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*Full Length Research Paper*

# Factors affecting adoption of post-harvest technologies of selected food crops in Rivers State, Nigeria

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**The study was conducted to determine the factors affecting adoption of post-harvest technologies of selected food crops in Rivers State, Nigeria. A multistage snow-ball procedure was used to sample 135 selected food crops farmers in the State. A well structured questionnaire was used to obtain information from the respondents and analyzed using both descriptive and inferential statistical tools. The results revealed that, majority (85.9%) of the respondents were females, mostly married (84.4%), with house-hold sizes between 5-9 persons (54.8%). Respondents mean age was 41.0 years, with mean of 15.9 years' farming experience co-farmer was the most commonly used sources of information on post-harvest technologies. Factors determined to be affecting the adoption of selected post-harvest technologies in the study area were, socio-economic characteristics of the respondents and sources of information on post-harvest technologies. All socio-economic characteristics measured were significantly related to adoption level with P – value less than 0.05. The technologies in the package were not introduced to the farmers (100%) and the level of adoption was poor (100%). The respondents' sources of information influenced their adoption of post-harvest technologies with the p- value less than 0.05. The study recommended that available post-harvest technologies should be made known to all users.**

**Key words**: Adoption, factors, food crops, post-harvest, technologies.

## INTRODUCTION

Post-harvest losses of agricultural produce has continued to impact negatively on food production, scientist have continued to report losses of agricultural produce during post-harvest handling (Olayemi *et al*. 2011). Losses are reported (Owolade, 2011) to have risen (50 – 70%) between production areas and point of consumption. The trend is associated with inadequate post-harvest handling and non adoption of available post-harvest technologies for reduction of losses (Owolade, 2011). Agriculture can only serve as backbone of the economy of a country if modern technologies are adopted in the processing, storage and marketing of food crops (Seidu *et al*. 2012). Further reports (Ogunremi and Oladele, 2012; Olayemi *et al.* 2010) observed that food wastage can only be reduced through adoption of post-harvest technologies which may result in achievement of profitable agricultural system. The rate at which agricultural technologies are developed by research establishment in developing countries are high but the adoption of

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these technologies by rural farmers are very low (Meena, 2009). Adoption simply means conscious decision to implement a practice or apply a new technology on a continuous basis (Ochuko, 2013).

However, plantains, vegetables and maize are food crops with economic benefits that are grown in Rivers State. They are perishable food crops (Owolade, 2011) that require post-harvest technologies so as to prolong the shelf-life of the commodities. In the light of preservation and storage techniques for food crops, Nigerian Stored Products Research Institutes (NSPRI) located in Rivers State had developed different post-harvest technologies for different food crops in order to reduce post-harvest losses (Williams, 2013). The various technologies had been disseminated by NSPRI through exhibition, Agricultural shows, extension agents and community development projects but the rate of adoption of these technologies by the farmers are not encouraging and makes research efforts on post-harvest technologies development partially successful. Revilla-Molina *et al. (*2009) reported that, introduction of new technologies in the past were partially successful compared to adoption rate while immediate and uniform adoption is very rare to achieve. It is on this basis that this study assessed the factors affecting the adoption of post-harvest technologies of selected food cops in Rivers State.

The specific objectives are to: ascertain the socio-economic characteristics of the selected food crops farmers in Rivers State; identify the available information sources on post-harvest technologies of selected food crops to selected food crops farmers in the study area; identify the post-harvest technologies of selected food crops that have been introduced to the farmers from the packages; determine the level of adoption of selected post-harvest technologies by the selected food crops farmers in the study area.

## METHODOLOGY

The study was carried out in Rivers State, Nigeria. The state has 23 Local Government Areas (RSMOA, 2014) and lies between latitude $4.7500^0$N and longitude $6.8333^0$E. The State has a total land mass of about 1,940,000 ha. Large (39%) fertile flat plain at the upland areas and water bodies covers about 60% of the rest surface areas. Food crop farmers (Plantain, Vegetables and Maize farmers) constituted the population for the study. A multistage snow-ball sampling technique was used to sample 135 respondents. The first stage involved, purposive selection of three local government areas which are; Etche, Abual/Odual and Oyingbo (L.G.As) that fell on upland areas, where there is cultivable land for Agriculture. The second stage was selection of three villages within each LGA where crops production is fully practised, while from each village, 75 selected food crops farmers` names lists were collected through snow ball technique making a total of 675 lists collected from all the villages selected. Lastly, random sampling was used to select 15 respondents from each village in the three local government areas, making a total of 135 respondents for the study.

