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# Membership of Rice Farmers Associations and Adoption of Improved Rice Production Technology in Kaduna and Kano States, North West Nigeria

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**Abstract**
The study examined adoption of recommended practices on improved rice production technology among members and non-members of Rice Farmers Associations in Kaduna and Kano States, North West Nigeria. A multi-stage sampling procedure was used for the selection of 282 respondents comprising of 141 members and 141 non-members from both States and semi-structured questionnaires were used for data collection. Data analysis was done by using descriptive statistics and Z-test. Results of the study showed that apart from number of years of formal education and use of mobile phones, there were significant differences ($P<0.05$) in age, household size, household labour, size of rice field and years of experience in rice production among members and non-members. In terms of adoption of recommended practices on improved rice production technology, performance of members was significantly better ($P<0.05$) than that of non-members in Kaduna whereas no significant difference was observed among members and non-members in Kano. Encouraging farmers to join Rice Farmers Associations alone may not lead to better adoption of improved rice production technology. It is recommended that the capacity of Rice Farmers Associations should be strengthened for them to operate as business entities and gain access to formal markets.
**Keywords:** Adoption, Improved Rice Production Technology, Rice Farmers Associations and Socioeconomic Characteristics

## 1. Introduction

In recent years, the Government of Nigeria through the Federal Ministry of Agriculture and Rural development has expressed strong commitment to ensuring that rice production is accelerated to the level where the country becomes self-sufficient. Improved rice production technology has been widely recognised as a critical input for increasing rice production in the country. In view of this, efforts have been made by the Government of Nigeria to ensure that farmers across the country access improved production technology through extension services. Moreover, rice farmers are being encouraged to form commodity associations to enhance adoption of improved rice production technology and increased income through better access to extension services and critical farm inputs. This is based on the premise that rice farmers who are members of Rice Farmers' Association perform better than non-members.

Several studies have revealed that farmers' group membership played significant roles in the adoption process. Faturoti *et al.* (2008) and Nielson (2001) demonstrated how peer farmers' influence affected innovation adoption. In a study on the effect of cooperative membership and participation on adoption decisions, Nwankwo *et al.* (2009) showed that there is a strong positive correlation between adopted innovations and awareness of source of recently adopted innovations indicating that those who became aware of new technologies from cooperatives trusted the information as reliable. In an assessment of factors influencing the utilisation of improved cereal crop production innovations by small scale farmers in Benue State, Odoemenem and Obinne (2010) found a positive correlation between membership of cooperatives and adoption of innovations implying that farmers who are members of cooperative associations adopted more technologies than non-members.

In another study on capital resource mobilisation and allocation efficiency by small scale cereal crop farmers of Benue State, Odoemenem (2007) concluded that cooperative membership enhanced access to information on improved technologies, material inputs of the technologies such as fertilizer and chemicals, and credit for the purchase of inputs and payment of hired labour. On the other hand, membership of farmers' association was found to have no significant influence on the adoption of chemical pest control among cowpea farmers in Makarfi Local Government Area of Kaduna State, Nigeria (Omolehin *et al*., 2007). According to Onyenweaku *et al.* (2007) there was no significant relationship between membership of social organisation and adoption of fertiliser among rice farmers in Bende Local Government Area of Abia State, Nigeria.

In a recent study among rice farmers in South-West Nigeria, Afolami *et al*. (2012) found no significant difference in the performance of cooperative and non-cooperative members with respect to yield and profit. Another study among farmers in Abuja FCT (Ajah, 2012), reported that there was no significant difference in access to extension services and level of education among members and non-members of cooperative groups.

