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THE IMPACT OF THE ADOPTION OF IMPROVED RICE TECHNOLOGIES ON HOUSEHOLD RESOURCES AMONG FARMERS IN KANO STATE, NIGERIA

Isma'il, I. S*, J. A. Bakang**, C. K. Osei** and A. M. Yaro*

*Kano University of Science and Technology, Wudil, Kano State Nigeria.

**Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

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ABSTRACT

Nigeria spends about N 237,687 billion yearly, since the year 2006 to import food and of this, rice alone gulps about N 96,012 billion. This study assess the impact of the adoption of improved rice technologies on household resources among farmers in Kano State, Nigeria. Data were collected from 315 participating and non-participating farmers using structured questionnaires and t-test as well as descriptive statistics were used to analyze the data. Result of the t-test analysis revealed significant difference between participants and non-participants farmers in terms of average annual income (137.149), yield of rice (140.5) and farm size (1.351) at 0.05 level of significance, which implied that, the participants had higher income and yield. High labor cost, inadequate fertilizers, inadequate training and presence of pests and diseases were the major problems militating against the adoption of the rice technologies. Therefore, formation of self-help co-operatives for inputs procurement, available markets, early supply of technologies and farmers training are recommended for the improvement of adoption of innovations.

INTRODUCTION

Transformation in agricultural practice from the peasant state of bare-substance to systems of extensive production will guarantee food security in the country. Nigeria has been spending a fortune to import food into the country. Nigeria spends about 237,687 naira billion yearly, since the year 2006 to import food and of this; rice alone gulps about 96,012 naira billion (Anozie, et al, 2012). Nigeria current rice production stands at 2.8 million metric tons, while total consumption stands at 4.4 million metric tons. Thus, creating a deficit of 1.6millionmetric tons (Anozie et al 2012). Nigeria is by far the largest rice importer in West Africa with an average yearly import of 1.6 million metric tons since the year 2000 (USAID 2008). The country has been hard hit by rising import bills. Poor rural households spend substantial earnings on food.

The importance of rice in Nigeria cannot be over stressed. Its role in saving the

population from destitution has been prominent. It is a good material for making of fertilizer, starch, alcohol, beverages, bread, biscuits, candles, and so on (Anozie et al, 2012). The straw is used in the manufacture of ceiling boards and in poultry feeding. Despite the significant contribution of rice to rural economics, the empirical analysis on the effects of socio-economic characteristics of farmers on rice production are few. World Bank reported that consumers are exhibiting a shift in preference from traditional staples (such as cassava, maize, guinea-corn, millet and yam) to rice, especially in the urban areas where rice consumption is increasing most rapidly (Sadiq, 2012). Statistics from 2003 rice consumption, survey showed that people in large cities like Kano, Lagos, Abuja, Kaduna, Port harcourt and Makurdi (Per capita consumption for Lagos,

Abuja and Makurdi stands at 64, 64, 72 kg respectively per annum) consume more rice than people in the rural areas, and majority of this rice consumed in cities is imported (Sadiq, 2012), Private investment in domestic processing capacity, and hopes to incentivize the development of up to 50 new industrial rice mills through subsidies. Furthermore, it anticipates that demand projections for 2009, 2010, 2013 and 2018 will steadily increase to 5.7, 5.9, 6.2 and 6.9 metric tons. Estimation indicates that over 90 percent of domestic rice production comes from resource poor and weakly organized smallholder, a key fact when considering the wide-ranging constraints that continue to impede significant progress in Nigeria's farm-level productivity and international competitiveness in rice. More than half of all Nigerians live on less than one dollar per day, and the poverty incidence exceeds 60 percent in rural areas (Sadiq, 2012); where people overwhelmingly depend on agricultural activities for their livelihoods.

