ADOPTION OF CASSAVA VALUE ADDED INNOVATION AND ITS IMPLICATION ON RURAL LIVELIHOOD: A CASE OF RURAL WOMEN IN ABIA STATE, NIGERIA

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ABSTRACT
The study examined the effect of adoption of cassava value added innovation on livelihood of rural women in Abia state, Nigeria. The specific objectives were to; describe the socioeconomics characteristics of rural women that benefited from training on value addition to cassava crop in the study area; identify Source(s) of training on cassava value added products in the study area; identify cassava value added products disseminated to the rural women in the study area; determine the level of adoption of selected cassava value added innovations (cassava fufu flour, high quality cassava flour, chips, garri and starch) by the rural women in the study area; determine the effect of adoption of cassava value added innovation on annual income, annual savings and monthly expenditures of rural women in the study area; identify problems encountered by rural women in the adoption of cassava value added innovation in the study area. Multistage random sampling technique was employed in collecting data from one hundred and eighty (180) rural women that had benefited from training on value addition to cassava crop organized by government and private organizations in the state. The instrument of data collection was via a set of pre-tested and structured questionnaire. The data were analyzed using descriptive statistics, probit regression model and paired t-test analysis. The study revealed that the most adopted cassava value added products among the rural women in the study area was garri, with a mean adoption score value of 11.53 and was followed by cassava fufu flour (χ= 9.08) and high quality cassava flour (χ=5.81). The result of the paired t-test for difference in the income level, savings and expenditures of rural women that adopted cassava value added innovation and that of their counterparts in the study area showed that the mean annual income level (N182,066.67), annual savings (N77,632.5) and monthly expenditure (N 20,648.94) of rural women farmers that adopted cassava value added innovation was greater than the income level (N156,333.33), annual savings (N43,061.22) and monthly expenditure (N14,306.38) of rural women that did not adopt the innovation. The result of probit regression analysis showed that women’s decision to adopt cassava value added innovation was influenced by household size, farm output, educational level, compatibility of innovation, membership of cooperative society and number of training received on cassava value added innovation. However it was observed that constraints such as inadequate knowledge of the innovation (χ=3.0), lack of equipment (χ=3.2) and lack of readily organized market for the products (χ=3.4) were the major challenges associated with adoption of cassava value added innovation. Since the adoption of cassava value added innovations had significant impact on women income, the governments should empower the women farmers through provision of massive training and extension of technologies of new and improved food forms of root/tuber crops. This will serve as a poverty alleviation outfit.

Keywords: effect, cassava value addition, income, expenditures, rural women
INTRODUCTION
Food security is much more than accessibility to food as it also involves availability and affordability of nutritious food. To this end, storage and preservation come into play because most of the food produced by the rural dwellers perish due to poor storage and low adoption level of value addition technologies. This is because good processing, preservation and value addition technologies are not yet within the reach of the rural dwellers (Okorji et al., 2003). Cassava is a perishable and bulky product, which makes it very costly to transport without some initial processing and consequent value addition. Root and Tuber Crops are known to be highly perishable. Most rural farmers do not get the desired reward for their work as most of their produce perishes few days after harvest (Aniedu et al., 2012).

Cassava (Manihot esculenta Crants) is one of the World’s most important food crops grown principally for its root (Allem, 2002). Throughout the tropics, especially in Nigeria, the plant’s root and leaves do not only serve as an essential source of calories but even more so as a major source of income for rural households. About 600 million people in Africa, Asia and Latin America depend on the cassava crop for their food and incomes (Okogbenin et al., 2002). In Nigeria, wide adoption of value added innovation to cassava root has resulted in a sharp rise in its production and consumption. In addition to its key role as the major staple in Nigeria, it has grown to become strategically important as an instrument for rural development.

