



## Rural Farmers' Farm Management Practices in the Rice Value Chain in Ogun and Niger States, Nigeria

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### Abstract

This study was borne out of the fact that in Nigeria, rice production has been declining due to poor farm practices. Yet, the consumption of rice is increasing while the country continues to import rice to cater for the citizenry. This study therefore assessed farm management practices of rural farmers in Rice Value Chain (RVC) in Ogun and Niger States, Nigeria. Three hundred and twenty respondents were selected through multistage sampling techniques. Data collected were analyzed with descriptive statistics, chi-square and t-test. Results of this study showed that 50.6 percent of the respondents in Ogun State were between 30 – 40 years of age compared to 43.7% in the similar age bracket in Niger State. In Ogun State, 82.5% male are into rice farming as against 78.1 percent male in Niger State. Also, 45% of the respondents had Secondary Education in Ogun State whereas 28.1% had Secondary Education in Niger State. All the respondents in the sampled states used herbicides (100%) for weed control. Fertilizer application was relatively low for both Urea (55%) and NPK (36.9%) in the sampled states. But, 70% and 91.3% used drill irrigation in Ogun and Niger States respectively. Major constraints to farm management practices in the rice production were birds' disturbance (96.6%), high cost of processing equipment (92.5%) and inadequate finance (83.1%) in the study areas. Results of t-test revealed that there is no significant difference in the farming management practices of the rice farmers in Niger and Ogun States ( $t = 10.1$ ,  $p = 0.06$ ). The study therefore recommends that agricultural extension services should expedite action by organizing training that can promote appropriate use of agrochemicals and fertilizers in order to increase rice production and income generation for the rice farmers in the study areas.

**Keywords:** farm management; rural farmers; rice; value chain; Nigeria

### Introduction

Value chain is the full range of activities required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers and final disposal after use (Kaplinisky and Morris 2001). Production, processing, marketing, and consumption of rice are moving towards high-value food products. The actors in the value chain could be categorized based on their activities such as production which is

mostly the farmers and support services, processing which is a combination of parboiling and milling, and marketing which is mostly by the women. Production stage is principally farming and it is the first stage in Rice Value Chain (RVC). Rice value chain in Nigeria is not yet developed to meet local and international market requirements as limited value addition (if any) is done to the rice, making its acceptability limited to rural markets. This is because small-scale producers (farmers) are often unable to increase production by adopting productivity-enhancing

technologies unless the value chains for their products are sufficiently developed (Humphrey and Robinson, 2015; Zuberi *et al.*, 2016; Maestre *et al.*, 2017). Rice is the most important cereal and it is widely consumed in Nigeria (Omoare, 2016) which makes Nigeria a major consumer and importer of rice in Africa. It is one of the few food items whose consumption has no cultural, religious, ethnic or geographical boundary (Ibitoye *et al.*, 2014). It is relatively easy to produce and is grown for sale and home consumption. In some areas there is a long tradition of rice growing, but for many, rice has been considered a luxury food for special occasions only. Nigeria has ecologies that favour rain-fed lowland, irrigated lowland as well as upland rice production. Production is dominated by smallholder farmers who use rudimentary technology and traditional methods in producing over 80% of Nigerian rice (Osabuohien *et al.*, 2018). Rice grows very well in almost every part of the country (Omoare, 2016). Total potential land for irrigated rice production is estimated at 1.6 million hectares but only 47,798ha are available. Estimated national demand for rice is put at 5.2 million tonnes per annum while in the last decade rice consumption has increased at an annual average rate of 10.3% (Maji *et al.*, 2015).

