Gender and Climate Smart Agriculture in Rice Farming in Ikwo Local Government Area, Ebonyi State, Nigeria

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K E Y W O R D S

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A B S T R A C T

The paper conducted gender analysis of adoption of climate smart agriculture (CSA) in rice farming in Ikwo Local Government Area, Ebonyi State, Nigeria. Cross sectional data from 120 rice farmers (60 male and 60 female rice farmers) were collected. Data collected were analyzed using descriptive statistics. The results showed that the male rice farmers had more access to improved seedlings, and tractor/machinery relative to the female rice farmers. The male rice farmers performed more roles in terms of nursery practices, fertilizer and pesticide applications, while the female rice farmers did more of rice planting, weeding, harvesting, threshing and parboiling. Male rice farmers adopted more of knowledge smart practices, information smart practices, nutrient smart practices, and water smart practices, than female farmers. The study recommends farmers to plan their yearly rice cultivation in line with accessed climate change information and effectively adopt CSA practices and techniques to avert adverse climate changes in the state.

INTRODUCTION

Extreme climate events, such as heavy precipitation, on-going flooding, and rising temperatures, have all had a significant negative economic impact on rice agriculture. Rice production contributes to greenhouse gas emissions globally (FAO, 2021; Durodola, 2019). Flooded paddy rice field is a major contributor of global methane emissions. Burning rice leftovers like straw and husks also contributes to the release of greenhouse gases (Niveta and Pathak, 2013 and Pires *et al.,* 2015). Previous studies have demonstrated that the global output of rice is being negatively impacted by climate change. The great majority of climate change's negative effects on rice production are mostly caused by changes in temperature and precipitation, which cause flooding, a shortage of freshwater, and an increase in pests, diseases, and weeds (Phanith and Malyne, 2012; Md. Abdur *et al.,* 2014; Omchand, 2019). Rainfall usually has a negative effect on rice plants during the early and flowering stages of the reproductive phase, which results in significant reductions in rice production (Abbas and Mayo, 2021). Increased water loss, yellowed and wilted leaves, slowed root development, and even seedling death are all effects of high temperatures (Zeng *et al.,* 2017, Ogah and Nwilene, 2017; Saliu *et al.,* 2019).

Studies have shown that women farmers are mostly vulnerable to climate change unlike the men farmers, women suffer adverse climatic effects due to societal, and cultural (customs and traditions) that denies them access to climate information and adoption technologies. Their inabilities to freely access climate information coupled with restricted access to climate change seminars, meetings, gatherings, conferences, etc endangers them to adverse climatic consequences (Rao *et al*., 2019; Duru *et al*., 2022). In addition, their feminine and domesticated roles and responsibilities as wives and mothers occupy their time and thus expose them to climate change. On the other hand, male farmers enjoys all the societal and cultural privileges regarding to access to climate change information, their ability to access early climate change signals and attend meetings, seminars, relating to climate change leverage them from unseemly climate change disturbances (Rao *et al*., 2019). Considering the devastating impacts of climate change on rice production, there is urgent need for adoption of climate smart agriculture (CSA) to increase rice production in the state. CSA is broadly projected to lessen the devastating effects of climate change on the agriculture sector (Onyeneke *et al.,* 2021). CSA includes a set of practices and innovations that improve adaptive tendencies and resilience of rice farmers in adapting to climate change inconsistencies while further developing food and nutrition security and relieving carbon emissions and other greenhouse gases (World Bank, 2016). CSA offers household farmers the opportunity to leverage on adverse climatic effects and untold weather and atmospheric conditions. Most generally distinguished CSA practices incorporate information smart practices, knowledge smart practices/administrations, water smart advances, nutrient smart practices and weather smart practices/administrations (FAO, 2022). Other sub-practices incorporates changing crop types, modifying planting dates, adoption of tolerant crop varieties, crop expansion and diversifications, mechanical land levelling, use of agro-automated tilling machines and other agronomic practices such as (cover cropping, crop rotation, and minimum tillage, etc) (Mishra *et al*., 2021).

However adoption of CSA differs between men and women farmers, men are usually broad in adopting CSA unlike the women farmers. They are ever readily and eager to adopt any tested and proven CSA being introduced to them without any forms of reservation or misbelieve (Jost *et al*., 2016). Being culturally and resource favoured they are always on the frontline to expand their land cultivations for increased yields and production and thus seeks to adopt sustainable CSA made available to them. The women farmers due to their nature and cultural restrictions and resource limitations are usually narrow and objective in adopting CSA. Prior now, no studies had explored the gender analysis of adoption of CSA in rice farming in Ebonyi State Nigeria, hence this created the gap in knowledge and the motivation of the study.