 

The foregoing underpins the need to validate the premise that members of Rice Farmers Associations perform better than non-members in terms of adoption of improved technology. It is against this backdrop that the study investigated the effects of membership of Rice Farmers Associations on adoption of rice production technology in Kaduna and Kano States, Nigeria. The specific objectives of the study were to compare the socioeconomic characteristics of members and non-members of Rice Farmers Associations in the study area and determine the relationship between membership of Rice Farmers Associations and adoption of improved rice production technology. The study hypothesised that there was no significant difference in the adoption of improved rice production technology between members and non-members of Rice Farmers Associations.

## 2. Methodology

2.1 Study area

The study was conducted in Kaduna and Kano States. Kaduna State is in the North West geopolitical zone of Nigeria. The State lies between latitude $09^0$ 02'N and $11^0$ 32'S and between longitude $96^0$ 15'E and $08^0$ 60'E, at Coordinates: $10^0$31'23"N $7^0$26'25"E (www.kadunastate.gov.ng) where it occupies a land area of 45,567km$^2$ with a projected population of 7,328, 597 in 2012 based on 3.2% annual growth rate (NPC, 2006) and a population density of 500 people per kilometre especially within the Kaduna and Zaria axis. The State is made up of 23 Local Government Areas. The State has an altitude of 500-1000m above sea level and an annual average rainfall of 1,272m (World Bank, 2008a). The farming season in the State is characterised by the rainy season which lasts for six months from May to October and the dry season from November to April. The vegetation in the State ranges from the Guinea Savannah in the southern part to the Sudan Savannah in the north. Maize, Rice, Sorghum, Millet, Soybean and Groundnut are some of the major crops grown by farmers in the State.

Kano state is also located in the North-west geopolitical zone of Nigeria between latitudes $13^0$ N and $11^0$ S and longitudes $8^0$N and $10^0$ E with a land mass of 20,760 km$^2$. It has a projected population of 11,206,688 million in 2012 based on NPC (2006). The average annual rainfall is 700 mm with $35^0$ C and $19^0$ C as mean daily maximum and minimum temperature respectively. Major crops cultivated by farmers in the State include rice, maize, millet, cowpea, groundnut and vegetables. The Kano State Agricultural and Rural Development Authority is the agency of government mainly responsible for extension services in the State.

2.2 Sampling procedure and sample size

Rice farmers from both States were the target population for the study. Multi-stage sampling procedure was used for selecting respondents. The first stage involved purposive selection of two Local Government Areas from each State. In this regard, Kura and Bunkure in Kano State were selected while in Kaduna State, Igabi and Kajuru were preferred on account of the importance of rice as a prominent crop in the areas. The sample frame for Rice Farmers Associations is constituted by 936 registered members based on figures for the selected LGAs provided by Kaduna Agricultural Development Programme and Kano Agricultural and Rural Development Authority. In the second stage of sampling, two settlements were purposively selected from each of the 4 LGAs. In Kura LGA in Kano, Bakin Kogi and Rimin Kwarya were selected while Refawa and Bela were selected in Bunkure LGA. The selected locations for Igabi LGA in Kaduna State were Fako and Ligyara. In Kajuru LGA, Kasuwan Magani and Kallah were the preferred locations for the study. The locations were selected based on the presence of rice growers both as members and non-members of Rice Farmers Associations. From the sample frame of 936 members of Rice Farmers Associations, 141 respondents (15%) were selected randomly across settlements in the two States for the study. The same number of non-members of Rice Farmers Associations was selected randomly from each location giving a total of sample size of 282 comprising of 141 members and 141non-members. Data collected were analysed using Z-test and descriptive statistics such as frequency, mean and percentage.