On one side, rice became a critical component of the Nigerian household diet and on the other side, a major consumer of the country's foreign exchange. Goronyo (2019) reported that as a staple food in Nigeria, rice accounts for 45 percent of the diet of the country's population. West Africa Rice Development Association (WARDA) estimates that per capita rice consumption in Nigeria has nearly doubled between the 1980s and 2006, growing from 15.4kg/year

to 25.4kg/year (WARDA, 2003 cited in Cadoni and Agelucci, 2013) and 37.5kg in 2014 (University of Arkansas, 2015). It is expected to increase further due to increase in population and urbanization. Export figures obtained from India and Thailand, which are dominant rice exporters to Nigeria, indicate that so far exported only a paltry 426 tonnes as at July 2018. It is a long walk away from the over 400,000 metric tonnes of rice previously imported into the country. The volume of rice importation into Nigeria has declined drastically, but we are still insufficient in rice production (Roy-Macauley, 2019). This gap has continued to increase relative to demand. Rice importation is seen as a waste of foreign exchange based on the comparative advantage of the country in rice production (Oyediran, 2016). It is indeed lamentable for a country such as Nigeria with huge human and natural resources (land and water), including capital to continue to bear the burden of unbearable pain of rice importation for many decades following huge capital flight and increasing unemployment (Akinwunmi, 2013).

The current rate of rice importation gives serious concern as the nation population grows. In recent time, a bag of 50kg rice is sold for as high as ₦ 17,000 – ₦ 19,000 in the local markets hence making it non-affordable for most low income households. There are up-land rice, low-land rice, Fadama rice, all types of rice that grow very well in Sokoto, Kebbi, Kano, Katsina, Niger, Kogi, Ogun, Enugu and Delta States yet Nigeria still imports rice; whereas local rice is more nutritious than the imported ones where most of the nutrients have been washed off during processing (Akinwunmi, 2013). Over the years, farmers cultivate different varieties

of rice such as Ofada, Nerica 8 and Faro 44 using different farming practices to overcome the problems of declining rice yield. Several reports on rice production have shown an average increase of 300,000 tonnes in the 1990s to over 4 million tonnes in the year 2019 (Roy-Macauley, 2019). According to Goronyo (2019), Nigeria currently produces about 8 million tonnes yearly, but can produce 14 million tonnes per year if appropriate farming practices are put in place. Some of these farm management practices in rice production include soil test, seed selection, transplanting, weed control, fertilizer application, pests and disease management. It is in view of this background that this study looked at some selected farm management practices of rural farmers in the rice value chain in Ogun and Niger States, Nigeria.

**The specific objectives of this study are to:**

- i. describe the socio-economic characteristics of the rice farmers in the study areas
- ii. assess farm management practices for rice production in Ogun and Niger States
- iii. identify challenges to rice farming in the study areas

**Hypotheses of the Study**

$H_{01}$ : There is no significant difference in farm management practices of rice farmers in Ogun and Niger States.

$H_{02}$ : There is no significant relationship between challenges face by the rice farmers and farm management practices adopted in the sampled states.

**Research Methodology**

**Ogun State**

Ogun State is one of the six States in the south west Nigeria. It is bounded in the west by Republic of Benin, bounded in the south by Lagos State and Atlantic Ocean, in the North by both Oyo and Osun States and in the East by Ondo State. The State lies between the latitudes  $7^{\circ}18'N$  and longitude  $5^{\circ}55'E$ . It is situated within the tropics covering  $16,409.29km^2$  with a population of about 4,054,272 (NPC, 2006). The State has bimodal rainfall pattern which reaches its peak in July and September and it comprises of mostly agrarian communities which engage in farming activities by both males and females, in cash crops and food crops in order to meet the livelihood needs of the farmers. Most of the crops grown in Ogun State include cassava, rice, maize, melon, cotton, cocoyam, cocoa, yam, cowpea etc. Agriculture in Ogun State is more on crops, while the livestock raised is supplementary.

**Niger State**

Niger State is one of the six States in North Central Nigeria, and its population is 4,082,558 (NPC, 2006). It is located between latitudes  $8^{\circ}20'N$  and  $11^{\circ}30'N$  and longitudes  $3^{\circ}30'E$  and  $7^{\circ}20'E$ . Currently, the state covers a total land area of  $76,000km^2$  (about 9 percent of Nigeria's total land area). This makes it the largest state in the country (Community Portal of Nigeria, 2003 cited in Oyediran, 2017). By reason of its location and its climate, soil, and hydrology, Niger State has the capacity to produce most of Nigeria's staple crops such as maize, sorghum, rice, yam, pepper and melon. Agriculture is the back bone of the economy of Niger State as nearly 90 percent of the population depends either

directly or indirectly on it for their livelihood.

