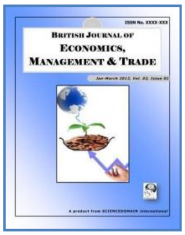

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Comparative Productivity Analysis of Cassava Enterprises by Project and Non-project Women Farmers in Benue State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author MMA designed the study in conjunction with authors ECO and CCE. Author MMA managed the literature searches, data collection and analyses of data together with authors ECO and CCE. Author MMA wrote the first draft of the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

This study has considered whether the differences in output and productivity among cassava women farmers in Benue state, Nigeria occur because of involvement in agricultural development project (ADP), or simply due to differences in observed characteristics. Data from 87 project (ADP) and 87 non-project (non-ADP) women farmers in Benue State, were analysed using descriptive statistics, chi-square analysis and the ordinary least square regression techniques, during which respondents' productivities were estimated, compared and determinants of productivity identified. Chi-square results showed that except for age and membership of farmers' associations (which were significant), there was no significant difference between the socio-economic characteristics of ADP and non-ADP respondents. Regression results showed that there was a significant difference between the productivity of ADP and non-ADP respondents since computed F (27.56) was greater than tabulated F (1.93) at 5% level of significance. The coefficient of determination (R^2) for ADP

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regression was 0.402 while F-ratio was 7.619 (P =.001). Significant variables were use of improved cassava stem cuttings (P =.074), amount of agrochemical used (P =.018), farm size (P =.064) and access to credit (P =.044). The R^2 for non-ADP regression was 0.930 while F-ratio was 5.352 (P=.065). Significant variables were farming experience (P=.065), years of education (P =.019), family size (P =.013), and access to credit size (P =.031). Policies for greater project participation, access to education, family planning services, production inputs such as improved cassava varieties, land, agrochemicals and other identified needs by women farmers would improve their productivity and reduce poverty in Nigeria.

Keywords: Cassava enterprises; women farmers; improved productivity; poverty reduction.

1. INTRODUCTION

Poverty remains a challenge in Nigeria's development efforts. Although the national poverty rate was 54 percent, or 69 million people in 2004, a reduction from its highest level in the early 1990s, it is still two times higher than the poverty rate in 1980. On the other hand, relatively impressive economic growth rates were recorded during the 2000-07 period. Compared to the periods of 1990-94 and 1995-99, when the economy grew at 2.6 and 3.0 percent per year respectively, the annual growth rate of GDP rose to 7.3 percent during 2000-07 [1]. Impressive as this may look, [2] described it as "jobless growth" because the apparent improvement in growth indices is yet to translate into welfare improvement for Nigerians. This implies that while economic growth is necessary for the country's development, it does not automatically impact poverty reduction. Notably, the agricultural sector has been a key driver of recent growth in Nigeria. Between 1990 and 2006, the agricultural and oil sectors accounted for 47 and 39 percent of national growth, respectively. Despite the high dependence of government revenues and national export earnings on the oil sector, the agricultural sector has comprised the most important source of growth in recent years. Furthermore, agriculture is the single largest employer among sectors employing about 70 percent of labor force [3], and as labor is the main and sometimes only asset of the poor [4], the agricultural sector outperforms all other sectors in reducing poverty [1].

Consequently, agricultural development is a major component of Nigeria's ambition to become one of the top 20 economies in the world by year 2020-vision 20:2020 [2]. To attain this, [5] estimated that Nigeria requires overall growth of above 10% on a consistent basis. As a result, Nigeria has set targets for year 2020 namely a GDP of US$900 billion, 15% (US$135 billion) of which is to come from agriculture, and a per capita income of US$4000. These impressive targets are set based on the expectation to make optimal use of non-oil sources of economic growth such as agriculture. Non-oil exports (mainly from agriculture) are targeted to grow at an average annual rate of 30.0%. Cassava is to be a major component of these exports [2]. Cassava contributes about 40% of the calories consumed in Africa [6], and generates about 25% of cash income from all crops grown, constituting the single most important source of cash income [7]. Both rich and poor farmers often derive more income from cassava than from any other crop or income earning activity [8]. Consequently, the crop has become the paramount staple food security crop in sub-Saharan Africa, and a mainstay of the rural, and increasingly the urban economy [9]. According to [10] these and other features have endowed cassava with special capacity to contribute to food security, equity, poverty alleviation and environmental protection.

