

EFFECTS OF AGRICULTURAL EXTENSION SERVICE DELIVERY ON CLIMATE CHANGE ADAPTATION OF RICE FARMERS IN AYAMELUM LOCAL GOVERNMENT AREA OF ANAMBRA STATE.

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ABSTRACT

The study examined the effects of agricultural extension service delivery on Climate Change adaptation of rice farmers in Ayamelum Local Government Area of Anambra State. Two-stage sampling technique was used to select 71 rice farmers for the study. Data was collected with the aid of structured questionnaire complemented with interview schedule. Data collected was analyzed using descriptive statistics. The major effects of agricultural extension services delivered on the climate change adaptation of rice farmers in the study area were increase in yield of rice (\bar{x} =3.47), better access to improved rice varieties (\bar{x} =3.01), improved capacity of the farmers on climate change adaptation issues (\bar{x} =2.63), increased awareness of climate change adaptation strategies (\bar{x} =2.64) and improved knowledge of climate change adaptation strategies of the rice farmers (\bar{x} =2.55). The study recommended that extension agents should implement field-based teaching methods and practices to facilitate the building of knowledge and skills among rice farmers as well as develop strategies with appropriate resources to address the needs of rice farmers in the study area.

Keywords: Agricultural Extension Services, Climate Change, Adaptation Strategies, Effects

INTRODUCTION

Rice is the seed gotten from *Oryza sativa* species which comes from the family Gramineae and is indigenous to central and eastern China. It is the most commonly consumed food for the large part of the world's human population (Koerniati, 2004). Rice production in Nigeria comes with a whole lot of advantages which mainly includes its nutritive value in diet and the fact that it is one of the most imported foods in the country. Nigeria spends approximately 365 billion naira annually importing rice (Nigerian finder, 2017). when it has the potential of growing enough rice to support her population and generate surplus that can be exported thereby regarding Nigeria as one of the highest importers of rice in the world (Agro Nigeria, 2014). Rice production in Nigeria is not stable and therefore, experiences a lot of constraints and as a result, made the government to rethink its food security. A major challenge of rice production being faced is adverse changes in climate which brings about reduction in rice yield.

Climate change happens when there is severe alteration in any of its elements and the elements of weather include; temperature, pressure, rainfall, humidity, wind-speed. It can also be referred to as the change in the average weather condition of an area which could be over a decade caused by man or nature. Adverse changes in climate are as a result of the emissions of green-house gases (GHG) in the ecosystem. Human activities are majorly responsible for the release of green-house gases (GHG) that leads to increase in temperature over the last 150 years (IPCC, 2007). Common example of human activities that emits GHG are burning fossil fuels, heat transportation, electricity etc. (IPCC,2007).

Safdar, (2012) reported that the issue of climate change has become a major threat to agriculture and agricultural activities. The International Food Policy Research Institute (IFPRI) report on Climate Change projections stated that by 2050, climate change impact on agriculture and costs of adaptation forecasts prices will increase between 32% and 37%. Rice production has been affected by climate change through; extreme temperature, frequent flooding, drought and increased salinity of water used for irrigation. This has directly affected the livelihoods of farmers making it difficult for them to adopt the practices and has threatened the environment, economy, social life of the people and food security in the nation (Safdar, Shahbaz, Ali, Khan, Luqman & Ali, 2014; Ifeanyi-Obi, Etuk & Uloh, 2013).

Therefore, there is need to find ways of mitigating the effects of climate change. Adaptation is one of the ways of reducing the negative impact of climate change, adaptation could be done by adjustment of the natural and human systems in response to an actual or expected change in climate and its effects (Ifeanyi-Obi et-al, 2013). The adjustments done are activities carried out after the impacts are felt or before the impacts are observed (Ifeanyi-obi, Etuk & Jike-wai, 2012).