## 3. Results and Discussion

3.1 Socioeconomic characteristics of respondents

*3.1.1 Age*

The average age of members of Rice Farmers Associations in Kaduna State was 41 years and 33 years for non-members meaning that members were older than non-members (Table 1a). In Kano State, mean age was 44 years among members and 43 years among non-members. The age difference among members and non-members in Kano was marginal. Mean age was 43 years for members and 39 years for non-members in the pooled data. The difference in age among members and non-members was found to be significant ($P<0.05$) in Kaduna and insignificant in Kano as the calculated z-value (3.081) is higher than the tabulated z-value (1.96) in the former and lower (0.914) than the tabulated z-value (1.96) in the latter. The pooled results showed significant age difference ($P<0.05$) among members and non-members as the calculated z-value (2.547) is higher than the tabulated z-value (1.96) thus necessitating the rejection of the null hypothesis. However, Okwoche and Obinne (2010) found no significant difference in the mean age of women cooperative members (38) and non-members

 

(40) in Benue State, North Central Nigeria. In South West Nigeria, Afolami *et al*, (2012) obtained 46.75 and 48.7 years as the mean age of rice farmers in Ekiti and Ogun States respectively. Ogundele and Okoruwa (2006) found that the estimated average age of rice farmers under traditional technology was 42 years while 45 years was obtained among rice farmers under improved technology. They asserted that rice farmers within the productive age group of 20-45 years are likely to have the necessary physical stamina required to carry out farm operations. According to Odoemenem (2010), farmers who adopted recommended practice on rice production were younger in age.

*3.1.2 Household size*

Mean household size among members of Rice Farmers Associations in Kaduna (7.92) was slightly lower than that of non-members (8.28) even though the difference was not significant. In Kano State, mean household size among members (9.06) was significantly higher ($P<0.05$) than the figure for non-members (6.40) based on the result of the z-test. The pooled results also showed significant difference between the mean household size among members (8.73) and non-members (6.95) at $P<0.05$. The household size may be related to the number of household members that will be available for farm work. There is a probability that the larger the household size the greater the volume of farm work that will be absorbed by household labour. This socio-economic variable is expected to influence the adoption of technology that has considerable labour requirement. Okwocha and Obinne (2010) reported a significant difference in the household size of women cooperative members (9) and non-members (8) in Benue, North Central Nigeria. These figures are much lower than the results Afolami *et al*. (2012) obtained among rice farmers in Ekiti (6.52) and Ogun States (6.91). Rice farmers who adopted improved technology were found to have a larger household size (10) than their counterpart (8) who practiced traditional technology of rice production though the difference was not significant (Ogundele and Okoruwa, 2006). Afolami *et al*. (2012) observed that the average number of household members actively involved in farm work was 4.23 in Ekiti State and 3.94 in Ogun State, South West Nigeria.

*3.1.3 Household labour*

Mean figure of household members involved in farm work among members of Rice Farmers Associations was found to be higher than the number obtained for non-members in both States and also in the pooled results. Mean household members involved in farm work among members in Kaduna (4.33) was higher than that of non-members (4.14) though the difference was not significant based on the outcome of the z-test. In Kano State, mean household members involved in farm work among members (3.12) was significantly higher ($P<0.05$) than the figure for non-members (2.06) as confirmed by the result of the z-test. The pooled results also show significant difference between the mean household members involved in farm work among members (3.49) and non-members (2.70) at $P<0.05$. Household members were more involved farm work among members of Rice Farmers Associations than non-members in Kano and in pooled data. Afolami *et al*. (2012) observed that the average number of household members actively involved in farm work was 4.23 in Ekiti State and 3.94 in Ogun State, South West Nigeria.

*3.1.4 Years of experience in rice production*

Mean years of experience in rice production among members of Rice Farmers Associations was higher than the number obtained for non-members in the pooled results and also in both States (Table 1b). Mean years of experience in rice production among members in Kaduna State (15.09) was higher than that of non-members (13.74) but the difference was not significant based on the result of the z-test. In Kano State, mean years of experience in rice production among members (16.88) was significantly higher ($P<0.05$) than the figure for non-members (11.53) as confirmed by the result of the z-test. The pooled results also show significant difference between the mean years of experience in rice production among members (17.43) and non-members (12.07) at $P<0.05$ as the calculated z-value (4.156) is higher than the tabulated z-value (1.96). Afolami *et al.* (2012) obtained 15.61 and 13.63 as years of experience in among rice farmers in Ogun and Ekiti States respectively. According to Ogundele and Okoruwa, (2006) the average years of rice farming experience among rice farmers adopting improved technology was 22 while farmers with traditional technology had 15 though the difference was not significantly different.

