

*Full Length Research Paper*

# **Effect of adoption of improved cassava variety tme 419 on farmers' livelihood in Ekiti State, Nigeria**

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**The study examined the effect of adoption of improved cassava variety TME 419 on farmers' livelihood in Ekiti State. Specifically it examined the effect of adoption of TME 419 variety on farmers' cassava output, income and livelihood activities. A multistage random sampling technique was used to select 192 respondents for the study from Agriculture Development Project Extension Zones in Ondo State. Qualitative and quantitative techniques were used to obtain information for the study. Data were obtained through reliable and validated structured questionnaire while analysis was done through descriptive statistics, Pearson moment correlation and T-test. The result showed that the mean age of the respondents was 60 years with 18.2% having no-formal education, household size of 5 and mean farm size of 2.5 ha. About 81.8% of the respondents had farming as their primary occupation while the average yield from cassava varieties by the farmers before adopting TME 419 was 1.73 tones which increased to 3.17 tones after adoption. The average income of the farmers increased from ₦30, 000 before adoption to ₦ 75,000 monthly after adoption of cassava TME 419 variety. The livelihood activities of the farmer after adoption increased as the farmers were involved in processing of the cassava variety to various forms There was a significant difference between farmer's livelihood before and after adoption of cassava variety TME 419 ( $t=4.02$ ) and relationship existed between the adoption of cassava TME 419 variety and the livelihood of farmers in the state ( $r= 0.54$ ).**

**Key words:** Adoption, farmer, livelihood, cassava TME419.

## **INTRODUCTION**

Cassava (*Manihot esculenta*) is a staple food in Nigeria and most African countries serving as a dependable source of livelihood for millions of farmers, processors and traders. Cassava is known for its high carbohydrate content, is the fourth largest staple food after wheat, maize and rice consumed in the developing countries, with over 200 million people in sub-Saharan Africa relying

on the crop for over half of their daily food energy (IITA, 2011).

Nigerian cassava production figures stands at 54.8 million tons in 2014 respectively and is by far the largest in the world. A third more than the production in Brazil, and almost double the production of Indonesia and Thailand (Okunlola, 2019). According to FAO (2018), as

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of 2018, world cassava production stood at about 278 million tonnes; Africa total production was about 170 million tonnes (about 56% of world production) (FAOSTAT, 2019). At the same period, Nigeria produced about 60 million tonnes (FAOSTAT, 2019). The demand for cassava and its constituents is high in the domestic economy. However, the supply has been unable to meet the huge demand. For instance, the supply-demand gap for High-Quality Cassava Flour stands at about 485,000 metric tonnes (MT) per annum while the gap for cassava starch is about 290,000 MT (Okunlola, 2019).

In Nigeria, cassava being one of the most important food crops; it is the most widely cultivated crop that provides food and income to over 30 million farmers and large numbers of processors and traders (Alabi et al., 2011, Abdoulaye et al., 2013) with small holders accounting for 80% of cassava production in Nigeria (Oyebanji and Akwashiki, 2003). It is an important source of carbohydrate and provides food for over 60 million people in Nigeria (Abdulahi, 2003). Cassava's popularity stems from the ease of cultivation and the wide variety of products such as *garri*, *lafu*, *akpu*, chips, and flour.

Nweke et al. (2002), stated that 80% of Nigerians in the rural areas eat cassava meal at least once a week and majority eats cassava at least once a day, Ayinde and Adewunmi (2016) corroborated this that it is virtually impossible that an average household in Nigeria will not consume cassava product in a day. In a study carried out by IITA (2011) it was found out that in Nigeria, cassava is the source of livelihood for farmers and countless processors and traders as a cash crop and source of livestock feed. From the study, in about one-third of the households, cassava accounts for about 75% of their total income while, it also contributed 50% of the total income of women in one-third of the households.

Despite the importance of cassava as sources of livelihood and income to the farmers, the local varieties of cassava such as; Antiota (MS-6), Odongbo (MS-3), Okojoyawo (TME-7) that farmers have been planting over years gives lower yield in tonnes of output; the starch contents for industries to use are also very low. The market (commercial/small holder farmers') requirements are quite different. The commercial market requirements of cassava include varieties with higher starch contents for industries.

Majority of cassava farmers are small holder farmers who plant for the small markets which expectedly, bring lower returns on investment. The markets demand preference is more of cassava for higher starch contents which can be used in the industries. This results in a conflict issue in the supply and demand continuum as farmers complain of access to markets while the industrial processors who could provide the commercial market complain of lack of raw materials for processing. It should also be noted that apart from the problems of local varieties there is also the problem of disadoption by the

farmers of some previous existing varieties. The reasons for disadoption include varieties not being good for processing and having a low market price (5%). The farmers also mentioned the following as some of the factors that made them disadopt improved varieties:

susceptibility to pests or diseases, lack of money to buy stems, requiring too much labor/work to grow, late maturity, short underground storage period after maturity, and poor mealy qualities/poor starch content (the *lafun* made from the varieties turns to water very quickly) (IITA, 2011; Ogunsumi et al. (2013).