Understandably, cassava is among the top priority crops in Nigeria's bid to actualize vision 20:2020, as the Federal Government has targeted 100% increase in annual yield of cassava from 49 million MT [11] to 100 million MT [2]. The problem is, though Nigeria is the world's largest producer of cassava [12], past increases in cassava yield have been through land area expansion rather than increases in productivity [13]. Regrettably, this trend is not sustainable because of competing demand for land from other uses [14]. Therefore, to achieve the required level of cassava output, there is need to seek ways to increase productivity rather than increasing the area under cultivation. Studies show that women of many countries play dominant and prominent roles in meeting the challenges of agricultural production and development [15]. Notably, women in Nigeria play central roles in cassava production, processing and marketing, contributing over 58%

of the total agricultural labour [16]. Hence improving the productivity of these women can contribute to agricultural development, poverty reduction and invariably national development. Consequently, this study was undertaken to determine and compare productivities of women farmers involved in Agricultural Development Project (ADP) and those not involved (non-ADP) in Benue State, Nigeria. This was to determine the suitability of using ADP women farmers as drivers of the cassava transformation process. The specific objectives were to: (a) identify the socio-economic characteristics of respondents and determine their effect on respondents' productivity; (b) identify the determinants of respondents' productivity; (c) determine and compare the productivities of ADP and non-ADP cassava women farmers in the State. Based on the objectives of the study the following hypotheses were set in a null form: (i) Socio-economic characteristics of ADP and non-ADP respondents do not differ significantly; (ii) There is no significant difference between the productivities of ADP and non-ADP respondents.

2. MATERIALS AND METHODS

2.1 Study Area, Sampling and Data Collection

The study area is Benue State, Nigeria. Benue State has a population of 4,219,244 [17] and a total land area of 34,095 km^2. The State lies between longitude 8ºE and 10ºE, Latitude 6º3ºN and 8½ºN and consists of 23 Local Government Areas grouped into three Agricultural Development Project zones (A, B, C). Benue State is found in North Central Nigeria and shares boundaries with other states like Cross River to the south, Enugu to the south West, Ebonyi to the south, Kogi to the west, Taraba and Nasarawa States to the East and North respectively. Benue state also has an international boundary with the republic of Cameroon to the South East. The State has abundant human and material resources, as it is located in the rich agriculture land of the Guinea Savannah zone of the Nigeria. The state has two main seasons, the rainy season which usually starts from April and ends in October with an average precipitation of 1500 mm. The daily mean temperature during rainy season is 28ºC [18].

Multi stage sampling technique was adopted for the study. Stage one was purposive selection of Benue State because it is the largest cassava producing state in Nigeria [19]. Stage two was purposive selection of two cassava producing local governments from each zones in the state, making a total of six Local Governments. Stage three was random selection of twenty-nine ADP and 29 non-ADP) cassava women farmers respectively from the selected Local Governments in each zone giving a total of 87 ADP and 87 non-ADP respondents, and a grand total of 172 respondents. Descriptive statistics such as means, frequencies, and percentages were used to analyse the data. The ordinary least square multiple regression model was used to estimate the determinants of respondents' output. This was similar to the procedure adopted by [20]. The explicit form of the model (selected) was:

$$\text{Log } Yc = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10}$$

Where: Yc = output of cassava in kg, X_1= farming experience of farmers (years), X_2 = years of education (years), X_3 = family size of farmer (number) X_4 = amount of fertilizer used (kg), X_5 = use of improved cassava cuttings (dummy, 1 = improved, 0 otherwise). X_6 = amount of agrochemicals used (L), X_7 = farm size in (hectares), X_8 = total amount of labour used (man-days). X_9 = credit use (dummy, 1 = credit use and 0 otherwise). X_{10} = access to extension advice (dummy, access=1, 0 otherwise), b_0 = intercept, bi = coefficients of the variables used in the regression, e = error term.