*3.1.5 Years of formal education*

Mean years of formal education among members of Rice Farmers Associations was lower than the number obtained for non-members in the pooled results and also in both States. Mean years of formal education among members in Kaduna State (4.90) was lower than that of non-members (5.55) but the difference was not significant based on the result of the z-test. The same trend was observed in Kano State where the difference between mean years of formal education among members and non-members was not significant even though the figure obtained among members (5.17) was lower than that of non-members (6.38). Similarly, the pooled results show no significant difference between the mean years of formal education among members (5.09) and non-members (6.15) at $P<0.05$. Okwocha and Obinne (2010) found that the average number of years of formal education was 12 years among women cooperative members and 9 years among non-members in Benue State, North Central Nigeria though the difference was not significant. Ogundele and Okoruwa (2006) noted that

 

farmers with higher levels of education are likely to be more efficient in the use of inputs than those with little or no education. They observed that the average years of schooling for farmers adopting improved technology was 8 years compared to 7 years for farmers using traditional technology.

*3.1.6 Size of rice field*

In Kaduna State, majority of members (44.5%) and non-members (57.45%) of Rice Farmers Associations cultivated 1 to 3 hectares of land. The same size of rice field was cultivated by majority of members (60.8%) and non-members (77.3%) of Rice Farmers Associations in Kano State. The pooled data shows that majority of members (56%) and non-members (71%) cultivated 1 to 3 hectares of land. In Kaduna State, the average size of rice field cultivated by members was 4.03 hectares and 3.27 hectares for non-members. There is no significant difference in the size of rice field cultivated by the two groups of farmers in Kaduna State given that the calculated z-value (1.506) is lower than the tabulated z-value (1.96). In Kano State, the average size of rice field cultivated by members was 3.88 hectares while the average holding for non-members was 2.66 hectares. The z-test shows a significant difference in the average holdings of the two categories of farmers at $P<0.05$ as the calculated z-value (4.093) is higher than the tabulated z-value (1.96). For the pooled data, mean size of rice field for members was 3.93 hectares and that of non-members was 2.59 hectares. The mean farm size of members of Rice Farmers Associations in Kaduna and Kano States was found to be significantly (3.93) higher than that of non-members (2.59) at $P<0.05$ in view of the fact that the calculated z-value (4.26) is greater than the tabulated one (1.96). In South West, Nigeria Afolami *et al.* (2012) obtained 1.72 and 1.64 hectares as farm size among cooperative and non-cooperative rice farmers whereas the average size of farm cultivated by women cooperative members in Benue State (5.10) was significantly higher (3.02) than that of non-members (Okwoche and Obinna, 2009).

*3.1.7 Usage of mobile phone*

In Kaduna State there were more users of mobile phones (81%) among non-members of Rice Farmers Associations than among members (77%). The reverse is the case in Kano State as 95% of the respondents among members used mobile phones compared to 85% among non-members. The pooled results followed the trend in Kano with greater percentage of mobile phone users (89%) among members than among non-members (86%). Both members and non-members in Kano State surpassed their respective counterparts in Kaduna State in terms of usage of mobile phones. Non-users of mobile phones constituted 23% among members and 18% among non-members in Kaduna and 5% among members and 12% among non-members in Kano State. The pooled results indicated that non-users of mobile phones were 11% among members and 15% among non-members. Kaduna State had more non-users of mobile phones among members and non-members than their respective counterparts in Kano State. Chi-Square values showed that there was no significant relationship between membership of Rice Farmers Associations and usage of mobile phones in Kaduna and Kano States as well as in the pooled results. According to NBS/FMARD (2011), there were 7,976,466 farmers in Nigeria who own mobile phones with 4.5% of them in Kaduna and 6.0% in Kano. Ownership of mobile phone facilitates farmers' access to subsidised fertiliser and improved seeds through the Growth Enhancement Support Scheme of the Federal Government of Nigeria. In a study on effectiveness of GESS in Kwara State, North central Nigeria, Adebo (2014) reported that 86% of the respondents possessed mobile phones.