### **Sampling Technique**

This study used multistage sampling techniques to select 320 rice farmers for this study. Two Local Government Areas (LGAs) were purposively selected in Ogun and Niger States based on the *a priori* information that they are rice producing communities. This gave rise to 4 Local Government Areas, namely: Yewa North and Obafemi-Owode Local Government Areas in Ogun State and Lavun and Gbako Local Government Areas in Niger State. Secondly, two rice farming communities each from the 4 selected rice producing LGAs from the 2 States were purposively selected, this gave rise to 8 communities namely Eegua, Igbogila, Obafe, Ofada in Ogun State, while Ebba, Baddegi, Lemu Kataeregi in Niger State. In the third stage, simple random sampling technique was used to select 40 registered rice farmers each from these communities (list of 3,197 farmers that participated in the Growth Enhancement Support Scheme (GESS) in the two states was used). This gave rise to a total of 320 rice farmers selected out of 3,197 farmers which was used as the sample size for this study.

### **Data Collection Method**

Data for this study were collected through the use of a well-structured interview guide in addition to Focus Group Discussions (FGD) with rice farmers in the study areas. The exercise was carried out with the assistance of Ogun State Agricultural Development Programme (OGADEP) and Niger State Agricultural Development Programme (NSADP) field officers and also the executive members of Rice

Farmers Association (RIFAN), who helped to locate farm locations. The instrument used for the data collection was subjected to face and content validity involving supervisors' assessment, experts in Agricultural Extension and Rural Development and Agricultural Administration Department, their criticisms and suggestions were positively utilized for a more valid instrument. Content validity was carried out to ensure that the instrument covers all the objectives highlighted in this study. Also, the reliability test for the instrument was conducted using test re-test method. Administration of the instrument was done for 40 rice farmers (20 farmers in each state) who were not included in the actual study sample at two weeks interval. Scores were assigned to the responses of the selected respondents. Total scores for each period were computed and Pearson Product Moment Correlation (PPMC) was used to determine the relationship coefficient between the two set of scores. The instrument was considered reliable with a reliability coefficient of 0.75.

### **Measurement of variables and method of data analysis**

Age, household size, farmers experience and farm size were measured as actual number as at the time of collecting these data and were converted to interval level while gender, marital status, educational attainment and farming status were measured at nominal level. Also, weed and birds control was measured at nominal level as Used (1), Not Used (0). Harvested rice was measured in tonnes/ha while sales was measured in ? /ha and presented at interval level. Constraints were also nominally measured as Yes (1), No (0). Data obtained were analyzed with both descriptive

statistics and chi-square.  
Ch-square formula:

$$\chi^2 = \sum_i \frac{(O_i - E_i)^2}{E_i}$$

$\chi^2$  = the test statistics

$O_i$  = Observed Outcome;  $E_i$  = Expected Outcome

$\sum$  = the sum of

## Results and Discussion

### Socio-economic characteristics of the respondents

The results in Table 1 showed that average age of the respondents was 42.2 years with standard deviation of 7.7. About, 47.2 percent of the respondents were between 30 – 40 years of age. Meanwhile the proportion of the respondents that was between 30 – 40 years of age was higher in Ogun State (50.6%) compared to Niger State (43.7%). This is an indication that in Ogun and Niger States, most of the rice farmers are within the economically active part of population and therefore constitute a good labour force for rice production in the rural areas of Nigeria. These results are in tandem with the reports of Theodora (2005), Omoare (2015) and Oyediran (2016) that people who are young are more agile, prone to risk taking than the old, hence they are innovative. A large proportion (80.3%) of the respondents was male while the remaining (19.7%) were female. This indicates the dominance of male in rice farming in the study areas. Ogun State has the higher proportion of male (82.5%) in rice farming compared to Niger State (78.1%). But, female participation in rice farming was 21.9% in Niger State and 17.5% in Ogun State. More than eighty percent (83.1%) of the respondents were