Chi-square was used (test hypothesis one) to determine whether or not there was a significant difference between socio-economic characteristics of ADP and non-ADP respondents (since this can affect their output and productivity). This was tested at 5% level of significance. This was used according to the procedure adopted by [21] as:

$$\chi^2 = \frac{\Sigma(fo-fe)^2}{fe}$$

Where χ^2 = Chi-square, Fo = Frequency observed, Fe = Expected frequency

Decision rule was accept null hypothesis if chi-square calculated is greater than table chi-square [χ^2 (cal) > χ^2 (tab)] at 5% level of significance, otherwise reject null hypothesis and accept alternative hypothesis. The null hypothesis was that socio-economic characteristics of ADP and non-ADP

respondents did not differ significantly and could not be responsible for any observed differences in productivity among ADP and non-ADP respondents.

Chow's F-test was used to determine whether there is a significant difference between ADP and non-ADP respondents' productivity (hypothesis two). It was specified as:

$$\text{Chow's F} = \frac{[\Sigma ep^2 - (\Sigma e_1^2 + \Sigma e_2^2)]/k}{(\Sigma e_1^2 + \Sigma e_2^2)/(n_1 + n_2 - 2k)}$$

Where; Σep^2 = sum of pooled (combined) unexplained variations from multiple regression of observations from ADP and non ADP woman farmers, Σe_1^2 = sum of residual variations from multiple regression of ADP respondents' data. Σe_2^2 = Sum of residual variations from regression of non-ADP respondents' data, n_1 = sample size of ADP respondents, n_2 = sample size of non ADP respondents, k = number of estimated parameters including the intercept. Decision rule is accept null hypothesis if computed Chow's F is greater than critical F-value at 5% level of significance otherwise reject null and accept the alternative hypothesis.

3. RESULTS AND DISCUSSION

3.1 Socio-economic Characteristics of Respondents

Analysis of respondents' socio-economic characteristics showed that 90.8% of the ADP and 70.1% of the non-ADP respondents were below 50 years of age. Thus about 70-90% of all women farmers studied were below the age of 50. Moreover, less than 5% of all respondents were aged 60 years and above. This implies that respondents were young and energetic enough to farm. The importance of age distribution of farmers is because agriculture especially in the study area relies heavily on the use of human power and younger stronger people are better able to cope. This conforms to [22] and [23]. From the ADP group, 78.2% of the respondents were married while 70.1 of the non-ADP group respondents were married. Overall, 96.4% of all the respondents were married; divorced or widowed. Only 3.4% of all cassava women farmers sampled were single. This implies that respondents are people married with responsibility out to fend for their families. About 81.6% of respondents had formal education at one level or the other while 18.49% did not have any formal education. Among ADP respondents, 63.2% of had formal education while 36.8% did not have any formal education. One can conclude that 60-80% of all cassava women farmers sampled were educated while 20-40% did not benefit from any formal education. Therefore, majority of the respondents were educated enough to enable them successfully farm, and adopt innovations that would improve their productivity and welfare.

1. Cassava women farmers in the study area had moderate family sizes. Seventy-seven percent (77%) of the ADP and 74.7% of the non-ADP respondents had family sizes below 10 while about 20% of ADP and 23% of non-ADP respondents had family sizes between 10-20 persons. A large family size is important in the supply of farm labor in farming communities especially in Nigeria where farmers depend mainly on manual labour. Hence, respondents had big reservoir of labour for farm work. Close to 38% (37.9%) of the ADP farmers had never belonged to any farmers' association, 17.2% were once members while 44.4% are current members of farmers associations. About 82.8% of the non-ADP respondents have never belonged to any farmers association, 5.7% were once members, and 11.5% are currently members. Table 1 gives the details about respondents' socio-economic characteristics:

This shows clearly that the ADP respondents are better organized and better positioned to get assistance from government and other organizations including banks for their farm operations since such assistance is channeled through organizations rather than through individual farmers. Results further showed that 71.3% and 58.6% of the ADP and non-ADP cassava women farmers respectively had been farming for close to 10 years and must have acquired the necessary experience successful cassava production.