In terms of socioeconomic characteristics of members and non-members of Rice Farmers Associations in the two States, apart from level of formal education, the study found significant differences in age, household size, household labour, years of experience in rice farming, farm size and ownership of mobile phones.

3.2 Adoption of recommended practices on improved rice production technology in Kaduna State

Adoption index of each of the 13 components of improved rice production technology was categorised into high, average and low for the purpose of analysis. High adoption index was considered to be $\geq 0.7$; average is from 0.5 to 0.69 and low was $< 0.5$. Considering the 13 components of improved rice production technology the adoption index was high in 8, average in 2 and low in 3 among members and high in 6, average in 5 and low in 2 among non-members of Rice Farmers Associations in Kaduna (Table 2). The components of improved rice production technology with high adoption index among members included: use of planting of improved rice variety, sorting of rice seeds for planting, seed dressing with agrochemical, use of herbicide for clearing, use of herbicide for weed control in rice fields, basal NPK fertiliser application, top dressing with urea and use of rice crop residue as manure. Adoption index of use of tractor for land preparation and use of milling machine was average while rice-legume rotation, use of mechanical thresher and use of mechanical winnower recorded low adoption score among members. For non-members adoption index was also high for the same components as members apart from sorting of seeds and seed dressing with average adoption score. Other components with average adoption index for non-members included use of milling machine, rice-legume rotation and use of tractor for land preparation. Adoption index of use of mechanical winnower and use of mechanical thresher was low among non-members. Across the recommended practices or components of improved rice production technology the mean adoption index obtained among members (0.70) was significantly higher than that of non-members (0.64) at

 

P<0.05 given that the calculated z-value (2.810) was higher than the tabulated z-value (1.96).

3.3 Adoption of recommended practices on improved rice production technology in Kano State

Of the 13 components or recommendations on improved rice production technology the adoption index was high in 7, average in 2 and low in 4 among members and high in 7 and low in 6 among non-members of Rice Farmers Associations in Kano. The components of improved rice production technology with high adoption index among members and non-members include: use of tractor for land preparation, use of planting of improved rice variety, seed dressing with agrochemical, use of herbicide for clearing, use of herbicide for weed control in rice fields, basal NPK fertiliser application and top dressing with urea. Adoption of use of rice crop residue as manure and use of rice milling machine among members was average based on the adoption index. Sorting of rice seeds for planting, rice-legume rotation, use of mechanical thresher and use of mechanical winnower recorded low adoption index among members. In the case of non-members, the extent of adoption was low for use of crop residue as manure and rice milling machine in addition to the same components with low adoption index among members. Across the components of improved rice production technology the mean adoption index obtained among members (0.61) and non-members (0.53) was not significantly different as the calculated z-value (1.290) was lower than the tabulated z-value (1.96) at P<0.05.

**4. Conclusion and Recommendation**

The study has shown that the adoption of each of the recommended practices on improved rice production technology was significantly better among members than non-members of Rice Farmers Associations in Kaduna State but not significantly different among the two groups of farmers in Kano State. Encouraging farmers to join Rice Farmers Associations alone may not lead to better adoption of improved rice production technology. It is recommended that the capacity of Rice Farmers Associations should be strengthened for them to operate as business entities and gain access to the formal markets.