married in Ogun and Niger States, with 75% respondents from Ogun State married and 91.2% in Niger State were married. Niger State has the higher proportion of married among the respondents in the two states. This is expected going by the early marriage practice in Niger State compared to Ogun State. Marriage made those involved to be responsible for the provision of food items, clothing and shelter for the family (Omoare *et al.*, 2015; Oyediran *et al.*, 2016). In contrast, 11.9% of the respondents were divorced and 5.0% were single. About fifty-two percent of the respondents had 4 – 6 people in their households while 48.1% had more than 7 people in their households; 60.6% of the respondents in Niger State had more than 7 people as household size compared to 35.6% in Ogun State with similar household size. The average household size and standard deviation was  $6 \pm 2$  people which show that the household size was relatively large in the study areas. Oyediran (2017) stated that household size is an important factor to be considered for rural development intervention in Nigeria.

About 26.6 percent had primary education, 36.6% had secondary education and 17.5% had tertiary education. This is an indication that rice farmers in the sampled states had formal education but respondents that had secondary education (45%) and tertiary education (23.8%) in Ogun State were higher than that of Niger State which had 28.1% for Secondary Education and 11.2% for Tertiary Education. However, 19.4% did not have formal education in the sampled states. Moreover, the results revealed that the mean year of experience of farmers in rice production was  $17.9 \pm 8.4$  years. Above fifty percent (53.4%) of the respondents had spent more than 20 years in

rice farming, 36.6% had spent between 11 – 20 years and 10% had spent less than 10 years in rice farming in the study areas. There are highly experienced farmers with more than 20 years in rice farming (57.5%) in Niger State than rice farmers in Ogun State (49.4%). Years of farming experience usually play a vital role in any farming enterprise (Abiona, 2010 cited in Omoare *et al.*, 2015). Results further showed that majority (72.2%) of the respondents cultivated between 6 – 10ha of farm land for rice and 27.8% cultivated less than 5 ha of land. In Niger State 80.6% cultivated 6 – 10 ha compared to 63.7% in Ogun State that cultivated same hectare of land. The average farm size cultivated for rice in the two states was  $6.4 \pm 1.9$ ha. It implies that the rice farmers are small to medium scale farmers. This concurs with the previous results of Sodiya and Oyediran (2014) that most rural farmers operate at subsistence level in Nigeria. Full-time farmers are higher (95.6%) in Niger State than Ogun State (81.3%). It is an indication that large proportion of respondents in Niger State took rice farming as major means of livelihood.

#### **Farm Management Practices and Cost Implications for the rice farmers Ogun and Niger States**

All (100%) the respondents used herbicides for weed control while 36.6% did hand weeding on their rice farms. The use of herbicides in recent time is due to its availability, cheaper price, convenience and effectiveness when it compares to hiring labour for weed control. Yet, hand weeding was more in use in Ogun State (46.8%) compared to Niger State (26.3%). The quantity of herbicides used by 64.7% of the respondents were 3.0 – 5.0litres/ha

while 35.3% sprayed more than 6.0litres/ha to control weeds. Similarly, 52.5% applied NPK fertilizer to rice farm in Niger State while it was only very few (21.2%) that applied NPK in Ogun State. Fertilizer application was relatively low for both Urea (55%) and NPK (36.9%) in the sampled states. The use of Urea fertilizer was higher in Niger State (68.1%) than Ogun State (41.9%). Also, 86.9% of respondents in Ogun State and 65.6% in Niger State applied more than 4.0 litres of insecticides per hectare. The higher rate of insecticides used among respondents in Ogun State is as a result of climatic condition that support rapid spread of insects in the state. Nets (100%) and trap (25%) were used for birds and rodents control but no respondents used clapper in the sampled states. Most (80%) of the respondents used drill irrigation while 11.9% used watering-can. Niger State had higher proportion (91.3%) of respondents that used drill irrigation as against 70% in Ogun State.