Agricultural extension plays a major role in promoting agricultural productivity, increasing food security, improving rural livelihoods, and promoting agriculture as an engine of economic growth. They also support and motivate farmers to increase/improve agricultural production and livelihoods of a nation. Agricultural extension service helps in enhancing the efficiency of adoption techniques by the farmers (Maponya & Mpandeli, 2013). The tools involved include the use of public information and education programs that can assist farmers in mitigating the effects of climate change

(FAO, 2003). Agricultural extension services provide information, technologies, and education to farmers on how to cope with climate change and the challenges/risks associated the production of rice (International (IFPRI, 2009).

Agriculture is greatly dependent on climate. Climate change through increase in temperature and reduction of rainfall has adversely affected rice farmers' production by reducing the yield of rice. Various researches have been conducted in relation to the effects of climate change on crop yield as well as in the area of climate change mitigation and adaptation strategies. Also, there is evidence of roles played by agricultural extension agents in providing farmers with information. For instance, Selbut (2013) opined that agricultural extension agents provide information on agricultural programs to small holder farmers. However, the existing studies show no evidence of effect of agricultural extension services on rice farmers' adaptation to climate change. Hence, this study examined the effects of agricultural extension service delivery on climate change adaptation of rice farmers in Ayamelum Local Government Area of Anambra State.

Objectives of study

The broad objective of the study was to assess the effects of agricultural extension service delivery on climate change adaptation of rice farmers in Ayamelum Local Government Area, Anambra State. The specific objectives were to:

- i) describe the socio-economic characteristics of the rice farmers in the study area.
- ii) identify rice farmers' sources of climate change information in the study area.
- iii) identify the extension services in climate change adaptation of rice delivered by extension agents in the study area.
- iv) assess the effects of extension services delivered by the agricultural extension agents on climate change adaptation of rice farmers in the study area.

METHODOLOGY

This study was conducted in Ayamelum Local Government Area of Anambra State. Anambra state is divided into 20 Local Government Areas and is situated in the South East Geopolitical Zone of Nigeria. Anambra state is made up of two land form regions: a highland region and a low-plains. It has an annual rainfall which is high, ranging from 1,400mm in the north to 2,500mm in the south. The state is one of the most densely populated states in Nigeria according to the 1991 National Population Census; the State has a total population of 2,796,475 in a land area of 4,416 sq. km (Online Nigeria, 2018). Ayamelum is a Local Government Area of Anambra State with its Headquarters situated in Anaku and it shares boundaries with Kogi State to the north, Enugu State to the east, Imo, Abia and Rivers states

to the south, and Delta and Edo state to the west. Towns that make up Ayamelum local government are Omor, Umueje, Omasi, Igbakwu, Umumbo, Anaku, Umuerum, IfiteOgwari. The major agro raw material in the Local Government is rice, yam, cassava, maize, cocoyam, melon, fruits as well as other natural resources like clay and kaolin (Raw Materials and Research Development Council RMRDC, 2012).

The population of the study comprised of all the rice farmers in Ayamelum local government area of Anambra state. Two - stage sampling procedure was used to select sample for the study. The first stage was the purposive selection of three communities namely; Umumbo, Ifite-ogwari and Omor from the eight communities in Ayamelum Local Government Area of Anambra State. These are the major producers of rice in the local government. The second stage comprised of the selection of major rice farmers from each of the three selected communities using snowballing approach. This gave a total of 71 rice farmers for the study. The instrument for data collection was structured questionnaire for rice farmers. However, interview schedule was adopted for non-literate rice farmers. The data collected from the study was analyzed using descriptive statistical tools namely; mean, frequency and percentages.

