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Extension workers' access to climate information and sources in Edo State Nigeria

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ABSTRACT

This study examined access of Agricultural Extension Workers in Edo State Agricultural Development Programme (ADP) to climate information sources. All the 47 Extension workers in the ADP constituted the respondents for the study. The findings showed that 51.06% of the respondents were males, 85.11% were married, about 55.32% were between 40- 49 years old and 61.7% had over 10years working experience. Majority (68.08%) of the respondents belonged to the Extension Agent (EA) cadre. The climate change observations considered to be prevalent by most of the respondents were increase in pest and disease infestation (95.7%), erosion (91.5%), flooding (89.4%) and excessive heat (76.6%). More than 40% of the respondents accessed climate information on climate parameters and their applications to agricultural practices. The most frequently accessed formal sources were local radio (mean=3.04), national radio (mean=2.98) and national television (mean=2.52) while the informal sources were farmers/client system (mean=2.64), personal assessment (mean=2.62) family and friends (mean=2.55). Major constraints to accessing climate information include inadequate funding (mean=2.64) and irregular power supply (mean=2.53). There were positive but non significant relationships between respondents' personal characteristics and access to climate information sources; age (r=0.208), education (r=0.120) and working experience (r=0.100). There was significant difference in respondents access of formal and informal climate information sources (t=2.043; p=0.000). It was recommended among others that climate information should be institutionalized, regulated, coordinated and applied/related to local agricultural activities on a regular basis for extension workers to access.

Keywords: climate information, sources, access, extension workers, Nigeria.

INTRODUCTION

Nigeria is an agrarian economy with over 65% small holder farmers accounting for the nation's agricultural output. Agriculture takes place in the environment hence vulnerable to environmental factors which include weather, climate and soil properties. Agricultural practice in the country is grossly dependent on natural conditions such as rain-fed farming, soil fertility, temperature, sunshine and humidity. All these affect agricultural production [1] states that climate and agricultural resources are very closely related and as such any crisis situation in the

agricultural sector notably a food crisis stands a great risk of becoming escalated by vagaries and extreme weather events like heat wave, drought and flood.

Weather is the state of the atmosphere at a place and time as regards heat, cloudiness, dryness, sunshine, wind and rain. Climate is the prevailing weather conditions of an area while climate change is the alteration or modification in the prevailing weather conditions. The difference between climate and weather is summarized by the popular phrase “climate is what you expect; weather is what you get (Wikipedia free encyclopaedia). Climatic factors have not been adequately managed over the years and the effects manifest in various forms such as soil degradation, flooding, reduced rainfall, erosion, global warning/excessive heat, wind and rain storm, cyclones, delayed/short rains etc. This could due to dearth of data/information requisite to effective management of these factors.

Agro-climatic information is necessary to assist in the management of agricultural activities and operations such as determining the time, extent and manner of cultivation, planting, land preparation and application of agro chemicals such as herbicides and fertilizers. According to [2], information about the expected onset and cessation of the rainy season and likely intensity of expected rains or dry spells can help to choose strategies to maximize crop yields and protect livestock. Climate parameters are therefore indispensable. Judicious and appropriate applications of agro-climate information have been found to result in about 30%

increase in crop yield [1]. Reduction of the vulnerability of food production to weather hazards, ensure that farmers make informed management decisions and adopt strategies aimed at reducing losses via early warnings and services/information[1, 3, 4] provided on the hazards.

Climate change and environmental issues in development have been of great concern globally in recent times. This is expected because technological development has not adequately addressed the issues of hunger, poverty, morbidity and even mortality [3, 4]. All these indicators are crucial to the millennium development goals (MDGs) attainment. Evidences of adverse situations now manifest around the globe to show that climate is changing. Climatic influence on production, harvesting, storage processing of crops livestock, fisheries, agro-forestry cannot be over emphasized.

Climate parameters such as rainfall is the main source of moisture supply to crops thus it could make or mar crop production. The onset and cessation of rainfall dates will help to determine the growing season and water requirement of the crop for sufficient crop performances and affect availability of water for grazing in livestock. Temperature aids biochemical processes determine crop growth and development and air and soil temperature affect all the growth, development and performance of crops cultivars and animal breeds. Solar radiation/cloud cover and sunshine duration, solar radiation, wind/air motion, soil moisture content and humidity affect crop and animals as well.