Data were collected from the respondents through the use of structured questionnaire. It contained relevant questions based on the objectives of the study. The dependent variable for the study was the adoption of post-harvest technologies which was measured by adoption scores. The independent variables were, age measured at interval level, sex measured at nominal, years of formal education measured at ordinal, house-hold sizes measured at interval and years of farming experience was also measured at interval while sources of information on post-harvest technologies and technologies introduced were measured in nominal level. Descriptive statistics such as frequency, percentage and mean were used to categorize respondents based on their socio-economic characteristics. It was also used for sources of information and technologies introduced to the farmers. Inferential statistics was used to establish a relationship between socio-economic characteristics of the respondents and adoption level of post-harvest technologies and also relationship between sources of information and adoption level of post-harvest technologies

## RESULTS AND DISCUSSION

### Socio-economic characteristics of the respondents

The results in Table 1 revealed that 60.6% of the respondents were within the active age group of 25 – 45years. Only 30.4% of the respondents were above 46years of age, with the mean age being 41.0years. The implication of the mean age on adoption of post-harvest technologies is that the young farmers can take risks by adopting new technologies than the older farmers. This finding agrees with Jabil and Abdu (2012) who pointed out that young farmers are more willing to adopt new genes than older ones and they are not, aversive to risk. Majority (85.9%) of the respondents were females. This implies that women dominated food crops production in the study area thereby corroborating Olayemi *et. al*, (2011) who also reported that women are more involved in agricultural activities than men in the study area. Further results showed that 84.4% of the respondents were married. This reflects on social responsibility. Married people would likely be more responsible to innovations to increase their productivity so as to be able to cater for the family. Dauda *et. al,* (2014) also indicated that, married people

**Table1.** Distribution of Respondents according to Socio-Economic Characteristics (N=135).

| Socio-Economic Characteristics | Frequency | Percentage | Mean |
|---|---|---|---|
| **Age (Years)** | | | |
| < 25 | 1 | 0.7 | |
| 25-35 | 47 | 34.8 | |
| 36-45 | 46 | 34.1 | 41.0 |
| 46-55 | 31 | 23.0 | |
| >55 | 10 | 7.4 | |
| **Sex** | | | |
| Female | 116 | 85.9 | |
| Male | 19 | 14.1 | |
| **Years of formal Education** | | | |
| 6years | 42 | 31.2 | |
| 9years | 8 | 5.9 | 3.09 |
| 12years | 40 | 29.6 | |
| 15years | 8 | 5.9 | |
| 17years | 6 | 4.4 | |
| Non formal | 31 | 23 | |
| **House-Hold Size** | | | |
| 1-4 | 45 | 33.3 | |
| 5-9 | 74 | 54.8 | |
| 10-14 | 13 | 9.6 | 6 |
| 15-19 | 3 | 2.3 | |
| **Marital Status** | | | |
| Single | 13 | 9.6 | |
| Married | 114 | 84.4 | |
| Widowed | 7 | 5.3 | |
| Divorced | 1 | 0.7 | |
| **Years of Farming Experience** | | | |
| 1-10 | 45 | 34.2 | |
| 11-20 | 63 | 46.6 | 15.9 |
| 21-30 | 20 | 14.8 | |
| 31-40 | 6 | 4.4 | |

Source: Field Survey, 2015.

would be responsible to innovation since they would have family to cater for. The majority (77%) of the respondents attended primary schools while 23% of the respondents had no formal education. This implies that the majority of the respondents were literates and this could encourage effective use of post-harvest-technologies. The mean of the years of farming experience was 15.9years meaning that the respondents have been farming for long and they are highly experienced in crop production while, the mean for the house-hold sizes was 6 persons per family. This implies that labor for post-harvest activities were likely to be readily supplied by the family members.