#### **Challenges to Rice Farming in Ogun and Niger States**

In Nigeria, challenges facing rice farming are numerous. Most of the respondents identified birds' disturbance (96.6%), high cost of processing equipment (92.5%), inadequate finance (83.1%) and lack of rural infrastructure (82.8%) as major impediments to rice farming in the sampled states and these were ranked 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> respectively. In Niger State, birds' disturbance was higher (98.7%) compared to Ogun State (94.4%). Similarly, the burden of finance (84.4%) and cost of processing equipment (93.9%) were higher in Niger State than in Ogun State (81.9% and 91.3%). But, pest and diseases

**Table 1: Distribution based on socio-economic characteristics of the respondents (n = 320)**

<b>Socio-Economic Variables</b>	<b>Ogun (n=160)</b>	<b>Niger (n=160)</b>	<b>Total (n=320)</b>	<b>Mean</b>	<b>Std. Dev.</b>
<b>Age (years)</b>					
31 – 40	81(50.6)	70(43.7)	151(47.2)	42.2	7.7
41 – 50	57(35.6)	62(38.8)	119(37.2)		
51 and above	22(13.8)	28(17.5)	50(15.6)		
Mean±Std. Dev.	42.1±7.9	42.2±7.5			
<b>Gender</b>					
Male	132(82.5)	125(78.1)	257(80.3)		
Female	28(17.5)	35(21.9)	63(19.7)		
<b>Marital status</b>					
Single	11(6.9)	05(3.1)	16(5.0)		
Married	120(75.0)	146(91.2)	266(83.1)		
Separated/Divorced	29(18.1)	09(5.6)	38(11.9)		
<b>Household size (people)</b>					
4 – 6	103(64.4)	63(39.4)	166(51.9)	6	2
7 and above	57(35.6)	97(60.6)	154(48.1)		
Mean±Std. Dev.	6±2	6±2			
<b>Educational attainment</b>					
No formal education	20(12.5)	42(26.3)	62(19.4)		
Primary education	30(18.7)	55(34.4)	85(26.6)		
Secondary education	72(45.0)	45(28.1)	117(36.6)		
Tertiary education	38(23.8)	18(11.2)	56(17.5)		
<b>Years of experience</b>					
Less than or equal 10	20(12.5)	12(7.5)	32(10.0)		
11 – 20	61(38.1)	56(35.0)	117(36.6)	17.9	8.4
21 and above	79(49.4)	92(57.5)	171(53.4)		
Mean±Std. Dev.	17.8±8.3	18.2±8.5			
<b>Farm size (ha)</b>					
Less than 5	58(36.3)	31(19.4)	89(27.8)	6.4	1.9
6 – 10	102(63.7)	129(80.6)	231(72.2)		
Mean±Std. Dev.	6.4±1.8	6.3±1.9			
<b>Farming status</b>					
Full-time	130(81.3)	153(95.6)	283(88.4)		
Part-time	30(18.7)	07(4.4)	37(11.6)		

Source: Field Survey, 2018. Values in parenthesis are percentages.

Std. Dev. – Standard Deviation

**Table 2: Distribution according to farm management practices in Ogun and Niger States**

<b>Weed control</b>	<b>Ogun (n = 160)</b>	<b>Niger (n = 160)</b>	<b>Total (n = 320)</b>
Hand weeding	75(46.8)	42(26.3)	117(36.6)
Use of herbicides	160(100.0)	160(100.0)	320(100.0)
<b>Use of herbicides (Litres/ha)</b>			
3.0 – 5.0	107(66.9)	100(62.5)	207(64.7)
6.0 and above	53(33.1)	60(37.5)	113(35.3)
<b>Use of Fertilizer (kg/ha)</b>			
Urea	67(41.9)	109(68.1)	176(55.0)
NPK	34(21.2)	84(52.5)	118(36.9)
<b>Disease and Insect control</b>			
<b>Use of insecticides/fungicides (Litres/ha)</b>			
2.0 – 3.0	21(13.1)	55(34.4)	76(23.8)
4.0 and above	139(86.9)	105(65.6)	244(76.3)
<b>Birds and rodents control</b>			
Use of trap	49(30.6)	31(19.4)	80(25.0)
Nets	160(100.0)	160(100.0)	320(100.0)
Clapper	0(0.0)	0(0.0)	0(0.0)
<b>Irrigation system</b>			
Knapsack	0(0.0)	0(0.0)	0(0.0)
Drill	112(70.0)	146(91.3)	258(80.0)
Sprinkler	0(0.0)	0(0.0)	0(0.0)
Watery-can	25(15.6)	13(8.1)	38(11.9)