World Bank and Sadiq (2012) opined that government goal of achieving self-sufficiency in rice production to a large extent will depend on the level of farmers' productivity which can be determined by their rates of adoption of improved technologies and efficiency to resource use. The low rates of adoption of rice technologies by farmers as a result of resource poverty among other reasons; efficiency improvement becomes an important and significant factor in increasing productivity. The low agricultural productivity in Nigeria is revealed by the actual yields of major crops such as rice compared with potential yields, the implication is that there is scope for additional increases of output from existing hectares of rice, if resources are properly harnessed and efficiently allocated (Sadiq, 2012). Nigeria with a population of about 140 million people relies on a massive rice importation. Although, it is the largest producer of rice in West Africa, yet it account for 20 percent of sub-Saharan Africa's rice import. West Africa Rice Development Association reported that over the last decades (1961-1998), rice consumption in Nigeria has boomed (+10.3 percent per

annum) which is attributed to rapid population growth (+2.8 percent per annum) and increasing per capita consumption (+7.3 percent per annum) and changes in consumer's preferences in favor of rice (Hamid, 2010) that, the demand for rice has been on the increase in Nigeria at a rate faster than other West African Countries since the mid 1970's.

Problem Statement:

Agricultural Development Project has gulped huge sums of funds for the livelihood of the rural poor, however, only few farmers' records remarkable yields (Jibowo, 2011). There is a high ratio of the extension agent-to-farmers ratio in Nigeria. This becomes true when an extension agents is seen with thousands farmers to take care of. The failure of input supplies to ensure effective and timely distributions of technology to farmers still persist. The agricultural activities are seasonal in practice, when delayed there is an obvious reason as to why there is a failure in production. However, despite the efforts of the Agricultural Development Project and Kano State, farmers in the state were reported to obtain low yields (Musa, 1997).

Research findings have indicated that farmers find it difficult to obtain good quality seeds, weedicides and some extension advices. To this end, the study seeks to determine the impact of the adoption of improved rice technologies on farmers' production levels under the Kano State Agricultural and Rural Development Authority (KNARDA).

Objective of the study:

The main objective of the study is to assess the Impact of the Adoption of Improved Rice Production Technologies by Farmers in Kano State, Nigeria. While the specific objectives are to;

- (i) describe the Socio-economic characteristics of the farmers in the study area.
- (ii) determine the impact of the adoption of improved rice technologies on farmers in the study area,
- (iii) describe the constraints to the adoption of the improved rice technologies in Kano state.

METHODOLOGY:**Study Area:**

Nigeria occupies a total land area of 923,768 square kilometers with 910,770 square kilometers as arable land, a coastland of 853 square kilometers with ecological diversities which enables the country to produce a wide variety of crops and livestock, fishery and forestry to support its very large population of over 150 million people (FOS estimate, 2008). Nigeria has two main climatic zones which are influenced by the Atlantic Ocean in the south, and Sahara desert in the north (FOS, 2008). This study only focuses on Kano state. Kano state is one of the thirty-six (36) states and the Federal Capital Territory (FCT-Abuja) which, together constituted the Federal Republic of Nigeria. It lies between latitude 10.35N and 12.37N and longitude 7.34E to 12.25E within the Sudan savannah zone. It covers a total area of 20,400 square kilometers and has a population of over 14 million (NPC estimate, 2006) being the most densely populated state in the federation. The climate is characterized by high temperature and seasonal rainfall. Although, fluctuations occur in annual average maximum and minimum temperatures throughout the year, the annual mean ranges from 30°C - 35°C recorded in March to May (Manga, 2012). The lowest mean temperature of about 13°C occurs in December to January during the dry cold season of harmattan which is favorable for wheat at milking stage as well as fruiting stage for tomato and sweet pepper. The pattern of relative humidity is the same with the temperature. The rainfall is unimodal as compared to the far south (coastal state) and is 90 to 100 days. The total rainfall received during the year irrespective of the location is 843mm distributed in 7 to 8 months.

Data Collection Procedure:

To achieve the stated objective, data will be collected from the use of structured questionnaire from two hundred and twenty five (225) farmers to give the treatment component (group) and other ninety (90) questionnaires to those farmers whom were not chanced to have the improved rice technologies to make for the control group

component of the questionnaires. While the use of journals, textbooks, and conference proceeding will be source of the secondary data.

Sampling Procedure:

Kano State which has 44 local government areas has been divided into THREE (3) zones; Dambatta zone, Rano zone and Gaya zone by the Kano State Agricultural and Rural Development Authority. In this study multi-stage sampling will be employed in the data collection.

The first stage will involve the selection of all the three (3) Agricultural zones in Kano State based on the subdivision of the Kano State Agricultural and Rural Development Authority (KNARDA). In the second stage purposeful selection of three (3) local government areas (LGA) from each zone based on the intensity, concentration and those given the improved rice variety.