METHODOLOGY

The study was done in Ikwo Local Government Area (LGA) in Ebonyi State, Nigeria. Farming is the major occupation of the people of the area. The population of the study was male and female rice farmers. Four communities were selected from the LGA. In each community, twenty rice farmers (ten male rice farmers and ten female rice farmers) were selected. A total of one hundred and twenty (120) rice farmers (60 female and 60 male rice farmers) were interviewed for this study. Primary data were collected from the respondents using a structured questionnaire on information relevant to this study. Descriptive statistics was used to analyze the data collected.

Results and Discussion

Gender difference in access to resources, roles performed and decision making processes

Table 1 showed the gender difference in access to resources, roles performed and decision making processes of the rice farmers. Male farmers (95%) have more access to improved seed than the female farmers (83%). This could be premised on the engagement of more male farmers than female farmers on rice farming operations. The high percentage accessibility could also result from the rigorous hurdles encountered in accessing improved seedlings which favours the male farmers relative to the female farmers (Lateef *et al*., 2021; Namonje-Kapembwa and Chapoto, 2016). The tractor/machinery showed that male rice farmers (53%) had more access to tractor/machinery in comparison to the female rice farmers (38%). This is possible because of the cost implications of such tractors/machineries which the female farmers may not be able to afford due to their poor financial constraints and limitations (Paris *et al*. 2015).

The nursery operations showed that the male rice farmers (83%) performed more nursery roles relative to the female farmers (28%). This could be due to their desire to shield young rice seedlings from unwanted external factors mostly climate change before transplanting to the permanent field for proper growth and yields (Kinkingninhoun *et al.,* 2020). Female rice farmers (97%) were more involved in rice planting than the male rice farmers (48%). This could result from their intensive engagements in rice cultivation and production. Applications of pesticides indicate that male rice farmers (87%) had more access to agrochemicals than their female counterparts (78%).

Similarly, over 90% of the female rice farmers also performed threshing and parboiling roles than the male rice farmers. This could be attributed to their doggedness and effectiveness in rice farming which is widely acknowledged (USAID, 2022). Land to be cultivated and seed/seedlings to be planted indicate that the male rice farmers took firm and unwavering decisions in these operations more than the female rice farmers (Kamal *et al.,* 2021). Male rice farmers made tangible decisions on labour allocations and use of agrochemicals relative to the female farmers. This could be due to their manly dispositions accorded by society and nature in taking vital and cogent decisions at all times (Aigbokie *et al.,* 2021). Male rice farmers took more decisions on capital to be acquired/borrowed, sales of farm produce and purchase relative to the female farmers.

Table 1: Distribution of male and female rice farmers by access to resources, roles and decision-making in rice production

	Gender	Frequency	Percentage
Access to resources			
Land	Male	56	93.00
	Female	51	85.00
Credit	Male	27	45.00
	Female	24	40.00
Grants	Male	11	18.00
	Female	9	15.00
Improved seeds	Male	57	95.00
	Female	50	83.00
Fertilizer	Male	59	98.00
	Female	59	98.00
Climate information	Male	34	57.00
	Female	37	62.00
Training/skills	Male	29	48.00
	Female	29	48.00
Pesticide	Male	52	87.00
	Female	47	78.00
Tractor/Machinery	Male	32	53.00
	Female	23	38.00
Roles performed			
Nursery	Male	50	83.00
	Female	17	28.00
Rice planting	Male	29	48.00
	Female	58	97.00
Applying fertilizer	Male	53	88.00
	Female	27	45.00
Applying pesticides	Male	51	85.00
	Female	10	17.00
Weeding	Male	12	20.00
	Female	47	78.00
Harvesting	Male	33	55.00
	Female	56	93.00
Threshing	Male	12	20.00
	Female	49	82.00
Parboiling	Male	27	45.00
	Female	55	92.00
Decision making			
Land to be cultivated	Male	53	88.00
	Female	25	42.00
Seeds/seedlings to be planted	Male	55	92.00
	Female	32	53.00
Labour allocation	Male	59	98.00
	Female	35	58.00
Agrochemicals to be used	Male	54	90.00
	Female	27	45.00
Capital to be acquired/borrowed	Male	53	88.00
	Female	26	43.00
Sale of farm products	Male	51	85.00
	Female	28	47.00
Purchase decisions	Male	54	90.00
	Female	28	48.00