The roots which are used for human consumption are processed into many food forms. The women are largely responsible for the work of processing it to make gari, fufu, tapioca and other products The uses of cassava are expanding, as further processing can produce chips, pellets, flour, alcohol and starch (Adebayo, 2009). A wide range of industries use cassava in the production of livestock feed, textiles, confections, plywood and soft drinks. Nevertheless, apart from high quality cassava flour (HQCF) being used in the food industries, cassava also has found uses in other industries, especially feed and non-food industries, including starch for the manufacture of textiles, paints, adhesives, and other chemicals (Aniedu et al., 2012). These products are made after about 15 operational processes depending on the product (Okorji et al., 2003). Most of the steps in processing are carried out manually using simple and inexpensive equipment that are available to rural women.
In Nigeria, the industrial utilization of cassava is not merely emerging but increasing day by day (Sanni, et al., 2009; Yimala et al., 2008). Many cassava processing and value addition technologies have been developed by research centers and disseminated to farmers over the years. These technologies are aimed at reducing drudgery, increasing food forms and adding values to the crop (Nwakor et al., 2011). The adoption of innovation is the last step in a decision process to make full use of an innovation having considered that such will impact positively on the livelihood of the adopter. Also, Aniedu (2006) indicated that personal issues such as gender, availability of resources required for the use of innovations, priority and benefits expected to be gained motivate both males and females to adopt innovations. In the light of the foregoing, the research is anchored on the following objectives; (i) to identify Source(s) of training on cassava value added products in the study area; (ii) to identify cassava value added products disseminated to the rural women in the study area; (iii) to determine the level of adoption of selected cassava value added innovation (cassava fufu flour, high quality cassava flour, chips, garri and starch) among rural women in the study area; (iv) to determine the effect of adoption of cassava value added innovation on the annual income, annual savings and monthly expenditures of rural women in the study area; (v) to identify problems encountered by rural women in the adoption of cassava value added innovation.

**Hypotheses of the study**

The following hypotheses were tested in the null form;

**Ho1:** There is no significant difference in the annual farm income, annual savings and monthly expenditures of rural women that adopted cassava value added innovation and that of their counterpart (rural women that did not adopt cassava value added innovation).

**Ho2:** Rural women’s decision to adopt cassava value added innovation is not influenced by Age, educational status, household size, farm income, farm size, number of training received, membership of cooperative society, cassava output, compatibility of innovation and farming experience.

**RESEARCH METHODOLOGY**

The study was carried out in Abia State, Nigeria. The state is located within the Southeastern Nigeria and lies between longitudes 04° 45' and 06° 07' East of the Greenwich Meridian and Latitudes 07° 00' and 08° 10' North of the equator. The state which occupies an area of about 5,834 square kilometer is bounded by Imo state at the western border; Ebonyi and Enugu
states at the North; Cross River and Akwa-Ibom states on the East and Rivers state at the south. The Southern part of the state lies within the riverine part of Nigeria. Its population stood at about 2,883,999 persons with a relatively high density of 580 persons per square kilometer. Abia state, Nigeria is divided into 17 Local Government Areas, which is grouped into three (3) agricultural zones namely, Ohafia, Umuahia and Aba zones. Agriculture predominates in the area, though there are a good exercise of commerce and crafts. The agricultural activities carried out are mostly at subsistence level. The major food crops produced are cassava, yam, maize, cocoyam and vegetable. Cassava are widely grown and processed mainly by women.

The population for the study consisted of women who had benefited from training in value addition to cassava crop organized by either government or private organizations in the state. The study adopted a multistage random sampling technique in the selection of respondents. In the first stage, ten autonomous communities were randomly selected from 35 autonomous communities of the Local Government Areas. From each of the chosen autonomous communities, a list of women group beneficiaries was obtained from the village secretaries who acted as the key informants. This formed the sampling frame for the women group beneficiaries from which samples of two women groups were randomly selected in each of the selected communities, thus giving a total of 20 women group beneficiaries. In the last stage, nine (9) women were randomly chosen from each of the groups. This gave a total sample of one hundred and eighty (180) rural women. The instrument for data collection was via a set of pre-tested and structured questionnaire. The data were analyzed using descriptive statistics, 5 point adoption scale model, Paired t-test model, 3 point likert scale type and probit regression model.