3.2 Chi-square Analysis of Respondents' Socio-economic Characteristics

Socio-economic characteristics such as age, marital status, family size, level of education, membership of farmers associations, and farming experience often times affect farmers' output and productivity. Education for instance reflects the ability to implement technology, and

Table 1. Frequency distribution of respondents' socio-economic characteristics

Variable	ADP Respondents		Non-ADP Respondents	
	Frequency	Percentage	Frequency	Percentage
Age(Years)				
<20	3	3.4	3	3.4
20-29	23	26.4	14	16.2
30-39	38	43.7	23	26.4
40-49	15	17.2	21	24.1
50-59	6	6.9	20	23.0
≥60	2	2.3	6	6.9
Marital status				
Married	68	78.2	61	70.2
Divorced	4	4.6	12	13.8
Widowed	12	13.8	11	12.6
Single	3	3.4	3	3.4
Educational level				
No formal education	16	18.4	32	36.8
Primary education	35	40.2	29	33.3
Secondary education	22	25.3	15	17.2
Tertiary education	14	16.1	11	12.6
Family size				
≤10	67	77.0	65	74.7
11-20	17	19.6	20	23.0
21-30	2	2.3	2	2.3
≥31	1	0.1	-	-
Membership of farmers' Associations				
Never been a member	33	37.9	72	82.8
Once a member	15	17.2	5	5.7
Currently a member	39	44.8	10	11.5
Farming experience (years)				
≤ 5	30	34.5	21	24.1
6-10	32	36.8	30	34.5
11-15	15	17.2	16	18.4
16-20	7	8.0	8	9.2
>20	3	3.4	12	13.8

Source: Field data, 2010

together with experience can increase the value of human resources. This can increase the output and productivity of farmers [24]. Therefore, Chi-square analysis was employed to determine whether or not the observed differences in output and productivity among ADP and non-ADP respondents were due to differences in their socio-economic characteristics. Chi-square was used because the socio-economic variables were categorical. Chi-square results showed that there was no significant difference between the socio-economic characteristics of ADP and non-ADP respondents with respect to variables such as marital status, level of education, family size, and farming experience because computed chi-square value was less than table value at 5% level of significance. Therefore, the null hypothesis was accepted for marital status, level of education, family size and farming experience, since they had no significant effect on output, and could not be responsible for the observed differences in output.

However, there was a significant difference in age distribution between ADP and non-ADP cassava women farmers because calculated chi-square value obtained (16.416) was greater than table value (11.07) at 5% level of significance and 5 degrees of freedom. However, in the regression results, the coefficient for farming experience which proxied age was not significant implying that age did not have a significant effect on output. Therefore, the observed differences in ADP and non-ADP respondents' output and productivity cannot be attributed to the differences in their ages. Chi-square analysis further showed a significant difference between ADP and non-ADP respondents in their membership of farmers' associations because chi-square calculated (36.649) was greater than tabulated (5.99) at 5 percent level of significance

and 2 degrees of freedom. However, membership of farmers' associations was a proxy for access to credit and the possible explanation could be non accessibility of credit by the associations and the inability to properly utilize the little credit obtained for agricultural purposes. Table 2 summarizes the results of respondents' chi-square analysis:

3.3 Comparison of ADP and Non-ADP Productivity and Testing of Hypothesis Two:

Chow's F-test was used to test the hypothesis that there is no significant difference between ADP and non-ADP productivity. To do this, Chow's F was computed using unexplained variations (residuals) from the multiple regressions of observations from ADP respondents (e^2_1), non-ADP respondents ($e_2{}^2$) and the pooled (combined ADP and non-ADP) regression (ep^2). Results showed that computed Chow's F (27.56) was greater than table value (1.93) at 9 degrees of freedom numerator and 142 degrees of freedom denominator, at 5% level of significance. This implies that there is a significant difference between ADP and non-ADP productivity. Therefore, the null hypothesis which states that there is no significant difference between the productivities of ADP and non-ADP respondents was rejected and the alternative hypothesis accepted. This significant difference has been attributed to respondents' involvement in the Benue State Agricultural Development Project. The implication of this is that involvement in agricultural development project is beneficial and can enhance farmers' productivity in Benue State, Nigeria.