Climate information is expected to be based on reliable weather data collected on continuous basis [5] which could assist in forecasting and local application to agricultural practices. To adequately guide farmers, extension workers require information which derives from the knowledge of the weather/climate parameters their effects on agricultural (upstream and downstream) activities. It also includes adaptation and coping strategies such as identified by [6] but summarized as pest management, adjustment in farming activities, use of tolerant varieties or breeds of livestock, best cultural farming practices, artificial regulation of water, temperature and other parameters.

Agricultural extension education is about putting useful knowledge to practice. It is concerned with the tasks of information dissemination, education and assistance with practical application to help farm people to use information and technologies to help themselves. [7] argued that putting useful knowledge to study means transfer and spread of technology and technical Information or know-how from information sources or developers through those who communicate it to those who receive it.

There are various sources at the disposal of extension agents such as their organizations, individual associates, local, national and international seminars/workshops/trainings, print and electronic media, telecommunication, and internet services. These channels/sources of information are for enlightenment to increase the knowledge of those who access them [8]. [9] reiterated the importance of radio in extension services delivery. The channel could be extension workers or farmers. Particularly agricultural extension workers need to be properly informed about crucial issues related their field such as climate changes, climate/weather situations of their environment. [10] states that extension workers and farmers need to have access to agro-climatic information such as weather forecasts, adaptive technology innovations, or market- through extension and information system.

The Nigerian Meteorological Agency (NIMET) has the mission to observe Nigerian weather and climate and provide meteorological, hydrological and oceanographic services in support of national needs and international obligations [1]. NIMET provides various agro-climate info services/products for managing hazards/food crisis. These services could not be said to be accessible to research and extension institutions consequently the extension workers let alone the farmers.

The Agricultural Development Project (ADP) as the extension arm of the State Ministry of Agriculture and Natural Resources (SMANR) for each State of the federation in Nigeria serves as a link between researchers and farmers. Globally there are manifestations of climate change such as erratic rainfall, crop failure, high mortality rate of livestock, incidence of pest and diseases among others and Edo State, Nigeria is not exempted. The ADP Monitoring and Evaluation (M&E) component has the task to monitor climate and record weather data and report at review meetings for application to agricultural activities [11]. This is expected to pass on to the Extension workers who should assist farmers to apply information to their agricultural practices. The contact with the extension agent could not be regular [12, 13]. The need to have access to climate information from credible and reliable sources is cannot be overemphasized. It is against this background that the study examined climate information and the sources accessed by the Extension Workers in Edo State ADP.

The specific objectives were: To

1. examine the personal characteristics of the extension workers in the Edo state ADP;
2. identify climate change observations made by the respondents;
3. ascertain the climate/weather parameters that are relevant to climate change observations as perceived by extension workers;
4. identify the climate information that the extension workers have access to;
5. Examine channels/sources accessed for climate information by extension workers.
6. examine the constraint faced by extension workers in accessing climate information;

Ho (1): There is no significant relationship between the personal characteristics of the respondents and their access of climate information sources.

Ho (2): There is no significant difference between respondents' access of formal and informal sources of climate information

Definition of terms

Local radio, television and print media- media located in Edo or boundary States except National radio and television stations;

National radio, television and print media- Nigerian media (mostly Private stations/media) located outside Edo and her boundary States as well as National radio and television stations;

International radio, television and print media – Nigerian International networks (NTA International) and foreign media

MATERIALS AND METHODS

Edo State is made up of 18 Local Government Areas (LGAs). The state is in South- Western agro ecological zone of Nigeria in the rain forest region. The occupation of the people includes farming of tree crops; oil palm, cocoa, rubber and arable crops such as pineapple, rice, beans vegetables plantain and livestock and forestry activities. The study is a population study of all the forty seven (47) extension workers in Edo state ADP [9]. Data were obtained using structured questionnaire which captured the socio-economic characteristics of the extension workers and their sources and access to climate information. Descriptive statistics such as frequency count, percentage, mean and standard deviation were used in data analysis. Pearson Product Moment Correlation (PPMC) was used to test the hypothesis.