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Table 1a: Socioeconomic characteristics of members and non-members of Rice Farmers Associations in Kaduna and Kano States

| **Variable** | **Kaduna** | | **Kano** | | **Pooled** | |
|---|---|---|---|---|---|---|
| | **Members** | **Non-members** | **Members** | **Non-members** | **Members** | **Non-members** |
| **Age** | | | | | | |
| ≤ 20 | 2(4.2 ) | 6(12.5) | 2 (2.1) | 3 (3.1) | 4 (2.8) | 9 (6.2) |
| 21-40 | 30(62.5 ) | 32(66.7) | 45 (46.4) | 43 (44.3) | 75 (51.7) | 75 (51.7) |
| 41-60 | 10(20.8 ) | 10(20.8) | 39 (40.2) | 45 (46.4) | 49 (33.8) | 55 (37.9) |
| > 60 | 6(12.5 ) | 0 (0.0) | 11 (11.3) | 6 (6.2) | 17 (11.7) | 6 (4.2) |
| Total | 48(100) | 48 (100) | 97 (100) | 97 (100) | 145 (100) | 145 (100) |
| Mean | 41.12 | 33.33 | 44.05 | 42.52 | 43.097 | 39.476 |
| Calculated z | 3.081* | | 0.914 | | 2.547 | |
| Tabulated z | 1.96 | | 1.96 | | 1.96 | |
| **Household size** | | | | | | |
| 0-5 | 13(33.3) | 11(28.2) | 33 (35.5) | 54 (58.1) | 46 (34.8) | 65 (49.2) |
| 6-11 | 18(46.2) | 19(48.7) | 23 (24.7) | 19 (20.4) | 41 (31.1) | 38 (28.8) |
| 12-17 | 7(18.0) | 8(20.5) | 32 (34.4) | 19 (20.4) | 39 (29.5) | 27 (20.5) |
| 18-23 | 1(2.5) | 1(2.5) | 5 (1.1) | 1 (1.1) | 6 (4.6) | 2 (1.5) |
| Total | 39(100) | 39(100) | 93 (100) | 93 (100) | 132 (100) | 132 (132) |
| Mean | 7.92 | 8.28 | 9.06 | 6.40 | 8.73 | 6.95 |
| Calculated z | -0.352 | | 3.446* | | 2.804* | |
| Tabulated z | 1.96 | | 1.96 | | 1.96 | |
| **Household labour** | | | | | | |
| 0-3 | 19 (44.2) | 23 (53.5) | 53 (54.6) | 75 (77.3) | 72 (51.4) | 98 (70.0) |
| 4-7 | 17 (39.5) | 14 (32.6) | 39 (40.2) | 20 (20.6) | 56 (40.0) | 34 (24.3) |
| 8-11 | 7 (16.3) | 5 (11.6) | 5 (5.2) | 2 (2.1) | 12 (8.6) | 7 (5.0) |
| >11 | 0 (0) | 1 (2.3) | 0 (0) | 0 (0) | 0 (0) | 1 (0.7) |
| Total | 43 (100) | 43 (100) | 97(100) | 97(100) | 140(100) | 140(100) |
| Mean | 4.326 | 4.140 | 3.123 | 2.062 | 3.493 | 2.700 |
| Calculated z | 0.266 | | 2.731* | | 2.301* | |
| Tabulated z | 1.96 | | 1.96 | | 1.96 | |

 

Table 1b: Socioeconomic characteristics of members and non-members of Rice Farmers Associations in Kaduna and Kano States

