flooding etc. The information is helpful to farmers in that it can enable them to develop coping strategies to adverse weather conditions on plants, livestock and on the farmers themselves. Also, it was noted that the majority (79.2%) of the extension staff disseminated information on weed and pest control measures so as to help farmers cope with increased infestations resulting from changes in weather/climatic patterns.

This information is critical to farmers as increased weed infestation and pest attack resulting from changing climatic patterns affect yields hence profitability of the agricultural venture. Thus, it is essential to keep updating farmers on new techniques of weed and pest control measures (preventive and curative). These results tend to agree with findings of Guido *et al.* (2020) who observed that agricultural stakeholders, particularly extension educators, tend to disseminate short-term weather/climate information that will help farmers make in-season decisions aimed at managing immediate climate risks. These include information like appropriate measures to take to prevent water shortages in the face of adverse weather conditions, crop variety selection, when to plant/sow, and proper time to harvest. Such information items assist farmers in short term planning of agricultural activities. On the other hand, the results show that few (15.3%) extension agents were disseminating climate and weather predictions/forecasts to farmers despite the weather and climate data and information generated by the Nigerian Meteorological Agency (NIMET) for dissemination to various stakeholders. This might be attributed to the technical nature of the information, which requires that extension personnel

should have an in-depth understanding of its content before disseminating to farmers.

Table 1: Extension staff by the type of climate information provided

Type of climate change information provided	Percent (n=72)
Appropriate measures to take to prevent water shortage due to adverse weather conditions	75.0
Crop variety selection, when to plant/sow and proper time to harvest during adverse climatic conditions	69.4
Types of crops that are suitable for specific local agro-ecological conditions and practices to adopt in their production	62.5
Spraying conditions against insect, weed, or disease problems and control measures;	55.6
Challenges of animal health and their products in the face of adverse climatic conditions	52.7
Wildfire forecasts and wildfire prone areas;	27.8
Livestock management information for housing, health and nutrition during adverse climate conditions.	50.0
How to manage or manipulate microclimatic conditions above- and below the ground (e.g., advise on use of mulch, shade, wind protection)	55.6
Early warning on natural disasters (e.g., floods, hurricanes, drought, thunderstorms etc.) and strategies to use to reduce impacts on livelihood activities	70.8
Climate and weather predictions and forecasts	15.3
Providing information on weed and pest control measures to reduce infestations resulting from changes in weather/climatic patterns.	79.2
Livestock breeds that are resistant to changing climatic conditions	52.8
Post-harvest storage techniques to curtail spoilage due to adverse climatic conditions	58.3
Processing techniques to reduce post-harvest losses due to changes in climatic conditions	66.7

*Multiple responses recorded

Sources of Climate Information Used by Extension Staff

Table 2 shows that most (75.0%) of public extension personnel get climate information from the radio and/or television. A significant proportion (68.1%) of them disseminate climate information from the Federal and State Ministries of Agriculture and Natural Resources and 52.8% got climate information from university (academic) sources. Only 25.0% of the staff got climate information from NIMET which is the main national organisation charged with the production, storage, and dissemination of weather/climate information to various stakeholders. This result agrees with the findings made by Singh *et al*. (2018) that a lot of agro-climate information contained in agro-meteorological bulletins are not used by most climate service providers. This might be attributed to the technical nature of such reports. Hence, extension professionals most of whom are generalists require an

understanding of the specialised facts contained in them before they can disseminate the information to farmers.

Table 2: Sources of climate information used by extension staff

Sources of Information	Percent (n=72)
Agricultural research institutes	55. 6
Magazines/newspapers	40.3
Radio/Television climate change messages	75
NIMET	25
Academics	52.8
Internet	45.8
NGOs	59.7
Ministry of Agriculture	68.1
Internet or SMS via phones)	34.7
Bulletins	52.8

*Multiple responses recorded

Perceived Capacities of Extension Staff for Climate Information Dissemination

Table 3 shows that public extension staff perceived that they had capacities for using extension teaching/learning methods to disseminate information on climate change issues (95.8%), facilitating workshops for awareness creation on climate change adaptation (90.3%), and for identifying, collecting, and sharing climate information to farmers from other sources (80.6%). Contrarily, few extension personnel perceived that they had capacities for producing and airing radio and television agricultural messages on climate change (15.3%), carrying out impact analysis of climate change effects on farmers (18%), as well as designing frameworks for evaluating climate change adaptation projects (18.1%). Inability to conduct impact analysis as well as produce and air radio and television programmes on climate change issues is an indication that most of the extension agents have not received training on topical issues concerning climate change. This view is supported by Olorunfemi, Olorunfemi and Oladele (2020) who noted that most extension personnel are yet to receive thematic training on climate change hence their involvement in climate information dissemination may not be effective as expected.