In the third (3) stage a random selection of five (5) Fadama Users Association (FUA) that are given the new improved rice variety and a random selection of only five (5) farmers in each group that are producing the improved variety of rice. This gives a total of two hundred and twenty five (225) improved rice farmers in the treatment group. Finally, each of the local government areas, where the treatment groups were selected, two (2) Fadama Users Associations (FUA) would be selected that was not given the improved rice technologies as the control group and in the group, five (5) rice farmers will be randomly selected, giving a total of ninety (90) respondents to give the control group in the study. This gives an overall total of three hundred and fifteen farmers' interview.

Sample Size:

The sample size would be from the selection of a (1x3x5x5=75 Dambatta zone), (1x3x5x5 =75 Rano zone) and a (1x3x5x5=75 Gaya zone), that is 75+75+75=225 (treatment group). Also there is a (1x3x2x5 =30 Dambatta zone), (1x3x2x5 = 30 Rano zone) and a (1x3x2x5 = 30 Gaya zone) that is, (30+30+30 =90 control group). This gives an overall total of 225+90 = 315 as the sample size for the study

RESULTS AND DISCUSSION

3.1 Socio-economic Characteristics of the Respondents:

Table 1

Distribution of Respondents by Socio-economic characteristics of Rice Farmers

Variables	Treatment Group		Control Group	
	Frequency	Percentage	Frequency	Percentage
Age : (years)				
20-40	60	26.66	25	27.77
41-60	150	66.67	60	66.67
61-80	15	6.67	5	5.56
	225	100	90	100
Gender:				
Male	214	95.1	80	88.89
Female	11	4.9	10	11.11
	225	100	90	100
Marital status:				
Single	26	11.6	6	6.66
Married	199	88.4	84	93.33
	225	100	90	100
Educational status:				
Non-formal	19	8.44	52	57.78
Primary	100	44.45	20	22.22
Secondary	69	30.67	13	14.44
Tertiary	37	16.44	5	5.55
	225	100	90	100
Land ownership:				
Inherited	190	84.4	70	77.78
Purchased	25	11.1	14	15.56
Rented	10	4.45	6	6.66
	225	100	90	100
Extension contact:				
Has contact	156	70.66	73	81.11
No contact	69	30.66	17	18.89
	225	100		100
Major occupation:				
Farming	155	68.9	60	66.67
Non-farming	70	31.1	30	33.33
	225	100	90	100
Co-operative membership:				
Member	159	70.66	60	66.66
Non-member	66	29.33	30	33.33
Total	225	100	90	100

Source: Field Survey, 2016

Table (1) present information on socio-economic characteristics of rice farmers in the study area. The socio-economic characteristics considered include; Age (years), Gender, Marital status, Educational status, Land ownership, Extension contact, Major occupation as well as Co-operative membership of respondents in the study area. The result indicated that 66.67% for both treatment and control groups is the highest age group of 41-60 years of the respondents as majority which implies good working age of the farmers. The result agrees with Anozie et al, (2012) whom in their study found that an average age of 46.5 years was computed for the respondents, implying that the farmers were in their active age. In line with this , is finding by Ike, (2014) in his study opined that, the average age of respondents was 50.4 years, which implied that youth were involved in the adoption process of rice technologies. With regard to gender of the respondents 95.1% and 80% for both treatment as well as control groups were males, while only 49% and 11.11% were females which means males dominated the rice production because the females contributes their parts during processing. The result tallies with the finding from Ja'arufuro et al, (2013) who observed that males were the majority of the respondents (53.52%) in the study area with females occupying about 46.48% of the group formation indicating that there was a fair distribution of gender responsibility. As for the marital status 88.4% and 84% were found to be married and they are the majority for both treatment as well as control groups

which also implied sense of responsibility of the rice farmers.