Source: Field Survey, 2018. Values in parenthesis are percentages

\*multiple responses recorded

**Table 3: Distribution according to challenges to rice farming in Ogun and Niger States**

<b>Challenges</b>	<b>Ogun (n=160)</b>	<b>Niger (n=160)</b>	<b>Total (n=320)</b>	<b>Rank</b>
Non-availability of quality seeds and agro-chemicals	100(62.5)	106(66.3)	206(64.4)	12 <sup>th</sup>
Incidence of fire outbreak	91(56.9)	118(73.8)	209(65.3)	11 <sup>th</sup>
Poor market system	105(65.6)	117(73.1)	222(69.4)	10 <sup>th</sup>
Inadequate agricultural extension support on training and capacity building	144(90.0)	99(61.8)	243(75.9)	9 <sup>th</sup>
Land degradation and poor soil fertility	115(71.9)	129(80.6)	244(76.3)	8 <sup>th</sup>
Land tenure problem	140(87.5)	108(67.5)	248(77.5)	7 <sup>th</sup>
Climate change	129(80.6)	125(78.1)	254(79.4)	6 <sup>th</sup>
Pest and diseases incidence	138(86.3)	122(76.3)	260(81.2)	5 <sup>th</sup>
Lack of rural infrastructure	125(78.1)	140(87.5)	265(82.8)	4 <sup>th</sup>
Inadequate finance	131(81.9)	135(84.4)	266(83.1)	3 <sup>rd</sup>
High cost of processing equipment	146(91.3)	150(93.8)	296(92.5)	2 <sup>nd</sup>
Birds disturbance	151(94.4)	158(98.7)	309(96.6)	1 <sup>st</sup>

Source: Field Survey, 2018. Values in parenthesis are percentages

\*multiple responses recorded

incidence was higher in Ogun State (86.3%) because of high relative humidity compared to Niger State (76.3%) that is dry. Effects of climate change (80.6%) and land tenure system (87.5%) were more serious in Ogun State than Niger State (78.1% and 67.5%). Also, land degradation and poor soil fertility (65.3%), inadequate agricultural extension support on training and capacity building (75.9%), poor market system (69.4%), incidence of fire outbreak (65.3%) and non-availability of quality seeds and agro-chemicals (64.4%) were regarded as major challenges.’

**Hypotheses testing**

**Hypothesis 1**

H<sub>01</sub>: There is no significant difference in farm management practices of rice farmers in Ogun and Niger States

Results of the t-test in Table 4 showed that there was no significant difference in the farm management practices of rice farmers in Ogun and Niger States (t = 10.1, p = 0.06). It implies that farm practices in Ogun and Niger States is similar. This could not be unconnected with the fact that traditional methods of farming are still prevailing in the rice production in the rural areas of Nigeria. Therefore, the null hypothesis that “there is no significant difference in farm management practices of rice farmers in

Ogun and Niger States” is accepted.

**Hypothesis 2**

**Relationship between Challenges and Farm Management Practices**

H<sub>02</sub>: There is no significant relationship between challenges face by the rice farmers and farm management practices adopted in the sampled states.

Chi-square results in Table 5 showed that inadequate finance ( $\chi^2 = 12.55$ , df = 1, p = 0.02), pest and diseases incidence ( $\chi^2 = 29.02$ , df = 1, p = 0.00), climate change ( $\chi^2 = 10.83$ , df = 1, p = 0.04), birds disturbance ( $\chi^2 = 30.71$ , df = 1, p = 0.00), non-availability of quality seeds and agro-chemicals ( $\chi^2 = 15.21$ , df = 1, p = 0.02), lack of rural infrastructure ( $\chi^2 = 25.13$ , df = 1, p = 0.00), inadequate agricultural extension support on training and capacity building ( $\chi^2 = 13.41$ , df = 1, p = 0.02), high cost of processing equipment ( $\chi^2 = 23.52$ , df = 1, p = 0.03), poor market system ( $\chi^2 = 12.34$ , df = 1, p = 0.01) were significant to farm management practices at p < 0.05 level of significance across the sampled states. This implies that there is a significant relationship between challenges and farm management practices. It means that challenges limit the farm management practices in the study areas. But, land tenure