The level of adoption of cassava value added innovations (products) were determined using 5 point adoption score analysis in accordance with Aniedu and Nwakor (2012). The following scaling point were adopted; Aware (1), Interest (2), Evaluation (3), Trial (4), Accepted (5) The mean adoption level were determined thus;

\[ X_s = \frac{\sum X}{N} \]  

\[ - - - - - - - - - - - - - - - (i) \]

\[ X_s \] of each was computed by multiplying the frequency of each response with its appropriate nominal value and dividing the sum with the number of respondents to the items.
This is summarized with the equation below

\[ X_s = \sum f_n/n_r \]  

(ii)

Where \( X_s \) = mean score; \( \sum \) = summation; \( f \) = frequency; \( n \) = adoption nominal value; \( n_r \) = number of respondents

\[ X_s = \frac{1+2+3+4+5}{5} = 3.0 \]

From these responses the mean scores below 3.0 were regarded as having not adopted cassava value added innovation while mean scores equal to 3.0 or above were regarded as having adopted cassava value added innovation. Based on the established critical mean score (3.0), the respondents were then categorized as either adopters or non adopters of cassava value added innovation.

Paired treatment test (paired ‘t’ test) was used to determine the effect of adoption of cassava value added product on the income of rural women farmers in the study area in accordance with Ezeh and Anyiro (2013). The model is stated thus;

\[ t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \]

(iii)

\( n_1 + n_2 - 2 \) degree of freedom.

Where:

- \( t \) = paired t statistic
- \( \bar{X}_1 \) = Mean income, savings and expenditures of rural women that adopted cassava value added innovation
- \( \bar{X}_2 \) = Mean income of women, savings and expenditures of rural women that did not adopt cassava value added innovation
- \( S_1^2 \) = Variance of income, savings and expenditures of rural women that adopted cassava value added innovation
- \( S_2^2 \) = Variance of income, savings and expenditures of rural women that did not adopt cassava value added innovation
- \( n_1 \) = number of selected rural women that adopted cassava value added innovation
- \( n_2 \) = number of selected rural women that did not adopt cassava value added innovation

To determine factors affecting decision to adopt cassava value added innovation, probit regression model was considered most appropriate. The probit regression model was used because decision to adopt cassava value added innovation varies from one rural women
farmer to another and among exposable factors. This model is stated as follows according to Emerole et al. (2013):

\[ Y_{ij} = \alpha_j + \beta_j \sum_{k=1}^{s} H_{ijs} + \epsilon_{ij} \] \hspace{1cm} \text{... (iv)}

Where the \( H_{ijs} \) are vectors of the explanatory variables of the \( j^{th} \) women’s decision to adopt cassava value added innovation; \( Y_{ij} \) is a vector of binary variables such that \( Y_{ij} = 1 \) if the \( j^{th} \) women adopt cassava value added innovation, and 0 otherwise. Since \( Y_{ij} \) can only assume two different values for the decision yes or no, represented by 1 or 0, the expected probability can be defined as follows:

\[ E(Y_{ij}) = E[\alpha_j + \beta_j \sum_{k=1}^{s} H_{ijs} + \epsilon_{ij}] \]

\[ = \alpha_j + \beta_j \sum_{k=1}^{s} H_{ij} E(H_{ij}) \] \hspace{1cm} \text{...(v)}

Equation (vi) defines the proportion of women with characteristics \( H_{ij} \) likely to adopt improved cassava value added innovation. The empirical model is specified thus:

\[
\text{EXP } Y_{ij} = \beta_0 + \beta_1 \ln(X_1) + \beta_2 \ln(X_2) + \beta_3 \ln(X_3) + \beta_4 \ln(X_4) + \beta_5 \ln(X_5) + \beta_6 \ln(X_6) + \beta_7 \ln(X_7) + \beta_8 \ln(X_8) + \beta_9 \ln(X_9) + \epsilon_{ij}. \]

Where variables are as defined below. The dependent variable is farmers’ decision to adopt cassava value added innovation as defined in equation (ii). The explanatory variables are both the continuous and binary types.