## Sources of Information Available on Post-Harvest Technologies

Table 2 shows the respondents source of information on post-harvest technologies as follows: co-farmers (48.6%), radio (44.3%), extension agents (8.8%), television (8.6%) and news-papers (8.1%) This implies that many of the respondents sourced for information through their co-farmers and this corroborates with Nwabeze *et. al.*, (2012) who reported that, interpersonal method showed relative effectiveness of information sources compared to mass method. The second source of information often used by 44.3% of the respondents was radio. This support the findings of Nnena (2011) who stated that, media, such as radio is a popular organ in disseminating agricultural information to rural farmers. Only 8.8% of the respondents sourced for information through extension agents. This implies poor extension services in the study area and this could lead to non adoption of post-harvest technologies because the respondents would not have adequate persuasion and encouragement that could convince them to adopt post-harvest technologies. Few respondents (8.6%) sourced for information on post-harvest technologies through televisions. This may be associated with lack of electricity or inadequate supply of electricity in the rural areas and lack of funds to purchase television. This also agrees with Nenna (2011) who stated that some of the constraints in accessing agricultural information in the rural areas are non availability of electricity supply

**Table 2.** Distribution of the respondents according to sources of information available on post-harvest technologies (N=135).

| Sources of information | Frequency | Percentage (%) |
|---|---|---|
| Extension agent | 18 | 8.8 |
| Radio | 82 | 44.3 |
| Television | 16 | 8.6 |
| News paper | 15 | 8.1 |
| Others (co-farmers, neighbors) | 90 | 48.6 |
| | | |

Multiple Responses Source: Field Survey, 2015.

and lack of funds. Table 2 also showed that news-papers as source of information by the respondents has the lowest percentage of patronage by the respondents (8.1%). This is poor adoption. This corroborates with Nwabeze *et. al.* who reported that the aggregate effectiveness of information sources is found low in print media.

**Post-harvest Technologies Introduced to the farmers**

Table 3 revealed that 100% of the respondents confirmed that all the post-harvest technologies in the packages were not introduced to them. Meaning that, there was very low awareness of post-harvest technologies in existence in the study area. This implies that the related research institutes such as Nigerian Stored Products Research Institute (NSPRI) and Agricultural Development Projects (ADPs) located in the study area have not done enough in creating awareness at the grass-root for the peasant farmers to benefit on post-harvest technologies. Lack of awareness may be associated with poor research-extension-farmers linkages system. This corroborates with Oladele (2010) who stated that the degree of involvement of research-extension-farmers linkages had not been up to the expected level, he explained further that there was a need for intelligent mobilization of research and dissemination of its results and technologies by the extension agents to the farmers.

**Level of adoption of post-harvest technologies packages reviewed**

Table 4 showed that the post-harvest technologies in the packages were poorly adopted by all the respondents (100%) This implies poor level of post-harvest technologies packages adoption in the study area. Therefore, most of the food crops produced could be lost at post-harvest stages in the study area. This agrees with Owolade (2011) who found that 50-70% losses were estimated between production area and consumption point because of inadequate post-harvest handling and non adoption of post-harvest technologies.

**Relationship between socio-economic characteristics and adoption level of post-harvest technologie**s

Table 5 revealed that the following socio-economic characteristics are significant in adoption of post-harvest technologies:

Age (P - 0.000) which is significant at (P<0.05) Meaning that the younger the respondent the more he or she be willing to adopt innovation and vice-versa. This agrees with Jabil and Abdu, (2012) who reported that, young farmers are willing to adopt new genes than older farmers because the young farmers are more open to innovations, willing to try new genes and they are not afraid of risk.

Sex (P - 0.000) was found to be significant at (P< 0.05). This implies that the sex of the respondents determines the adoption rate of post-harvest technologies. The females dominated the post-harvest sector in agriculture. If the target beneficiaries are more of females than the males the adoption rate of post-harvest technologies could improve because it is more relevant to female activities on the farm than the male activities. This agreed with Olajide, (2012) who stated that women were more involved in food processing, marketing and maintenance of the home stead farm.

Marital Status (0.000) was significant at (P < 0.05) meaning that married persons were likely to adopt post-harvest technologies than single. This is because they have family responsibilities to fulfill. Adoption of post harvest technologies could also increase their earnings and improve their standard of living. This supports the findings of Dauda *et. al*, (2014) who reported that married persons could be responsible people who have family to cater for.