**Table 4: t-test result of significant difference between farming practices in Ogun and Niger States**

Farm Management Practices	Sample size	df	Mean	Std. Dev.	Std. Mean Error	Mean diff.	t	p-value	Decision
Ogun	160	159	0.49	0.50	0.05	0.37	10.1	0.06	NS
Niger	160	159	0.12	0.00	0.00				

Source: Field Survey, 2018. Significant at p < 0.05 level of significance  
df – degree of freedom

problem ( $\chi^2 = 3.57$ ,  $df = 1$ ,  $p = 0.09$ ), incidence of fire outbreak ( $\chi^2 = 1.12$ ,  $df = 1$ ,  $p = 0.16$ ), land degradation and poor soil fertility ( $\chi^2 = 1.88$ ,  $df = 1$ ,  $p = 0.07$ ) were not significant to farm management practices at  $p < 0.05$  level of significance. Since there is evidence of significance among most of the variables, the null hypothesis that “*there is no significant relationship between challenges face by the rice farmers and farm management practices adopted in the sampled states.*” is rejected.

### Conclusion

Based on the findings of this study, it was concluded that more than forty percent of the respondents in Niger and Ogun States were between 30 – 40 years of age which indicate economic active age group, predominantly male, married, and had formal education. Also, weed control is being carried out using herbicides and hand weeding; fertilizer used was however very low; nets and traps were used for birds' control; and drill method was

predominantly used for irrigation system. Meanwhile, birds' disturbance, high cost of processing equipment, inadequate finance and lack of rural infrastructure are the major challenges to rice farming in the sampled states. Results of the t-test revealed that there was no significant difference in the farm management practices of respondents in the sampled states while chi-square analysis confirmed that there is association between challenges and farm management practices adopted by the rice farmers in the sampled states at  $p < 0.05$  level of significance.

### Recommendations

The study recommends that:

1. Though the rice farmers are using herbicides for weed control agricultural extension services should expedite action by organizing training that can promote appropriate use of agrochemicals in order to increase rice production and income generation for the rice farmers in the study areas;
2. fertilizers should be available and

**Table 5: Relationship between Challenges and Farm Management Practices**

Challenges	$\chi^2$	df	p-value	Decision
Inadequate finance	12.55	1	0.02	Significant
Pest and diseases incidence	29.02	1	0.00	Significant
Climate change	10.83	1	0.04	Significant
Land tenure problem	3.57	1	0.09	Not significant
Incidence of fire outbreak	1.12	1	0.16	Not Significant
Birds disturbance	30.71	1	0.00	Significant
Land degradation and poor soil fertility	1.88	1	0.07	Significant
Non-availability of quality seeds and agro-chemicals	15.21	1	0.02	Significant
Lack of rural infrastructure	25.13	1	0.00	Significant
Inadequate agricultural extension support on training and capacity building	13.41	1	0.02	Significant
High cost of processing equipment	23.52	1	0.03	Significant
Poor market system	12.34	1	0.01	Significant

Source: Field Survey, 2018. *df* – degree of freedom; *S* - Significant at  $p < 0.05$  level of significance; *NS* - Not Significant at  $p > 0.05$  level of significance

- affordable to the rice farmers to encourage its application and ensure bumper harvest;
3. rice farmers should use their association platform (Rice Farmers Association of Nigeria) to access credits from banks to be able to purchase birds' control gadget (clapper) and agro-inputs at reduced prices;
  4. assistance of international donors and Non-Governmental Organizations should be solicited to come to the aid of rice farmers in terms of training and capacity for improved farm management practices;
  5. government should provide basic rural infrastructure like good feeder roads, electricity supply, and portable water that can ease rice farming activities and support livelihood of the rural farmers in the sampled states.

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