The independent variables include:

\( X_1 = \) Age (in years)
\( X_2 = \) Educational status (in years)
\( X_3 = \) Household size (number)
\( X_4 = \) Farm income (Naira)
\( X_5 = \) Farm size (hectare)
\( X_6 = \) Number of training received (number)
\( X_7 = \) Membership of cooperative society (1 = member, 0 if otherwise)
\( X_9 = \) Cassava output (kg)
To find out respondents’ perceived constraints to the adoption of cassava value added innovation, a list of possible constraints was listed and the respondents asked to indicate their perceived constraints. The following scaling procedure was adopted; Very serious constraints = 3; Serious constraints = 2; Not serious constraints = 1. From these responses the mean scores below 2.0 were regarded as not serious constraints while mean scores equal to 2.0 or above were regarded as serious constraints to the adoption of cassava value addition technologies.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of respondents

The socio-economic characteristics of the rural women that benefited from training on value addition to cassava crop organized by government and private organizations in the state are shown in Table 1.0. The mean age of the women was 41.7 years. This is an indication that the women beneficiaries were mostly middle aged that were within the active productive work force. Majority (83.33%) of the women were literate possessing divers’ formal educational levels that ranged from primary school education to tertiary school education. Majority (62.22%) of the women were married with a mean household size of 5.3 persons. The result also shows that the mean years of farming experience was 16.4 years. This indicates that the rural women have been cultivating cassava for a long time. Farming experience affects farm managerial know how and decision-making process. Meanwhile, it has been observed that higher farming experience attainable through increased years of farming leads to higher rates of adoption of new agricultural innovation. The mean farm size of the women was 0.7 hectare.
Table 1.0: Socioeconomics of rural women that benefited from training on value addition to cassava crop organized by government and private organizations in Abia State, Nigeria

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>46.7</td>
<td>20.453</td>
</tr>
<tr>
<td>Household size (number)</td>
<td>5.3</td>
<td>3.167</td>
</tr>
<tr>
<td>Farming experience</td>
<td>16.4</td>
<td>11.85</td>
</tr>
<tr>
<td>Farm size (hectare)</td>
<td>0.7</td>
<td>0.31</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>37.78</td>
</tr>
<tr>
<td>Married</td>
<td>62.22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education level</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No formal education</td>
<td>16.67</td>
</tr>
<tr>
<td>Primary education</td>
<td>27.78</td>
</tr>
<tr>
<td>Secondary education</td>
<td>40.00</td>
</tr>
<tr>
<td>Tertiary education</td>
<td>15.56</td>
</tr>
</tbody>
</table>

Source: Field Survey data, 2014:
Note 1 USD = ₦160

Source of information and training on cassava value added products

Table 2.0 shows respondents’ sources of information and training on cassava value added innovation in the study area. The table reveals that a good proportion of the respondents (35.55%) obtained training on cassava value added innovation from National Root Crop Research Institute, Umudike (NRCRI) while 23.33% of them received their training from Agricultural Development Programme (ADP). However, 12.22%, 11.11%, and 17.77% of the respondents received their training from farmers / women organizations, television/radio and friends respectively. The good number of respondents (35.35%) that obtained their training on cassava value added products from National root crop research institute and Agricultural Development Programme (ADP) confirms their statutory agenda and contribution towards massive training and extension of technologies of new and improved food forms of root/tuber crops to rural farmers in the country.
Table 2.0: Distribution of respondents according to their sources of information and training on cassava value added innovations in Abia State, Nigeria

<table>
<thead>
<tr>
<th>Source of training</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV radio</td>
<td>20</td>
<td>11.11</td>
</tr>
<tr>
<td>ADP</td>
<td>42</td>
<td>23.33</td>
</tr>
<tr>
<td>Farmers organization</td>
<td>22</td>
<td>12.22</td>
</tr>
<tr>
<td>Friends</td>
<td>32</td>
<td>17.77</td>
</tr>
<tr>
<td>NRCRI</td>
<td>64</td>
<td>35.55</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>180</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