3.4 Determination of the Factors Affecting Respondents' Productivity

The double log was selected as the lead equation for modeling both the ADP and non-ADP respondents' output. For ADP regression, the coefficient of determination (R^2) was 0.402 showing that 40.2% of the variation in output was explained by variables included in the model. The value of F-ratio (7.619) was significant beyond 1% (*P* =.001) showing that the combined influence of the explanatory variables was strong (indicating a good fit). Table 3 gives the summary of the ADP and non-ADP regression results:

Significant variables in ADP regression were use of improved cassava stem cuttings (*P* =.074), amount of agrochemical used (*P* =.018), farm size (*P* =.064), access to credit (*P* =.044).

For non-ADP regression, the coefficient of determination (R^2) was 0.930 showing that 93.0% of the variation in the output was explained by the explanatory variables included in the model. The F-ratio (5.352) was significant at 10% level showing that the combined influence of the explanatory variables was strong. Significant variables in non-ADP regression were farming experience (*P* =.065), years of education (*P* =.019), family size (*P* =.013), and access to credit size (*P* =.031). These results imply that policy makers should take notice of these significant variables to ensure that the needs of these cassava producers are met to improve productivity and enhance national development. Further implications of these results are:

3.4.1 Farming experience (X_1)

The coefficient of this variable was not significant in the ADP regression but it was negative and significant in the non-ADP regression. This implies that though farming experience has no significant effect on ADP output, it tends to reduce the output of ADP. This contrasts with [25] who found that as farmers get older and

Table 2. Summary of chi-square analysis of respondents' socio-economic characteristics

Socio-economic characteristic(s)	Computed χ^2	Tabulated χ^2	Degrees of freedom & sig
1. Age of respondents	16.416	11.07	5, significant
2. Marital status of respondents	4.432	7.80	3, not significant
3. Educational level of respondents	7.580	7.693	3, not significant
4. Family size of respondents	24.924	33.93	2, not significant
5. Membership of farmers' associations	36.649	5.99	2, significant
6. Farming experience of respondents	7.152	9.49	4, not significant

Source: Field data, 2010

Table 3. Summary of the regression results of ADP and non-ADP respondents

Variable	ADP respondents			Non-ADP respondents		
	Coeff.	t-value	sig	Coeff	t-value	sig
Constant	8.737	18.982	0.000	7.648	2.558	0.063
Farming experience (X_1)	0.090	0.681	0.501	0.675	3.002	0.065
Years of education (X_2)	0.140	0.973	0.338	1.236	3.803	0.019
Family size (X_3)	0.134	0.998	0.330	-0.079	-0.549	0.013
Amount of fertilizer (X_4)	0.287	1.558	0.109	0.189	0.741	0.500
Use of improved cassava(X_5	1.680	1.884	0.074	0.492	2.633	0.058
Use of agrochemicals (X_6)	0.326	2.478	0.018	0.110	0.535	0.621
Farm size (X_7)	0.247	1.917	0.064	0.523	1.134	0.320
Amount of labour (X_8	0.222	1.123	0.270	-0.366	-0.598	0.582
Access to credit (X_9)	-0.312	-2.093	0.044	-0.681	-3.258	0.031
Access to extension (X_{10})	0.012	0.085	0.933	0.030	0.207	0.846

Source: Field data, 2010

more experienced, they command more resources such as labour and land for more output and income. The possible explanation is that as farmers get older and more experienced, they become more conservative and less innovative, leaning more on their experience than on new innovative ideas in farming.

3.4.2 Level of education (X_2)

The coefficient of level of education is positive and insignificant in ADP regression, but positive and significant in the non-ADP regression. This implies that unit increase in education tends to increase non-ADP productivity *ceteris paribus.* This conforms to [26,27] who found that education increases productivity.

3.4.3 Family size (X_3)

The coefficient of family size was not significant in ADP regression but negative and significant in the non-ADP model. This implies that while unit increase in family size does not significantly affect ADP output, it tends to reduce non-ADP output. This agrees with [28] who also found a negative relationship between family size and output in their study. This calls policies to educate farmers on the benefits of smaller families.