RESULTS AND DISCUSSION

Socio-economic characteristics of rice farmers

The result in Table 1 showed that 90% of the farmers were male with 79% married. The respondents had a mean household size of 6persons, which implies that the farmers maintained an average family size and may need additional labour during planting seasons. Majority (66%) of the rice farmers had at least a secondary school education which shows that they were literate enough to understand the role of extension agents and give reasonable responses on the effects of extension service in their climate change adaptation strategies. Onubuogu and Esiobu (2014) reported that educated farmers are better informed and are more likely to be aware of climate change and its adaptation strategies. Also, it was shown that 73% of the farmers had more than 11years of farming experience which shows that the farmers must have acquired indigenous knowledge that helps them farm efficiently as well as adapt successfully to climate change. From the result gotten, it showed that 61% of the farmers practiced mixed cropping to boost their income with diversifying into other crops. Majority (87%) of the farmers had their major aim of production to be for both sale and consumption with a mean farm size and income as 5.56plots and ₦1,232,575 (annually) respectively. This is an indication that the rice farmers cultivate at a commercial scale. Only 48% of the rice farmers have been visited by Extension agents with 44% visited frequently while the remaining 56% were occasionally visited.

Table 1: Socio-Economic characteristics of respondents of rice- farmers

Variable	Frequency n=15	Percentage (%)	Mean
Sex			
Male	64	90.00	
Female	7	9.90	
Age			
≤ 20	4	5.60	39.30
21-30	14	19.60	
31-40	25	35.20	
41-50	15	21.00	
51-60	8	11.20	
61-70	7	7.00	
Marital status			
Single	15	21.10	-
Married	56	79.00	
Household size			
1-3	2	3.20	6.33
4-6	36	58.10	
7-9	17	27.40	
10-12	7	11.30	
Highest level of education attained			
No formal education	2	2.80	-
Primary	20	28.20	
Secondary	40	56.00	
Tertiary	7	10.00	
Farming Experience			
1-5years	5	7.20	-
6-10years	14	20.30	
11years & above	50	73.00	
Size of farm(plots)			
1-10	65	95.60	5.56
11-20	1	1.50	
21-30	1	1.50	
31-40	-	-	
41-50	1	1.50	
Type of cropping system			
Mono-cropping	28	39.40	-
Mixed cropping	43	61.00	
Main aim of producing rice			
Sale	9	12.90	-
Consumption	-	-	
Both sale & consumption	61	87.00	
Income at the end of every planting season			
≤ 500,000	32	42.40	1232575.76
501,000-1000000	15	22.70	
1,001,000-1,500,000	6	9.00	
1,501,000-2,000,000	6	9.00	
2,001,000-2,500,000	1	1.50	
2,501,000-3,000,000	1	1.50	
>3,000,000	5	7.50	
Do extension agents visit your farm?			
How often do they visit if your answer is yes?	34	48	-
Frequently	15	44.00	-
Occasionally	13	56.00	

Rarely	6	17.60
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Source: Field Survey Data, 2018

Rice farmers sources of climate change information

The result in Table 2 showed that the rice farmers accessed their information from all the sources captured in the study but in varying degrees. The result shows that the farmers' main sources of information were through other farmers (88%) and family/relations (52%). Other sources of information include farmer's associations/cooperative society (45%), radio (37%),

extension agents (24%), URL/internet browsers/search engines (23%), television (19%), telephone calls (17%), text messages (16%), consultants/experts (15%), social media (13%), posters/billboards (12%), electronic mail(e-mail) (12%), newspaper (9%), handbills/leaflets/flyers (9%) and bulletin/newsletters (9%). This implies that they had more face to face contact/personal interaction with each other.

TABLE 2: Rice farmers' sources of climate change information

S/N	Variable	YES	
		Frequency	Percentage
1	Extension agents	16	23.50
2	Radio	25	36.80
3	Other farmers	60	88.20
4	Family/relations	35	51.50
5	Consultants/experts	10	14.50
6	Television	13	18.80
7	Farmers' associations/cooperative society	31	44.90
8	Non-Governmental Organizations (NGOs)	3	4.30
9	Newspaper	6	8.70
10	Handbills/leaflets/flyers	6	8.70
11	Bulletin /newsletters	6	8.70
12	Posters/billboards	8	11.60
13	Electronic mail (e-mail)	8	11.60
14	Social media	9	13.00
15	Through URL/internet browsers/search engines	16	23.20
16	Telephone calls	12	17.40
17	Text messages	11	15.90