The dependent variable, access of climate information source was measured using 4-point Likert type scale: always (4), sometimes (3), rarely (2) and not at all (1). Mean $\geq$ 2.50 was considered regularly accessed (maximum score= 4x17=68, minimum=1x17=17)

Perception of the relevance of climate information/climate change observations were measured on a, 3-point Likert-scale: Not relevant (1), Relevant (2), Very relevant (3). Mean $\geq$ 2.00 was considered relevant. The constraint to access of climate information was measured using 3-point Likert scale: Not serious (1), Serious (2), Very serious (3) and mean $\geq$ 2.00 as serious constraint.

RESULTS AND DISCUSSION

Table 1 shows that 51.06% of the respondents were males, 85.11% were married. 55.32 % were within the age range of 40-49 years which shows that the extension workers were within the productive age and are likely adventurous in the search for information. Majority of respondents (46.81%) had only Ordinary National Diploma (OND), 40% had Higher National Diploma (HND) while others had B.Sc and M.Sc. About 61.70% of respondents had working experience of between 11-20 years. The extension workers cut across the hierarchy in extension service: one each (2.13%) of Director of Extension, Chief Extension Officer, Head of Women In Agricultural Extensions (HWIA) and majority were Extension Agents (51.06%). This agrees with [1] on the distribution of extension workers nationally. This reveals the shortfall in the number of EWs in the state. The ratio of 1:3 of Extension Agent to Block Extension supervisors

Table 1: Distribution of socio-economic characteristics of respondents

Variables		Frequency	Percentage
Sex	Female	23	48.94
	Male	24	51.06
	Total	47	100.00
Age range	Below 30	1	2.13
	30-39	16	34.04
	40-49	26	55.32
	50 & above	4	8.51
	Total	47	100.00
Marital status	Single	5	10.64
	Married	40	85.11
	Widowed	2	4.26
	Total	47	100.00
Education	OND	22	46.81
	ND	19	40.43
	B.Sc/B.Agric	3	6.38
	M.Sc	3	6.38
	Total	47	100.00
Working experience	10 & below	9	19.15
	11-12	29	61.70
	>20	9	19.15
	Total	47	100.00
Job rank	Director of extension	1	2.13
	CEO	1	2.13
	WIA	4	8.51
	SMS	2	4.26
	BES	7	14.89
	BEA	8	17.02
	EA	24	51.06
	Total	47	100.00

Source: Field Survey 2010.

Climate change observations by the respondents

Table 2 shows the respondents' climate change observations similar to some identified in [1, 15, 16, 17, 18] . Observations made by over 50% of the respondents were on increased diseases and pest infestation (95.7%), erosion (91.5%), on flooding (89.4%), excessive heat (76.6%), extreme cold temperature (72.3%), drought (70.2%), high humidity (61.7%).

Table 2: Distribution of respondents' climate change observation

Variables	Yes		No	
	Frequency*	%	Frequency*	%
Increased pest and infestation	45	95.7	2	4.3
Erosion	43	91.5	4	8.5
Flooding	42	89.4	5	10.6
Excessive heat	36	76.6	11	23.4
Extremely cold temperature	34	72.3	13	27.7
Drought	33	70.2	14	29.8
High humidity	29	61.7	18	38.3
Increase wind storm	19	40.4	28	59.6
Reduce natural vegetation	14	29.8	33	70.2
Acid rain	11	23.4	36	76.6

Source: Field Survey 2010. * *Multiple responses*

Relevance of climate parameters to climate change observations

Result in Table 3 shows the relevance of climate parameters to climate observations. Climate parameters with means > 2.00 were considered to be relevant by the extension workers. All the

types of climate information on these parameters were relevant to the respondents precipitation (mean =2.40) temperature, (mean=2.43), (mean=2.28) sunshine, wind (mean=2.13) and humidity (mean=2.11). The standard deviations (SD) imply variation/dispersion from the mean which were high but close figures for the parameters. The findings may be attributed to awareness level (scientific knowledge) of the importance of climate/weather to agriculture.