| Variable | Kaduna | | Kano | | Pooled | |
|---|---|---|---|---|---|---|
| | Members | Non-members | Members | Non-members | Members | Non-members |
| **Years of Formal Education** | | | | | | |
| 0-6 | 28(73.68) | 24(63.16) | 54 (55.67) | 49 (50.52) | 82 (60.74) | 73 (54.07) |
| 7-13 | 9 (23.68) | 14(36.84) | 37 (38.14) | 46 (47.42) | 46 (34.07) | 60 (44.44) |
| 14-20 | 1 (2.63) | 0 (0.00) | 6 (6.19) | 2(2.06) | 7 (5.19) | 2 (1.48) |
| Total | 38(100) | 38(100) | 97 (100) | 97(100) | 135(100) | 135(100) |
| Mean | 4.895 | 5.553 | 5.165 | 6.381 | 5.089 | 6.148 |
| Calculated z | -0.732 | | -1.488 | | -1.660 | |
| Tabulated z | 1.96 | | 1.96 | | 1.96 | |
| **Years of Rice Farming Experience** | | | | | | |
| <4 | 0(0.00) | 5 (14.29) | 1 (1.16) | 1 (1.16) | 1(0.83) | 6 (4.96) |
| 4-11 | 18(51.43) | 13 (37.14) | 35 (40.70) | 56 (65.12) | 53 (43.80) | 69 (57.02) |
| 12-19 | 4(11.43) | 5 (14.29) | 20 (23.26) | 16 (18.60) | 24 (19.83) | 21(17.36) |
| 20-27 | 6(17.14) | 8 (22.86) | 16 (18.60) | 9 (10.47) | 22 (18.18) | 17 (14.05) |
| 28-35 | 7(20.00) | 4 (11.43) | 7 (8.14) | 2 (2.33) | 14 (11.57) | 6 (4.96) |
| >35 | 0(0.00) | 0 (0.00) | 7 (8.14) | 2 (2.33) | 7(5.79) | 2 (1.65) |
| Total | 35(100) | 35 (100) | 86 (100) | 86 (100) | 121(100) | 121(100) |
| Mean | 15.086 | 13.743 | 16.883 | 11.523 | 17.480 | 12.072 |
| Calculated z | 0.616 | | 3.819* | | 4.156* | |
| Tabulated z | 1.96 | | 1.96 | | 1.96 | |
| **Size of Rice Field (Hectare)** | | | | | | |
| <1 | 1(2.12) | 2(4.26) | 6 (6.186) | 7 (7.22) | 7(4.86) | 9 (6.25) |
| 1-3 | 21(44.48) | 27(57.45) | 59 (60.82) | 75 (77.32) | 80 (55.56) | 102 (70.83) |
| 4-6 | 19(40.43) | 13(27.66) | 15 (15.46) | 15 (15.46) | 34 (23.61) | 28 (19.44) |
| 7-9 | 2(4.26) | 4(8.51) | 3 (3.09) | 0 (0.00) | 5 (3.47) | 4 (2.78) |
| 10-12 | 4(8.51) | 1(2.13) | 10 (10.31) | 0 (0.00) | 14 (9.72) | 1 (0.69) |
| >12 | 0(0.00) | 0(0.00) | 4 (4.12) | 0 (0.00) | 4 (2.78) | 0 (0.00) |
| Total | 47(100) | 47(100) | 97 (100) | 97 (100) | 144 (100) | 144 (100) |
| Mean | 4.032 | 3.266 | 3.884 | 2.660 | 3.932 | 2.592 |
| Calculated z | 1.506 | | 4.093* | | 4.260* | |
| Tabulated z | 1.96 | | 1.96 | | 1.96 | |
| | | | | | | |
| **Ownership of Mobile Phone** | | | | | | |
| Yes | 37(77.1 ) | 39(81.3 ) | 92(94.8) | 85(87.6) | 129(89.0) | 124(85.5) |
| No | 11(22.9 ) | 9(18.3 ) | 5(5.2) | 12(12.2) | 16(11.0) | 21(14.5) |
| Total | 48(100 ) | 48(100) | 97(100) | 97(100) | 145(100) | 145(100) |
| Chi-Square | 0.25(0.62) | | 3.16*(0.08) | | 0.77(0.38) | |

 