Source: Field Survey Data, 2018

Extension services delivered in climate change adaptation of rice
 Table 3 showed the extension services rendered in rice farmers' adaptation of climate change. The major services were; assistance in securing short duration rice (\bar{x} =3.01), assistance in purchasing of improved planting materials from commercial farmers (\bar{x} =2.96), assistance in securing stress tolerant varieties (\bar{x} =2.90), assistance in the use/application of improved rice varieties (\bar{x} =2.81),

extension services delivered in climate change adaptation of rice farming (\bar{x} =2.75), assistance in identification of problems in the farm (\bar{x} =2.64), establishment of SPAT (Small plot adoption technique) (\bar{x} =2.63) and taking farmers problems to research for identification of possible solutions (\bar{x} =2.50). According to Pye-smith (2012), extension service is supposed to empower farmers and they have the potential to help farmers increase their productivity.

TABLE 3: Extension services delivered in climate change adaptation of rice

S/N	Variable	Frequency (Percentage)				Mean
		SA	A	D	SD	
1	Assistance in securing stress tolerant varieties	10(16.7)	35(58.3)	14(23.3)	1(1.7)	2.90**
2	Assistance in securing short duration rice	18(27.7)	30(46.2)	17(26.2)	-	3.01**
3	Establishment of SPAT (Small plot adoption technique)	11(16.9)	28(43.1)	17(26.2)	9(13.8)	2.63**
4	Promotion of Awareness of innovations in rice farming.	14(21.5)	29(44.6)	14(21.5)	8(12.3)	2.75**
5	Assistance in financial loan procurement from the government	3(4.6)	28(43.1)	15(23.1)	19(29.2)	2.23*
6	Assistance in purchasing of improving planting materials from commercial farmers.	14(21.5)	37(56.9)	12(18.5)	2(3.1)	2.96**
7	Assistance in the use/application of improved rice varieties	8(12.3)	43(66.2)	8(12.3)	6(9.2)	2.81**
8	Assistance in identification of problems in the farm.	10(15.4)	30(46.2)	17(26.2)	8(12.3)	2.64**
9	Assistance in grants procurement from government.	5(7.7)	22(33.8)	20(30.8)	18(27.7)	2.21*
10	Provision of feedback from research institute.	2(3.1)	29(44.6)	19(29.2)	15(23.1)	2.27*
11	Taking farmers problems to research for identification of possible solutions	12(18.5)	23(35.4)	16(24.6)	14(21.5)	2.50**

Source: Field Survey Data, 2018: SA=Strongly agree, A=Agree, SD=Strongly disagree, D=Disagree.
*mean score < 2.5 suggest disagreement; ** mean score ≥ 2.5 suggests agreement

Effects of extension services delivered by agricultural extension agents on climate change adaptation of rice farmers.

The results in Table 4 showed that the rice farmers agree that the significant effects of extension service delivered by agricultural extension agents in climate change adaptation of rice farmers in the study area were: increase in yield of rice(\bar{x} =3.47), better

access to improved rice varieties(\bar{x} =3.01), improved capacity of the farmers on climate change adaptation issues(\bar{x} =2.63), increased awareness of climate change adaptation strategies(\bar{x} =2.64) and improved knowledge of climate change adaptation strategies of the rice farmers(\bar{x} =2.55).