Table 3: Respondents' perception of the relevance of climate parameters to climate change observations

Variables /climate parameters	Mean	Standard Deviation (SD)
Precipitation (rainfall)	2.40*	0.614
Temperature	2.34*	0.668
Soil moisture content	2.31*	0.453
Sunshine duration	2.28*	0.649
Wind/air motion	2.13*	0.711
Humidity	2.11*	0.787
Solar radiation	2.11*	0.658

*Source: Field Survey 2010. *Relevant (mean≥2.00)*

Climate information accessed

Table 4 shows that the most of the respondents had access to all the listed types of climate information but to varying degrees similar to some identified by [1, 6]. Each of the climate information identified was accessed by more than 40% of the respondents with weather forecast (89.36%), precipitation/ rainfall data (74.47%) and temperature (68.08%). Respondents accessed information on climate parameters more than those related to application information to agricultural practices. However the sources frequently accessed to obtain the information vary hence the authenticity and credibility of the climate information consequently the competency of extension workers will be issues of concern.

Table 4: Distribution of respondents by accessed climate information

Types of Climate Information	Freq*	(%)
Weather forecast	42	89.36
Precipitation/ rainfall data	35	74.47
Temperature	32	68.08
Sunshine	28	59.57
Humidity	28	59.97
Wind	25	53.19
Use of tolerant varieties or breeds of livestock-disease, drought, heat	35	74.47
Humidity/soil moisture regulation-mulching, leguminous cover crops	35	74.47
Regulation of water-irrigation, Fadama farming, construction of wells, erosion and water logging control	31	65.96
Adjustment in farming activities-planting/stocking dates,	29	61.70
Best cultural farming/forestry practices- afforestation, avoid bush burning, hedge rows, soil improvement	26	55.32
Pest and disease management- cultural, Integrated Pest Management (IPM), Integrated Production and Pest Management (IPPM)	27	57.45
Temperature regulation-use of dryers, shade trees	23	48.94
Traditional/indigenous weather forecasts, application and regulation measures (e.g. rainmaking, forecasts, incantations)	21	44.68

*Source: Field Survey 2010. * Multiple responses*

Table 5: Mean scores of respondents' access of climate information sources

Types of Sources Accessed	Mean	SD
Formal sources		
Local radio stations	3.04*	0.776
National radio	2.98*	1.108
National television	2.52*	1.073
Local television	2.53*	1.132
Local print media (newspaper/newsletter/journal)	1.87	1.172
Seminars/workshop, review meetings (local) e.g MTRMs	2.44	1.183
International radio	2.17	1.224
National newspaper	2.13	1.136
International television	2.05	1.194
Internet	2.04	1.042
International print media (newspaper/newsletter/journal)	1.62	0.874
Seminars/workshop/training (national)	1.36	0.121
Seminars/workshop /training (international)	1.12	0.213
NIMET agro-climate info services/products	1.17	0.126
Informal sources		
Farmers/client system (coverage area)	2.64*	0.115
Personal assessment/knowledge/judgement	2.62*	0.134
Family, friends and acquaintances	2.55*	0.196

*Source: Field Survey 2010. *Frequently Accessed source (mean≥2.50)*

Access to Sources of climate information

Table 5 shows that the respondents highly accessed climate information from local radio (mean=3.47) national radio (mean=3.11) and national television stations (mean=3.02) and local television (mean=2.98) because they had mean value greater than 2.50. This is similar to the findings of [12] that ADP extension contact was not accessed by majority (78.3%) as a source of information on environmental issues while 25.4% accessed electronic and print media. All the informal sources were easily accessible which may be due to high cost as well as unavailability of most of the formal sources. The high access of local and national radio and television stations could be due to the proliferation of these stations in the country in recent times [19], their weather forecasts and the ability of the respondents to afford them. The high standard deviations (SD) for most of the formal sources imply high variation/dispersion from the mean which is an indication of divergence in respondents' access of climate information from these sources.