Table 2: Adoption of the recommended practices on improved rice production technology by members and non-members of Rice Farmers Associations in Kaduna State

| Improved Rice Production Technology | Frequency and percentage of Adopters | | Adoption index | |
|---|---|---|---|---|
| | Members | Non-members | Members | Non-members |
| 1.Tractor for land preparation | 32(66.67) | 26(54.17) | 0.67 | 0.54 |
| 2.Improved rice variety | 35(72.92) | 35(72.92) | 0.73 | 0.73 |
| 3.Sorting of seeds for planting | 40(83.33) | 33(68.75) | 0.83 | 0.69 |
| 4.Seed dressing material | 37(77.08) | 29(60.42) | 0.77 | 0.60 |
| 5.Herbicide for land clearing | 48(100.00) | 47(97.92) | 1.00 | 0.98 |
| 6.Herbicide for weed control after planting rice (pre-emergence) | 48(100.00) | 47(97.92) | 1.00 | 0.98 |
| 7.Basal NPK fertiliser application | 48(100.00) | 47(97.92) | 1.00 | 0.98 |
| 8.Urea fertiliser application (Top dressing) | 46(95.83) | 44(91.67) | 0.96 | 0.92 |
| 9.Rice crop residues as manure | 44(91.67) | 39(81.25) | 0.92 | 0.81 |
| 10.Rice-legume rotation | 22(45.83) | 26(54.17) | 0.46 | 0.54 |
| 11.Mechanical thresher | 5(10.42) | 3(6.25) | 0.10 | 0.06 |
| 12.Mechanical winnower | 4(8.33) | 1(2.08) | 0.08 | 0.02 |
| 13.Rice milling machine | 25(52.08) | 24(50.00) | 0.53 | 0.50 |
| Mean | | | 0.70 | 0.64 |
| Calculated z-value | | | 2.810* | |
| Tabulated z-value | | | 1.96 | |

Figures in parenthesis are percentages. *Significant at 0.05 level of probability.

Table 3: Adoption of recommended practices on improved rice production technology by members and non-members of Rice Farmers Associations in Kano State

| Improved Rice Production Technology | Frequency and percentage of Adopters | | Adoption Index | |
|---|---|---|---|---|
| | Members | Non-members | Members | Non-members |
| 1.Tractor for land preparation | 67(73.63) | 74(81.32) | 0.74 | 0.81 |
| 2.Improved rice variety | 67(73.63) | 86(94.51) | 0.74 | 0.95 |
| 3.Sorting of seeds for planting | 27(29.67) | 11(12.09) | 0.30 | 0.12 |
| 4.Seed dressing material | 70(76.92) | 82(90.11) | 0.77 | 0.90 |
| 5.Herbicide for land clearing | 70(76.92) | 84(92.31) | 0.77 | 0.92 |
| 6.Herbicide for weed control after planting rice (pre-emergence) | 89(97.80) | 86(94.51) | 0.98 | 0.95 |
| 7.Basal NPK fertiliser application | 64(70.33) | 80(87.91) | 0.70 | 0.88 |
| 8.Urea fertiliser application (Top dressing) | 90(98.90) | 88(96.70) | 0.99 | 0.97 |
| 9.Rice crop residues as manure | 47(51.65) | 21(23.08) | 0.52 | 0.23 |
| 10.Rice-legume rotation | 45(49.45) | 9(9.89) | 0.49 | 0.10 |
| 11.Mechanical thresher | 22(24.18) | 0(0.00) | 0.24 | 0.00 |
| 12.Mechanical winnower | 20(21.98) | 1(1.10) | 0.22 | 0.01 |
| 13.Rice milling machine | 46(50.55) | 9(9.89) | 0.51 | 0.10 |
| Total | 91(100) | 91(100) | 7.96 | 6.93 |
| Mean | | | 0.61 | 0.53 |
| Calculated z-value | | | 1.290 | |
| Tabulated z-value | | | 1.96 | |

Figures in parenthesis are percentages.