TABLE 4: Effects of extension services delivered by the agricultural extension agents on climate change adaptation of rice farmers

S/N	Variable	Frequency (percentage)				Mean
		SA	A	D	SD	
1	Decrease in yield of rice	7(10.8)	2(3.1)	16(24.6)	40(61.5)	1.63*
2	Increased awareness of climate change adaptation strategies	6(9.2)	30(46.2)	29(44.6)	-	2.64**
3	Increase in yield of rice	33(50.8)	30(46.2)	2(3.1)	-	3.47**
4	Improved knowledge of climate change adaptation strategies of the rice farmers	5(7.7)	28(43.1)	30(46.2)	2(3.1)	2.55**
5	Decrease in cost of rice production	1(1.5)	6(9.2)	18(27.7)	40(61.5)	1.50*

6	Decrease in the cost of rice in the market	5(7.7)	6(9.2)	19(29.2)	35(53.8)	1.70*
7	Improved capacity of the farmers on climate change adaptation issues	6(9.2)	31(47.7)	26(40)	2(3.1)	2.63**
8	Better access to improved rice varieties	13(20.3)	39(60.9)	12(18.8)	-	3.01**
9	More access to credit facilities	8(12.3)	9(13.8)	33(50.8)	15(23.1)	2.15*
10	Farmers problems on adaptation of rice farming to research could easily reach research institutes	7(10.8)	21(32.3)	33(50.8)	4(6.2)	2.47*
11	Feedbacks from research institutes are received more easily	7(10.8)	14(21.5)	37(56.9)	7(10.8)	2.32*
12	Serves as incentive to farmers to continue in rice production	9(13.8)	8(12.3)	31(47.7)	17(26.2)	2.13*

Source: Field Survey Data, 2018: SA=Strongly agree, A=Agree, SD=Strongly disagree, D=Disagree.
***mean score < 2.5 suggest disagreement; ** mean score ≥ 2.5 suggests agreement**

CONCLUSION AND RECOMMENDATIONS

Conclusion

One of the risks of climate change is the uncertainty in the onset of rainfall, erratic rainfall, shifting of the wet and dry season which will impact crop yields as farmers may not be able to plant and harvest during the desired season. Climate change is already impacting negatively on rice farming in Nigeria through the extremes in temperature, irregularities of the rainfall patterns leading to drought, flooding, desertification, sea level rise, heat stress, pest and diseases etc. Unpredictable changes in the climate has increased the vulnerability of rice farmers to climate change. Undesirable factors like poverty, illiteracy, weak institutions, amongst others contribute and increase the impacts of climate change in rice farming in Nigeria. Therefore, there is need to promote better awareness on what climate change is, its cause and impacts by taking advantage of smallholder farmers' recognition that the climate is changing. Farmers without proper educational background find it difficult to adopt improved rice production technologies and techniques that would otherwise help in mitigating the effects of climate change. Also, the lack of Infrastructure and weather forecast stations that would better equip farmers in planning and adapting to climate change exerts further strain on rice farming in Nigeria. Rice farming in Nigeria, if properly managed and well harnessed, has the potentials to meet our current demand for rice and our rapidly growing population. The provision of agricultural extension is made to enhance farmers' knowledge and skills toward improved yield. Agricultural extension service helps in enhancing the efficiency of adoption techniques by

the farmers. They also support and motivate farmers to increase/improve agricultural production and livelihoods of a nation.

Due to inconsistent and poor service delivery, insufficient number of extension agents, poor facilities and infrastructure (e.g. road system and office buildings), extension service delivery still face challenges. Though extension services are offered to farmers, they are still considered inadequate because of its inability to their specific needs on timely basis.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. Information, knowledge and skills on climate change adaptation are very important and the role of agricultural extension is crucial in the process. Extension system should adopt field-based teaching methodologies and practices to facilitate the building of knowledge and skills in rice farmers.
2. Given what the rice farmers are currently doing to reduce the effects of climate change, more research needs to be done on what would be the effective adaptation practices. This will help to guide the farmers properly in their adaptation decisions.
3. Mass media plays a vital role in disseminating climate change-related messages to farmers. There is a need for a schedule of radio programs on climate change to be developed and shared with rice farmers.
4. Training programs designed to strengthen the teaching skills of the extension service staff in the area of field-based learning strategies and climate change should be developed and implemented.

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