*Source: Field Survey data, 2014*

Types of cassava value added innovation extended to farmers

Table 3.0 shows that various types of cassava value added products were introduced to rural women in the study area. Nine major types were identified which include; Garri, cassava fufu flour, high quality cassava flour, cassava chin chin, cassava starch, cassava cake, cassava chips, cassava strips and cassava bread. Specifically, cassava fufu flour, garri and high quality cassava flour were the most cassava value added products disseminated to the rural women as attested by 56.67%, 52.22% and 67.78% of the respondents respectively. The least cassava value added products extended to the rural women were cassava starch (18.89), cassava cake (14.44%), cassava chips (11.11%) and cassava strips (31.11%). This result implies that the predominant cassava value added products extended to women in the area was due to the active promotion of such products by National Root Crop research Institute (NRCRI), Umudike and Agricultural Development Programme (ADP) in the State and in alignment with the major diet of the respondents.
Table 3.0: Types of cassava value added innovations extended to rural women in Abia State, Nigeria

<table>
<thead>
<tr>
<th>Cassava value added innovations</th>
<th>Frequency*</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garri</td>
<td>122</td>
<td>67.78</td>
</tr>
<tr>
<td>cassava fufu flour</td>
<td>102</td>
<td>56.67</td>
</tr>
<tr>
<td>High quality cassava flour</td>
<td>94</td>
<td>52.22</td>
</tr>
<tr>
<td>Cassava chin chin</td>
<td>84</td>
<td>46.67</td>
</tr>
<tr>
<td>Cassava starch</td>
<td>34</td>
<td>18.89</td>
</tr>
<tr>
<td>Cassava cake</td>
<td>26</td>
<td>14.44</td>
</tr>
<tr>
<td>Cassava Chips</td>
<td>20</td>
<td>11.11</td>
</tr>
<tr>
<td>Cassava strip</td>
<td>56</td>
<td>31.11</td>
</tr>
<tr>
<td>Cassava bread</td>
<td>60</td>
<td>33.33</td>
</tr>
</tbody>
</table>

*Source: field survey data, 2014: *multiple responses recorded

Extent of adoption of cassava value added innovation

Table 4.0 shows the extent of adoption of cassava value added innovation by rural women in the study area. Results show that the adoption scores for the different cassava value added innovation ranged between 1.87 and 11.53, with an overall mean cut off score of 4.62. This is an indication of high adoption level of cassava value added technologies among women in the study area. Specifically, the most adopted cassava value added product by the women in the study area was garri, with a mean adoption score value of 11.53. This was followed by cassava fufu flour (9.08) and High quality cassava flour (χ²=5.81). However, cassava chin chin recorded moderate adoption rates (χ²=3.33). Although cassava value added products such as cakes, strips and bread had high awareness rates, they recorded very low adoption rates. The high rates of adoption of cassava value added innovation in the area could be attributed to the fact that Agricultural Development Project (ADP), National Root Crop Research Institute (NRCRI) and media houses in the state had embarked on awareness campaign and sensitization, exposing rural women farmers on various cassava value added innovation.
Table 4.0: Level of adoption of cassava value added innovation by rural women in Abia State, Nigeria