Gender difference in adoption of climate smart agriculture in rice production

Table 2 showed the gender difference in adoption of climate smart agriculture in rice production. The results revealed that nursery operation was an important knowledge smart practice engaged by both male and female rice farmers. Female rice farmers adopted the practice more than the male farmers. Male rice farmers practiced more of intercropping and minimum tillage than their female counterparts in the area. This is done to maximize the available farmlands and to equally harvest other crop produce outside rice production (FAO, 2015). Shifting cultivation and knowledge of integrated pest management were also adopted by male and female rice farmers. However, male rice farmers adopted more of shifting cultivation and integrated pest management than their female counterparts. Information on good quality agrochemicals and application was an important practice with percentage adoption value of 88% for male farmers and 58% for female farmers. This implies that male rice farmers embraced quality information on agrochemicals and its applications more than the female rice farmers. Adjusting planting dates was also an important practice with percentage adoption value of 82% for male farmers and 66% for female farmers implying that the male rice farmers adjusted their planting dates more than the female farmers (Antwi-Agyei *et al.,* 2021). Water smart technologies such as sprinkler irrigation and drainage were significant climate-smart practices engaged by the male and female rice farmers.

However, over 90% of the male rice farmers engaged more in the use of these water smart technologies relative to their female counterparts. This could be premised to ensure all round water availability and drainage provisions for proper and adequate rice farming. Nutrient smart practices had mulching, organic and inorganic fertilizer use, green manure, cover cropping and agro-forestry as climate-smart practices. Male rice farmers adopted and utilised more of green manure, cover cropping and agro-forestry than the female rice farmers while the female farmers adopted mulching, organic and inorganic fertilizer more than their male counterparts.

Table 2a. Distribution of male and female rice farmers according to adoption of climate smart agricultural practices

Climate smart agricultural practices/technologies/services	Gender	Frequency	Percentage
Knowledge smart practices			
Nursery	Male	30	50.00
	Female	44	73.00
Intercropping	Male	42	70.00
	Female	28	47.00
Minimum tillage	Male	38	63.00
	Female	24	40.00
Crop Diversification	Male	46	77.00
	Female	42	70.00
Shifting Cultivation	Male	43	72.00
	Female	32	53.00
Knowledge of integrated pest management	Male	49	82.00
	Female	37	62.00
Improved rice varieties	Male	52	87.00
	Female	53	88.00
Mixed farming practice	Male	49	82.00
	Female	50	83.00
Livelihood diversification	Male	54	90.00
	Female	44	88.00
Information smart practices/services			
Information on good quality agrochemicals and application	Male	53	88.00
	Female	35	58.00
Information on where to buy improved varieties	Male	59	98.00
	Female	49	82.00
Information on availability of grants	Male	8	13.00
	Female	8	13.00
Information on other rice farming technologies	Male	27	45.00
	Female	19	31.00
Adjusting planting dates	Male	49	82.00
	Female	40	66.00
Adjusting harvesting dates	Male	47	78.00
	Female	39	65.00
Water smart technologies			
Normal irrigation	Male	22	37.00
	Female	18	30.00
Drip irrigation	Male	9	15.00
	Female	7	12.00
Sprinkler irrigation	Male	26	44.00
	Female	17	28.00
Drainage	Male	53	88.00
	Female	31	52.00

Table 2b. Distribution of male and female rice farmers according to adoption of climate smart agricultural practices

Climate smart agricultural practices/technologies/services	Gender	Frequency	Percentage
Nutrient smart practices			
Organic manure	Male	16	27.00
	Female	17	28.00
Green manure	Male	44	73.00
	Female	29	48.00
Fertilizer	Male	58	97.00
	Female	60	100.00
Mulching	Male	21	35.00
	Female	26	43.00
Cover cropping	Male	49	82.00
	Female	31	52.00
Agroforestry	Male	44	73.00
	Female	28	47.00
Weather smart practices/services			
Insurance	Male	10	17.00
	Female	6	10.00
Climate information service	Male	34	57.00
	Female	35	58.00

CONCLUSIONS

Climate change has become a topical issue and concern of rice farmers in Ebonyi State due to its negative influences in rice cultivation and production. Results showed that the male rice farmers had more access to improved seedlings, and tractor/machinery. Again the male rice farmers performed more roles in terms of nursery practices, fertilizer and pesticide applications while the female rice farmers did more of rice planting, weeding, harvesting, threshing and parboiling. The male farmers made firm decisions on lands to be cultivated, seeds to be planted, labour allocations, agrochemicals, and capitals. Again, the male rice farmers adopted more of knowledge, information, water, and nutrient smart practices, while the female rice farmers adopted more of weather smart practices. The study recommends farmers to plan their yearly rice cultivation in line with accessed climate change information and effectively adopt CSA practices and techniques to avert adverse climatic change.

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