Table 3: Perceived capacities of extension staff for climate information dissemination

Capacities	Percent (n=72)
Knowledge on the causes of climate change	55.6
Ability to identify and assess farmers vulnerable to climate change impacts	43.1
Ability to carry out impact analysis of climate change effects on farmers	18.0
Has sufficient knowledge on climate change adaptation strategies	68.1
Ability to develop modules on climate change for training of farmers	43.1
Ability to facilitate workshops for awareness creation on climate change adaptation	90.3
Ability to use extension teaching/learning methods to disseminate information on climate change issues	95.8
Ability to identify, collect and share credible climate information to farmers from other sources	80.6
Ability to simplify and communicate agro-meteorological information to help farmers understand	36.1
Ability to produce and air radio and television messages on climate change issues	15.3
Ability to build partnerships and networks with other climate information stakeholders to enhance climate information dissemination	52.8
Ability to design frameworks for monitoring climate change adaptation projects	25.0
Ability to design frameworks for evaluating climate change adaptation projects	18.1
Ability to mainstream climate information into other extension activities	52.8
Ability to manipulate and use new media to disseminate climate information to farmers	47.2

*Multiple responses recorded

Relationship between Extension Personnel's Selected Socioeconomic Characteristics and Perceived Capacities for Climate Information Provision

Results on Table 4 show that number of years of work experience (x^2 =6.244; p = 0.044) had a positively significant effect on capacity to disseminate climate information to farmers as well as highest educational qualification (x^2 =11.021; p = 0.088). This suggests that extension professionals who have been working for longer periods are significantly more capable of disseminating climate information to farmers than those with fewer years of experience. Those who have been working for many years are expected to be more self-confident and have better mastery of extension communication skills that will help them communicate better climate information to farmers. This result aligns with findings of a study carried out by Olorunfemi, Olorunfemi and Oladele (2020) who also observed that the larger the number of years of experience an extension agent has, the better will be his ability to discharge his responsibilities to farmers.

Similarly, from results on Table 4, it can be inferred that highly educated extension workers are exposed to diverse sources of climate information, have better capacities to understand the climate change concept and ultimately more capable of disseminating the information to farmers. According to Zikhali, Mafongoya, Mudhara

and Jiri (2019), most extension professionals with high educational qualifications tend to be subject matter specialists who must have received specialized training on climate change, thereby enabling them to be more capable of disseminating climate information.

Table 4: Relationship between extension personnel selected socio-economic characteristics and perceived capacities for climate information dissemination

Effect	Model Fitting Criteria	Likelihood Ratio Tests	
	-2 Log Likelihood of Reduced Model	Chi-Square	Df
Intercept	99.127[a]	0.000	0
Gender	101.854	2.727	2
Marital status	104.486	5.358	4
Highest educational qualification	110.148	11.021	6
Membership into organisations	105.372	6.244	2
Age	101.541	2.413	6
Work Experience	101.958	2.831	4

Conclusion and Recommendations

The study established that though professionals in the state were disseminating information that are necessary for farmers to make in-season decisions for climate change adaptation, information generated by NIMET are not being disseminated by a substantial proportion of the public extension professionals. The major sources of climate information are the radio, television and the Ministry of Agriculture and Natural Resources. Staff perceived that they had low capacities to disseminate climate information that require specialized skills

Government should co-opt and train extension educators on how to interpret and disseminate agro-meteorological data and information from NIMET. More in-service training with the aim of enhancing specialised capacities of public extension professionals on climate change concerns should be organised. Furthermore, staff should be encouraged through scholarships/grants to go for specialised studies on climate change in higher institutions.

References

Chukwuezie, O. C., Nwakuba, N. R., Nwaigwe, K. N. & Asoegwu S. N. (2016). The impact of climate change on Nigerian agricultural sector and economy. Paper presented at the 37th Annual Conference and Annual General Meeting at Minna in October 2016.