<table>
<thead>
<tr>
<th>Cassava value added innovation</th>
<th>Awareness</th>
<th>Interest</th>
<th>Evaluation</th>
<th>Trial</th>
<th>Accept</th>
<th>Mean score</th>
</tr>
</thead>
<tbody>
<tr>
<td>cassava fufu flour</td>
<td>162(162)</td>
<td>102(204)</td>
<td>118(354)</td>
<td>104(416)</td>
<td>100(500)</td>
<td>9.08</td>
</tr>
<tr>
<td>High quality cassava flour</td>
<td>138(138)</td>
<td>88(176)</td>
<td>98(294)</td>
<td>52(208)</td>
<td>46(230)</td>
<td>5.81</td>
</tr>
<tr>
<td>Cassava Chips</td>
<td>66(66)</td>
<td>44(88)</td>
<td>39(114)</td>
<td>24(96)</td>
<td>20(100)</td>
<td>2.58</td>
</tr>
<tr>
<td>Garri</td>
<td>180(180)</td>
<td>154(308)</td>
<td>142(426)</td>
<td>138(552)</td>
<td>122(610)</td>
<td>11.53</td>
</tr>
<tr>
<td>Cassava Starch</td>
<td>118(118)</td>
<td>56(112)</td>
<td>34(102)</td>
<td>22(88)</td>
<td>18(90)</td>
<td>2.83</td>
</tr>
<tr>
<td>Cassava chin chin</td>
<td>76(76)</td>
<td>52(104)</td>
<td>44(132)</td>
<td>38(152)</td>
<td>26(130)</td>
<td>3.3</td>
</tr>
<tr>
<td>Cassava cakes</td>
<td>42(42)</td>
<td>38(76)</td>
<td>46(138)</td>
<td>24(96)</td>
<td>22(110)</td>
<td>2.57</td>
</tr>
<tr>
<td>Cassava strips</td>
<td>36(36)</td>
<td>34(68)</td>
<td>22(66)</td>
<td>22(88)</td>
<td>20(100)</td>
<td>1.99</td>
</tr>
<tr>
<td>Cassava bread</td>
<td>86(86)</td>
<td>46(82)</td>
<td>24(72)</td>
<td>14(56)</td>
<td>8(40)</td>
<td>1.87</td>
</tr>
<tr>
<td>Overall mean adoption</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.62</td>
</tr>
</tbody>
</table>

Figures in parenthesis are the likert scale value
Cut-off score = > 3.0 = adopted; < 3.0 = did not adopt.

**Effect of adoption of cassava value added innovation on the incomes, savings and Expenditures of rural women**

The result of the paired t-test for a difference in the income level of rural women that adopted cassava value added innovation and the income level of rural women that did not adopt cassava value added innovation in the study area is shown in Table 5.0. The result shows that the mean annual income of the rural women that adopted cassava value added innovation was ₦182,066.67, while the mean annual income of the rural women that did not adopt cassava...
value added innovations was N156,333.33. The mean difference between the two annual income levels was N25,733.33 with a standard error of 15975.7. The paired ‘t’ test result showed that this was statistically different at 1.0% risk level because the calculated ‘t’ = 2.66 was greater than the tabulated “t”0.025 = 2.58. This implies that the income level of the rural women that adopted cassava value added innovation was greater than the income level of rural women that did not adopt the innovation. Therefore the null hypothesis of no difference in the income level of rural women that adopted cassava value added innovation and that of their counterpart was rejected.

The result further showed that the mean annual savings of the rural women that adopted cassava value added innovation was N77,632.5 while the mean annual savings of rural women that did not adopt cassava value added innovation was N43,061.22. The mean difference between the two farm income levels was N34,571.28 with a standard error of 1597.7. The paired ‘t’ result showed that this is statistically significant at 1.0% risk level because the calculated ‘t’ = 4.5272 > the tabulated “t”0.025 = 2.58. This implies that the annual savings of rural women that adopted cassava value innovation was greater than the annual savings of rural women that did not adopt cassava value added innovation. Therefore the null hypothesis of no difference in annual savings of rural women that adopted cassava value added innovation and that of their counterpart was rejected.