3.4.4 Improved Cassava Stem Cuttings (X_5)

The coefficient of use of improved cassava stem cuttings was positive and significant in both ADP and non-ADP regressions. This implies that the use of improved cassava stem cuttings have a positive significant effect on output and productivity of both ADP and non-ADP respondents. It also means that even without proper extension advice, improved cassava stem cuttings tend to have significant effect on farmers' output. These results agree with [29] that improvement in agricultural technology (such as improved seeds, stem cuttings) can lead to improvement in farm productivity. Implied policy is to develop and distribute more improved technologies to farmers to improve their farm yields.

3.4.5 Agrochemicals (X_6)

The coefficient of agrochemicals was negative and insignificant in non-ADP but positive and significant in ADP regression. This implies that unit increase in the amount of agrochemicals will tend to increase ADP output, and *vice versa*. This conforms to [29] that, use of agricultural technology such as agrochemicals increase productivity.

3.4.6 Farm Size (X_7)

The coefficient of farm size was positive and significant in ADP regression but negative and insignificant in that of non-ADP. This implies that unit increase in farm size will tend to increase output of ADP respondents and *vice versa.* This result conforms to [30,31], and calls for policies to enable women farmers expand their farm sizes in order to improve their productivity and well being.

3.4.7 Access to Credit (X_9)

The coefficient of credit access was negative and significant in both ADP and non-ADP regressions. This implies that the use of credit tends to reduce output of both respondents. This is contrary to *a priori* expectation of a positive relationship between access to credit and output.

The reason for the negative result could be due the well known diversion of agricultural credit for non-agricultural uses common in the study area. This finding conforms to [32,33] that women benefit little from agricultural services such as credit schemes that would improve their productivity. The implication of this for policy is to ensure that agricultural credit is properly supervised to prevent diversion.

3.5 Respondents' Perceived Constraints to Productivity Improvement

Respondents were asked to identify problems they feel are hindrances to productivity improvement on their farms. The ADP respondents identified processing problem (46.0%), poor pricing of output (37.9%), lack of credit (34.5%), soil fertility problems (31.0%), labour problems (28.7%), transportation problems (27.6%), and poor market infrastructure (26.4%). The non-ADP women farmers identified poor pricing of output (50.6%), lack of credit (47.1%), soil fertility problems (46.0%), processing problems (40.2%), poor market infrastructure (34.5%), labour problems (31.0%), and transportation problems (27.6%). A pooled analysis of all respondents (ADP and non-ADP) showed that poor pricing of output (44.3%), processing problems (43.1%), lack of credit (40.8%), soil fertility problems (38.5%), poor market infrastructure (30.5%), labour problem (28.5%) and transportation problem (27.6%) were major constraints to increased productivity. Fig. 1 shows respondents' perceived constraints to increased productivity:

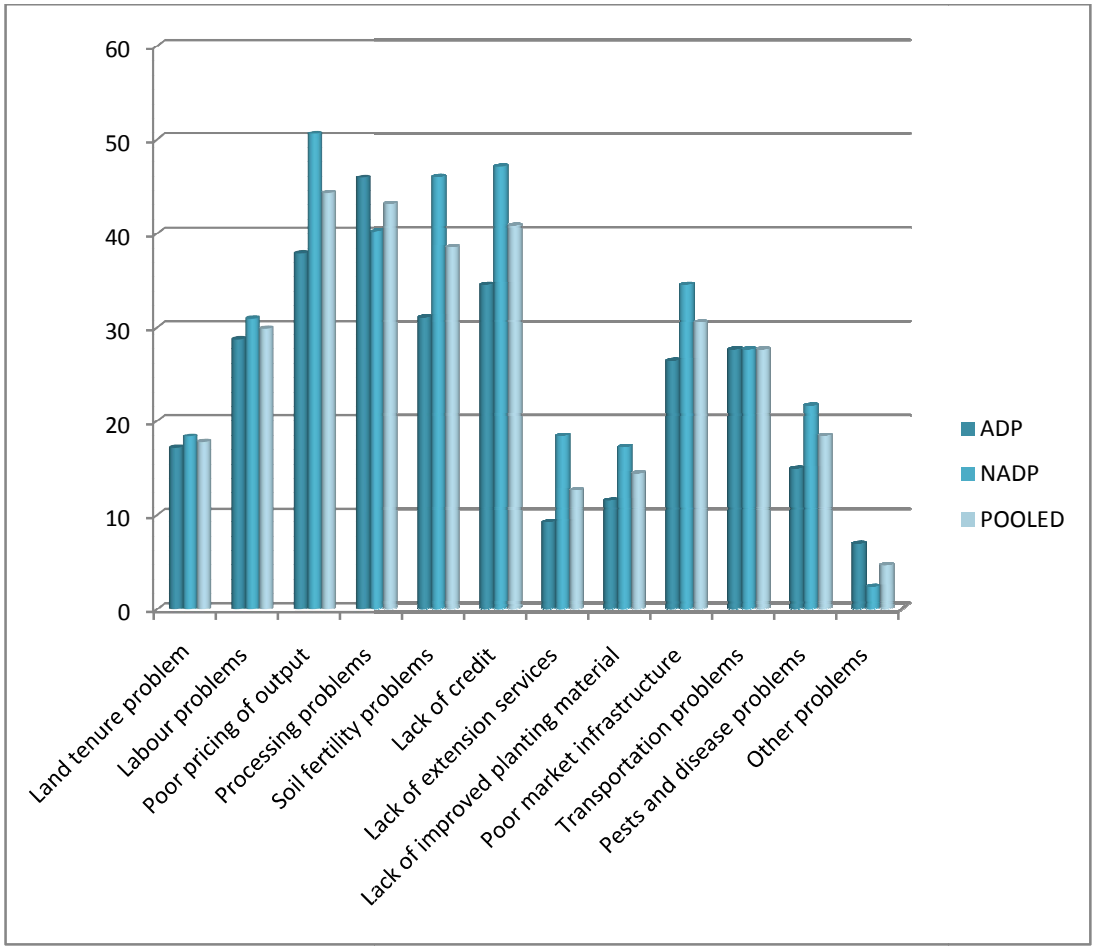

Fig. 1. Identified constraints of respondents
Source: Field data, 2010

4. CONCLUSION AND RECOMMENDATIONS

The need to find pathways (other than land area expansion) to productivity increases in cassava production in Nigeria necessitated this study. Cassava has been identified as one of the major crops in the economic transformation agenda in Nigeria and the women farmers as potential players in the cassava transformation process. The study determined and compared productivities of project (ADP) and non-project (non-ADP) cassava women farmers in Benue State, Nigeria. This was to explore the possibility of using women farmers (particularly ADP cassava women farmers) as drivers of the cassava transformation process in Nigeria. Results showed that there was a significant difference between ADP and non-ADP respondents' productivity because computed Chow's F (27.56) was greater than tabulated F (1.93)] at 5% level of significance. This has been attributed to the involvement of cassava women farmers in the Benue State Agricultural Development Project. This implies that involvement in agricultural development project can enhance farmers' productivity, and reduce poverty in Benue State and Nigeria at large.

Based on the findings of this study, the following recommendations are made towards improving cassava production in Benue State, Nigeria:

This study demonstrated that the productivity of cassava women farmers involved in the Benue agricultural development project was significantly different from that cassava women farmers not involved in the project. Therefore, the study recommends policies to ensure that more women are involved in same or similar projects such to improve their productivity, reduce poverty and promote development in the study area and Nigeria at large.

Since production inputs such as land, agrochemicals and improved cassava stem cuttings were significant determinants of productivity on cassava farms in this study, policies for provision of these inputs to women farmers would improve their productivity and poverty in the study area and Nigeria.

Though credit was a significant reducing factor in respondents' productivity (attributed to credit diversion), policies that ensure proper supervision of credit targeted to cassava women farmers to ensure proper use would improve their productivity and welfare.

Since education had a positive significant effect on productivity, improved education of respondents would improve productivity and help enlighten them about the benefits of optimal family sizes to their productivity and welfare.

Provision of basic infrastructure such as rural water supply, good roads, rural electricity, market infrastructure and agro-processing facilities in the study area would improve rural life, and curtail rural-urban migration one of the major factors responsible for agricultural labour shortages in the study area. This would tend to improve productivity in the area.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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