Constraints to access of climate information

Results in Table 6 show the seriousness of the constraints to respondents' access to sources of climate information. Inadequate fund by Government to purchase weather recording facilities needed by their organization (mean=2.64), irregular electric power supply (mean=2.53), obsolete facilities (mean=2.47), no knowledge of NIMET services and products (mean=2.39), poor network/reception (mean=2.36). The constraints are similar to those of [12] for ICTs. Others constraint identified; do not have time to access information (mean=1.98), lack of technical know-how in operating equipments (mean=1.87) and no interest (mean=1.74) were not serious problem to the respondents This could be because Extension Workers are not directly responsible for taking weather data in the ADP but the Monitoring and Evaluation staff. However the information should be made available to the Extension Workers through in-house interactions (trainings, meetings, seminars).

Table 6: Mean scores of respondents' constraints to access weather/climate information

Constraints	Mean	SD
Inadequate fund by government to supporting facilities	2.64*	0.568
Irregular electric power supply	2.53*	0.654
Obsolete weather recording facilities	2.47*	0.718
Poor network/reception for electronic media	2.36*	0.735
Cannot afford the facilities or cost to access	2.26*	0.706
Wrong timing in climate information	2.09*	0.620
Facilities are not available in my establishment	2.09*	0.620
Do not have time to access climate information	1.98	0.675
Lack of technical know-how in operating equipment	1.87	0.850
No knowledge of NIMET services and products	2.39	0.253
Not easy /not available	1.82	0.436
No interest (extension workers)	1.74	0.793

*Source: Field Survey 2010. *Serious constraints (mean≥2.00)*

Relationship between personal characteristics and access to climate information

Pearson correlation analysis in Table 7 shows that all of the selected personal characteristics showed positive but non significant relationships. This implies that access of climate information sources does not significantly depend on the respondents' socio-economic characteristics. However the positive relationships with age (r=0.208), educational level (r==0.120), and working experience (0.100) indicate that older, more educated and highly experienced extension workers had more access to climate information. Therefore the null hypothesis was accepted (Ho: there is no significant relationship between respondents' characteristics and access to climate change information). This could be explained by the initial findings of this study which showed that majority of the respondents made climate change observations, perceived that climate parameters were relevant and frequently accessed available sources of climate information.

Table 7: Correlation analysis showing the relationship between personal characteristics and access of climate information sources

Variables	Coefficient (r)	Probability level
Age (years)	0.208	0.162
Education	0.120	0.422
Working experience	0.100	0.948

*Source: Field Survey 2010. *Significant (p≤0.05).*

Difference between respondents' access of formal and informal sources of climate information

Table 8 shows the t-test analysis whereby there was significant difference in the means of respondents' access of formal and informal sources for climate information with higher mean for informal sources. This could be attributed to failure to frequently access most of the formal sources and shows the importance of indigenous knowledge in climate/weather information/issues access by EWs where formal sources are available.

Table 8: Difference between respondents' access of formal and informal sources of climate information

Groups	Mean score	SD	t	p	Decision
Access of formal sources of climate information	2.1579	0.89	2.043	0.000	significant
Access of formal sources of climate information	2.6033	0.15			

CONCLUSION

The study showed that extension workers made climate change observations and climate parameters were perceived as relevant to the climate observations. The respondents highly accessed climate information from informal and some formal sources particularly the local radio but poorly accessed NIMET services/products (with the mandate to observe Nigerian weather and climate services). The most serious constraints to accessing climate information were poor funding, lack of attention to climate information among others.

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

1. Climate information should be institutionalized, better coordinated and applied/related to local agricultural activities on a regular basis for extension workers to access at the State level.
2. Fund should be made available by the government to purchase the necessary weather recording facilities needed in the ADPs in order to complement NIMET effort at local level;
3. Efforts should be directed by the government to ensure stable electricity in order to guarantee direct access and use of facilities (ICTs) to access proven climate information;
4. NIMET services and products should be accessed directly by the ADPs through the internet as first hand information which could be complemented by their locally obtained data. These should be interpreted and applied to local value chain activities in agricultural practices ;
5. Extension workers should be sensitized in the use of ICTs (as formal sources) so as to have access to recent development and to have up-to-date global information relevant to their tasks;

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