The mean monthly expenditure value of rural women that adopted cassava value added innovation was N20648.94 while the mean monthly expenditure of their counterpart was N14306.38. The mean difference between the expenditure levels of the farm households was N6,342.553 with a standard error of 1771.302. The paired ‘t’ result showed that this was statistically significant at 1.0% risk level because the calculated ‘t’ = 3.5807 was greater than the tabulated “t”0.025 = 2.58. Therefore the null hypothesis of no difference was rejected.
Table 5.0: Result of paired t-test for difference in the income, savings and expenditure levels of rural women that adopted cassava value added innovations and the income, savings and expenditure of rural women that did not adopt cassava value added innovations in Abia State, Nigeria

<table>
<thead>
<tr>
<th>Variable</th>
<th>Individual mean</th>
<th>Mean difference</th>
<th>Standard error</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual incomes (₦)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non adopters</td>
<td>156,333.33</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adopters</td>
<td>182,066.67</td>
<td>25, 733.34</td>
<td>5912.04</td>
<td>2.66***</td>
</tr>
<tr>
<td>Annual savings (₦)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non adopters</td>
<td>43,061.22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adopters</td>
<td>77,632.5</td>
<td>34,571.28</td>
<td>1597.7</td>
<td>4.53***</td>
</tr>
<tr>
<td>Monthly expenditure (₦)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non adopters</td>
<td>14306.38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adopters</td>
<td>20648.94</td>
<td>6,342.553</td>
<td>1771.302</td>
<td>3.58***</td>
</tr>
</tbody>
</table>

Source: Calculations from field survey data, 2014.
***, = Variable significant at 1.0% alpha level.
Note: 1US$= 160 Naira (₦)

4.4.1 Factors influencing decision to adopt cassava value innovation

The Probit estimates of factors that influenced rural women’s decision to adopt cassava value added innovation in Abia State, Nigeria are presented in Table 6.0. Overall, the model predicted 84.92 per cent of the sample correctly and posted a log likelihood and pseudo $R^2$ value of -53.934663 and 0.6677 respectively.

In the model, six out of ten explanatory variables were statistically significant at given levels and these variables were household size, output, number of training received, compatibility and membership of farmers association. In the table (Table 6.0), a positive sign on the variable’s coefficient indicates a higher probability to adopt cassava value added innovation and vice versa when a negative sign was obtained.

Specifically, the coefficient of education (0.5418162) was positive and statistically significant at 1.0% probability level. This indicates that an increase in educational level of the respondents increased the decision to adopt cassava value added innovation. This result conforms to a priori expectation. Education has the capacities to influence people to accept new innovation and change their attitude to the desired technology (Okoye et al, 2004).
The coefficient \((-0.6810573)\) of household size was significant at 10.0% alpha level and indicates that household size was important in the adoption analysis of improved cassava value added innovation. The negative sign of the variable implies that the larger the household size, the lower the probability of adopting cassava value added innovation by the rural women. The regression coefficient was \(-0.68107\) implying that a unit increase in household size reduces the likelihood of adopting improved varieties. This contradicts the findings of Omonona et al (2003).

The coefficient of farm output and number of training received on cassava value added innovation were positive and significant at 5.0% alpha level which implies that the higher the farm output and number of training received on cassava value added innovation, the higher the likelihood to adopt the innovation. The regression coefficient was 0.79618 and 0.27603 for farm output and number of training respectively. This conform with the findings of Omonona et al (2003) that farm output and number of extension contact affect the level of adoption of improved cassava innovation.

The coefficient of compatibility was positive and was significant at 10.0% risk level, indicating that a very compatibility cassava value added innovation increased the decision for its adoption especially when the innovation is similar and agreed with the existing culture. This is in tandem with Rogers (1995).

The coefficient of membership of farmers association (0.43544) was positive and statistically significant at 10.0% alpha level. This implies that an increase in the membership of women farmers association stirred up the decision to adopt cassava value added innovation. Murphy (1993) stated that farmers communicate most frequently and effectively with those who are most similar to them. These farmers are more likely to obtain information from and be influenced in their farming practices and management decision by other farmers than by extension workers.
Table 6.0: Probit regression estimates of factors that influenced decision to adopt cassava value added innovation among rural women in Abia State, Nigeria