Years of formal education (0.000) was shown to be significant at (P < 0.05). This revealed that the more educated a respondent is, the easier the adoption of

**Table 3.** Distribution of the respondents according to the technologies introduced (N=135).

| Post-harvest technologies | I<br>F (%) | NI<br>F (%) |
|---|---|---|
| Plastic crates: Plantain | 0 (0) | 135 (100) |
| Plantain slicers: Plantain | 0 (0) | 135 (100) |
| Multipurpose dryer: Plantains, Vegetable and maize | 0 (0) | 135 (100) |
| Transparent polythene nylon: Plantain and Vegetable | 0 (0) | 136 (100) |
| Sealing machine: Plantain and Vegetable | 0 (0) | 135 (100) |
| NSPRI vegetable basket: Vegetable | 0 (0) | 135 (100) |
| Vegetable shed: Vegetable | 0 (0) | 135 (100) |
| Metal cribs: Maize | 0 (0) | 135 (100) |
| Inert atmosphere silo: Maize | 0 (0) | 135 (100) |
| Improved ware-house: Maize | 0 (0) | 135 (100) |
| **Total** | **0 (0)** | **135 (100)** |

Source: Field Survey, 2015
Legends: I = Introduced, NI = Not Introduced.

**Table 4.** Distribution of the respondents according to the level of adoption of post-harvest technologies (N=135).

| Level of adoption | Frequency | Percentage (%) |
|---|---|---|
| Poor Adoption | 135 | 100.0 |
| Fair Adoption | - | - |
| Good Adoption | - | - |
| **Total** | **135** | **100** |

Source: Field Survey, 2015.

post-harvest technologies could become. This agreed with Yusuf and Fakayode, (2012) who found that low level of literacy among the respondents could reduce the adoptability of innovations and effective use of post-harvest technologies.

House-Hold Size (0.000) was significant at ($P < 0.05$). This meant that, the higher the house-hold size, the more could be the cheap labor supply for post-harvest activities and the lower the adoption rate of post-harvest technologies could be. This is in line with Jabil and Abdu, (2012) who reported, that the house hold size is an important socio-economic indicator of labor.

Years of farming experience (0.000) was also significant at ($P < 0.05$). Years of farming experience could affect adoption of post-harvest technologies because farmers with many years of experience and belief could be conservative and decide not to try new innovation to avoid risk. This corroborates with Jabil and Abdu, (2012) who stated in their findings that adoption of innovation by farmers was affected by many factors such as farmers` conservative attitude towards innovation. This implies that there is a significant relationship between socio-economic characteristics of the respondents and the adoption level of post-harvest technologies.

## Relationship between Sources of Information and Adoption of Post-Harvest Technologies

The chi-square results in Table 6 showed significant relationship between sources of information and adoption of post-harvest technologies ($P<0.05$). Since the P – value is less than 0.05. This implies that all the sources of information identified in the study area have relationship with adoption of post-harvest technologies. If these sources of information (the inter-personal contact, media sources, farm and home visit, office calls, telephone calls and result demonstration) can be enhanced and strengthened, it could result in improved level of adoption of post-harvest technologies and consequently increase crop productions in the study area. This agreed with Nenna, (2011) who reported that, for optimal farm production, the rural farmers should be assisted to have access to agricultural Information.

**Table 5.** Relationship between socio-economic characteristics of the respondents and adoption of post-harvest technologies.

| Relationship | | df | P-value | Decision |
|---|---|---|---|---|
| Age vs Adoption of Post-harvest Technologies | 1.403 | 5 | 0.000 | S |
| Sex | 64.194 | 2 | 0.000 | S |
| Marital Status | 231 | 4 | 0.000 | S |
| Years of Formal Education | 80.688 | 6 | 0.000 | S |
| House hold Size | 149.97 | 4 | 0.000 | S |
| Years of Farming Experience | 235.537 | 4 | 0.000 | S |

* Significant at 0.005, S = Significant, NS = Not Significant
Decision: P-value is significant when less than 0.05.

**Table 6.** Relationship between sources of information and adoption level of post-harvest technologies.

| Relationship | $X^2$ | Df | P-value | Decision |
|---|---|---|---|---|
| Sources of information vs Adoption of Post-harvest Technologies | 107.606 | 4 | 0.000 | S |
| | | | | |

*Significant at 0.05, S = Significant, NS = Not Significant
Decision: P-value is significant when less than 0.05

## CONCLUSION

The study concludes that socio-economic characteristics and sources of information are the factors affecting adoption of post-harvest technologies in the study area.

## RECOMMENDATION

The study therefore recommends that:

1. Government should recruit extension agents for both research institutes and ADPs so as to ensure maximum coverage of rural farmers` extension needs
2. Research/Extension activities should be geared up so that available technologies on post harvest food losses reductions is made known to all end users.

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