In the aspect of education the result indicated that a total of 75.12% and 36.66% for both treatment and control groups had attended both primary as well as secondary schools, which also implied a good educational level attainment of the rice farmers as the majority which allows for a good understanding of the adoption process. Ike, (2012) asserted that, the level of education had direct influence on efficiency and effectiveness of the individual. With respect to land ownership of the rice farmers the majority which is 84.4% and 70% for the treatment and control groups of rice farmers owned their farms through inheritance which implied more land fragmentation in the future. For the extension contact of the rice farmers 70.66% and 81.11% for both treatment and control groups lamented that they had contact with the extension agents, which implied that they must have a good know-how of the processes of the production of the rice technologies. In the area of major occupation of rice farmers in the study area, there is 68.9% and 60% for both treatment and control groups had their major occupation as farming which implied that the farmers in the study area are committed to rice farming. With regard to co-operative membership of respondents we have, 70.66% and 66.66% for both treatment and control groups as belonging to co-operative membership of farmers in the study area, which means that, the farmers in the study area have access to input supply from the extension agents or government.

Table 2. Distribution of Respondents by Comparing the Impact of Adoption on Household Resources among Rice Producers in the study area:

Variables	Mean	S.D	S.E	T	df	Sign(2 tail)
Participants Vs Non participants Annual Income (NGN)	132,032.40	137.149	14.064	9.103	89	0.000*** 0.10%
Participants Vs Non-participants Yields harvested (kg)	390.89	140.5	93.63	4.175	224	0.000***
Participants Vs participants Farm Size (ha)	1.583	1.351	0.142	-11,112	89	0.000***

Source: Field survey, 2016

*** (0.05 level of significance)

Table (2) present information on the t-test result on the impact of adoption on household resources among rice producers in the study area. Adoption of technology has an impact on household resources as depicted in the table. The household resources considered include annual income, rice yield and farm size devoted for rice production. The result revealed significant difference between participants (treatment group) and non-participants (control group) in terms of annual income, yield of rice and farm size (at 5% level of significance). Adopters of the rice production technologies have higher income and yield. The result agrees with Floyd *et al*, (1999) who studied adoption and associated impact of technologies in the Western Hills of Nepal in 1994 to determine the level and extent of adoption of fifteen selected field crops, horticulture, livestock and forestry technologies. Four hundred and twenty four farmers stratified by agro-ecological location were selected. Results reveal that awareness of technologies was (80%) of households, household not adopting technologies were (25%). Reasons for not adopting technologies include lack of information, inputs and technical problems. Adoption was highest in cases of improved maize, wheat, grain legume varieties, improved tree fruit crops and planting of fodder trees for livestock.

3.2 Constraints Militating against the Adoption of Improved Rice Technologies:

For the high labor cost which has 155 respondents with the “agreed” response, meaning that out of the 225 farmers that were interviewed 155 farmers took to the agreed response that high labor cost is the problem militating the progress of the adoption of the technologies. There is the inadequate fertilizers which had 55 respondents from the strongly agreed side whom stated it as one problem militating the adoption of the technology. There is also inadequate training by extension agents on seeds planting techniques which has 147 responses from strongly agreed side and also 50, this implied that respondents from the agreed side, which implied that, this is the greatest problem militating the adoption of the technology.

There is the presence of the pests and diseases which scored 125 on the strongly agreed side as one of the greatest problems militating the progress of the adoption of the technologies. And finally, is poor access to market which has 170 responses from farmers on the strongly agreed and 45 on the agreed responses by the farmers in the study area.

Conclusion and Recommendation

*Therefore, we look at the socio-economic characteristics of the farmers in the study area to draw out an important finding in it. Here we say that, the age of the respondents in the study area is quite encouraging because they are in their active age that is within the age bracket of 41-60 years.

*Also on the gender, it was discovered that males do participate fully in the cultivation only processing that the females plays their role.

*We also found out that majority of the farmers in the study area are responsible because they are all married.

*They had attended various levels of formal educational settings, hence are fairly educated.

*In terms of farmland, the respondents have some numbers of farmlands for agricultural production because they have their land tenure system to be inheritance. Though some purchase it, while some rented it.

4.1 Recommendations

The study on the Assessment of the Impact of Adoption of Improved Rice Technologies on Farmers’ Productivity in Kano State, Nigeria, is over and the following should be the recommendations to this effect; (i) The farmers should be encouraged to form their cooperative association tasked with the procurement of relevant inputs by themselves and then sale it to fellow farmers belonging to the association. (ii) All technologies that are time sensitive to planting, should be made available on time before the rainy season commences, so as to avoid delay in the planting time. (iii) The extension agents should be encourage to train the farmers on time and should frequent the training at least twice or three times in a season.

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