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>T value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.452327</td>
<td>0.3066208</td>
<td>1.48</td>
</tr>
<tr>
<td>Household size</td>
<td>-0.6810573</td>
<td>0.3301048</td>
<td>-2.06*</td>
</tr>
<tr>
<td>Education status</td>
<td>0.5418162</td>
<td>0.181666</td>
<td>2.98***</td>
</tr>
<tr>
<td>Farm Income</td>
<td>-1868641</td>
<td>0.2085854</td>
<td>-0.90</td>
</tr>
<tr>
<td>Farming experience</td>
<td>0.1544868</td>
<td>0.1724209</td>
<td>0.90</td>
</tr>
<tr>
<td>Member of farmers association</td>
<td>0.435444</td>
<td>0.1824578</td>
<td>2.39*</td>
</tr>
<tr>
<td>Farm size</td>
<td>-0817202</td>
<td>0.1513319</td>
<td>-0.54</td>
</tr>
<tr>
<td>Farm output</td>
<td>0.796184</td>
<td>0.0309869</td>
<td>-2.57**</td>
</tr>
<tr>
<td>Number of training</td>
<td>0.2760361</td>
<td>0.543703</td>
<td>5.15***</td>
</tr>
<tr>
<td>Compatibility</td>
<td>0.6237272</td>
<td>0.2990147</td>
<td>2.09*</td>
</tr>
<tr>
<td>Constant</td>
<td>0.4853969</td>
<td>0.9585796</td>
<td>0.51</td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.6677</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-53.9346663</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chi²</td>
<td>343.93</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Field survey data, 2014.

Challenges associated with adoption of cassava value added innovations

The result (table 7.0) revealed that constraints such as inadequate knowledge of the innovation ($\chi^2=3.0$), lack of funds ($\chi^2=2.8$), socio-cultural restriction ($\chi^2=2.6$), lack of equipment/facilities ($\chi^2=3.2$) and lack of readily organized market for the products ($\chi^2=3.4$) were the major challenges associated with adoption of cassava value added innovations. This is in line with the earlier report of Young (1994) that rural women farmers are mostly poor resource farmers. Hence, to enable them adopt any innovation, funds should be provided and the provision of energy and time saving equipment and facilities to reduce drudgery should also be made available. Otherwise, any innovation that is labour intensive may not be readily acceptable by them. Also availability of organized market readily available as an incentive for those who adopt these innovations is important.
Table 7.0: Challenges associated with adoption of cassava value added innovations

<table>
<thead>
<tr>
<th>Constraints</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate knowledge of innovation</td>
<td>3.0*</td>
</tr>
<tr>
<td>Lack of funds</td>
<td>2.8*</td>
</tr>
<tr>
<td>No-retraining facilities</td>
<td>1.9</td>
</tr>
<tr>
<td>No extension agents to answer questions</td>
<td>1.6</td>
</tr>
<tr>
<td>Lack of equipment/facilities</td>
<td>3.2*</td>
</tr>
<tr>
<td>Socio – cultural restriction</td>
<td>2.6*</td>
</tr>
<tr>
<td>Lack of market</td>
<td>3.4*</td>
</tr>
</tbody>
</table>

Source: Farm Survey, 2014

*Constraints with mean ≥ 2.0 is deemed important

CONCLUSION

The research had shown that the most adopted cassava value added innovations among the rural women in the study area were garri, followed by cassava fufu flour and high quality cassava flour. The study also revealed that the income level, savings and expenditures of rural women farmers that adopted cassava value added innovations was greater than the income level, savings and expenditures of rural women that did not adopt the innovations. Since the adoption of cassava value added innovations had significant impact on women income, therefore, governments, should empower the women through provision of massive training and extension of technologies of new and improved food forms of root/tuber crops. This will serve as a poverty alleviation outfit. In order to enable the women adopt any innovation access to credit should be provided along side with access to energy and time saving equipment and facilities to reduce drudgery. Otherwise, any innovation that will add more work to the women will not be readily acceptable by the women. Also, provision of market, equipment and facilities should be put in place to ensure enhanced adoption and tangible impact of the training on the livelihood of the people in future dates.

REFERENCES