Cortekara, J., Themesslb, M. & Lamich, K. (2020). Systematic analysis of EU-based climate service providers. *Climate Services* 17 https://doi.org/10.1016/j.cliser.2019.100125

Guido, Z., Zimmer, A., L. Pus, S., Corrie, H., Gower, D., waldman, K., Krell, N., Sheffield, J., Caylor, K., and Evans, T. (2020). Farmer forecasts: Impacts of seasonal rainfall expectations on agricultural decision-making in Sub-Saharan Africa. *Climate Risk Management*. 30:1-15 https://doi.org/10.1016/j.crm.2020.100247. Retrieved on the 23rd of August, 2021

Hansen, J. W., Vaughan, C., Kagabo, D. M., Dinku, T., Carr, E. R., Körner, J. & Zougmoré, R. B. (2019). Climate services can support African farmers' context-specific adaptation

needs at scale. *E- Journal Frontiers in Sustainable Food Systems* 3:21. doi: 10.3389/fsufs.2019.00021

Ifeanyi-Obi C. C., Togun, A. O., Lamboll, R., Adesope, O. M., & Arokoyu, S. B. (2017) Challenges faced by cocoyam farmers in adapting to climate change in Southeast Nigeria. *Climate Risk Management.* 17:155-164 http://dx.doi.org/10.1016/j.crm.2017.04.002

Ogogo, A. U. Ekong, M. U. & Ifebueme M. N. (2018). Climate change awareness and adaptation measures among farmers in Cross River and Akwa Ibom States of Nigeria. In Leal Filho W. (Eds) *Handbook of Climate Resilience*. Springer, Cham. https://doi.org/10.1007/978-3-319-71025-9_153-1-018-2239-6

Olorunfemi, T. O., Olorunfemi, O. D. & Oladele, O. I. (2020) Determinants of the involvement of extension agents in disseminating climate smart agricultural initiatives: Implication for scaling up. *Journal of the Saudi Society of Agricultural Sciences* 19:285–292

Onyeneke, R. U., Igberi, C.O., Aligbe, J.O., Iruo, F.A., Amadi, M. U., Iheanacho. S. C., Osuji, E. E., Munonye, J. and Uwadoka C. (2019). Climate change adaptation actions by fish farmers: evidence from the Niger Delta region of Nigeria. *Australian Journal of Agricultural and Resource Economics*. 64(2):347-375 https://doi.org/10.1111/1467-8489.12359. Retrieved on the 8th of December 2021

Osuji, E. E., Okwara, M. O., Essien, U. A., Agu, C. G. and Oguegbuchulam, M. N. (2019). Sustainability of Climate Change Adaptation Measures in South-South, Nigeria. *Agriculture and Food Sciences Research*. 6 (1): 120-126 DOI: 10.20448/journal.512.2019.61.120.126. Retrieved on the 8th of December 2021

Partey, S. T., Dakorah, A. D., Zougmoré, R. B., Ouédraogo, M., Nyasimi, M., Nikoi, G.K. & Huyer, S. (2018). Gender and climate risk management: evidence of climate information use in Ghana. *Climatic Change*. 158:61–75 https://doi.org/10.1007/s10584-018-2239-6

Serdeczny, O., Adams, S., Baarsch, F. & Coumou, D. 2017. Climate change impacts in Sub-Saharan Africa: from physical changes to their social repercussion. In *Regional Environmental Change*. Reyer, Bugmann, Nabuurs and Hanewinkel (Eds). Springer. DOI 10.1007/s10113-015-0910-2

Singh, C., Daron, J., Bazaz, A., Ziervogel, G., Spear, D., Krishnaswamy, J., Zaroug, M., and Kituyi, E. (2018). The utility of weather and climate information for adaptation decision-making: current uses and future prospects in Africa and India. Climate and Development. 10:5, 389-405, https://doi.org/10.1080/17565529.27.1318744

Vincent, K., Dougill, A. J., Dixon, J. L., Stringer L. C., & Cull, T. (2017). Identifying climate services needs for national planning: insights from Malawi, *Climate Policy* 17(2):189-202, DOI: 10.1080/14693062.2015.1075374

World Meteorological Organization-WMO (2019). Provisional Statement on the State of the Global Climate in 2019. https://reliefweb.>report>world. Accessed on May 11th 2020

Zikhali, Z. M., Mafongoya, P. L., Mudhara, M. and Jiri, O. (2019). Climate change mainstreaming in Extension agents training curricula: A case of Mopani and Vhembe District, Limpopo Province, South Africa. *Journal of Asian and African Studies.* 55(1):44-57