In order to bridge the supply-demand gap and solve the problems of dis adoption, IITA came up with TME 419 variety that has higher starch contents and other improved production traits for industries and domestic uses to encourage production and increased farmers output.

The TME 419 variety is meets the demand by cassava related industries due to its starch content and also good consumption traits for the local consumers. It is also to be noted that the TME 419 variety also enhanced some production trait preference of the farmers in the area of early maturity, high yielding (roots), and tuber size while it also addressed processing and consumption taste such as smoothness and fiber content.

The cassava variety TME 419 has a field yield range of 10.69-23.45 t/ha and has a dry content of cassava estimated as percentage (DM) of total fresh root weight ranging from 30.68 to 31.26%, the level of Cyanide in the root (CNP- Cyanogenic Potential) is 6.33 ppm. This variety is mainly composed of starch but with a very low percentage of protein.

The quantity of starch contained by percentage in this variety ranges from 63.08 to 73.93% while the quantity of protein by percentage ranges from 0.80 to 1.52% (USAID, NRCR, IITA and FGN, 2010).

Cassava products are increasingly becoming popular in Nigerian food and agricultural markets. Thus, it provides a strong incentive for more economic agents to be involved in the cassava market. According to FAO (2018), cassava is a choice crop for rural development, poverty alleviation, economic growth and ultimately, food security. It is in view of the above that critical stakeholders have continued to contribute immensely to the debate on the development of cassava sub-sector in Nigeria.

Taking into cognizance the introduction of the TME variety to farmers for some years, it is important for the study to ask the following research questions: What are the socio-economic characteristics of the farmers? to what extent have the farmers adopted the TME 419 variety? how has TME 419 variety affected the farmer's output? how has the adoption of the improved variety affected the income level of the farmer? in what way has it affected the respondents' livelihood activities? and, what are the constraints to adoption of the improved variety by farmers?

## Objectives of study

The main objective of the study is to examine the effect of farmers' adoption of TME 419 Cassava variety on their livelihood activities in the study area. Specifically, the study;

- (i) Ascertain the socio-economic characteristics of the respondents.
- (ii) Determined the level of adoption of TME 419 variety by the respondents in Ekiti State.
- (iii) Examined the effect of the improved variety on farmers' output.
- (iv) Determined the effect of adoption of TME 419 variety on the income level of the farmers.
- (v) Examined the effect of adoption of the improved variety on the livelihood activities of farmers in

The hypotheses of the study, stated in null form were:

- (i) There is no significant difference between the farmers' livelihood before and after adoption of cassava variety TME 419.
- (ii) There is no significant relationship between the adoption of cassava variety TME 419 and the livelihood of the farmers.

## METHODOLOGY

The study was carried out in Ekiti State where the predominant occupation of the people is farming cultivating food crops like yam, maize, cassava, and cash crops such as cocoa, kola nut, cashew, and oil palm.

### Sampling technique and sample size

The population of the study comprised all TME 419 cassava farmers in Ekiti-State, Nigeria. The list was collected from Agricultural Development Programme (ADP). A multistage sampling technique was used in selecting respondents for this study. Ekiti State has three Agricultural Development Project (ADP) zones which are Aramoko (Zone 1), Ikere (Zone 2) and Isan-Ekiti (Zone 3) with the ADP headquarters at Ikole-Ekiti. The three zones were purposively selected for this study. Zones one and two consist of five Agricultural Extension Blocks out of which three blocks were randomly selected and two blocks were randomly selected out of six blocks from zone three because of the size making a total of eight blocks. Each block consist of six to seven cells out of which three cells in each blocks were randomly selected making a total of twenty-four cells. List of farmers from each cell were obtained from the Ekiti State Agricultural Development Programme (ESADP) Headquarters; eight farmers who adopted cassava TME 419 were purposively selected from each cell because they adopted and had also been planting local varieties making a total sample size of 192 respondents.

### Data collection techniques

Both quantitative and qualitative methods were used for data collection. The quantitative method include the use of validated and

reliable structured questionnaire while Focus Group Discussion (FGD) and Key informant techniques were the qualitative methods adopted.

## RESULTS AND DISCUSSION

### Socio-economic characteristics of respondents

The study revealed that male respondents are 85.4% with 18.1% having 11 to 15 household size and 5 average household size. This was attributed to the fact that females are not fully involved in the cultivation of cassava due to the physical energy involved. However, the female play key role in the processing and marketing of the cassava as confirmed by respondents during the FGD. The average household size also has implication for labour availability. Although, during the FGD the respondents stated that they used both hired labour and members of their household.

From the study, 75.4% of the respondents were above 51 years, 16.7% were within the age group of 41-50 while the mean age of the respondents was 60 years. This indicates that most of the young farmers were not involved in cassava production. This was attributed to the fact that most of the younger farmers prefer to cultivate crops with shorter harvesting period, where they can get quick turn over rate. Some young farmers also had the assumption that the process of cassava production is tedious with low profit when compared with other farm produce. This is at variance with Akinwalere and Okunlola (2019) report that, farming is dominated by young farmers especially those who are between ages of 31-40. However, the study agrees with Iyagba and Anyanwu (2012) that able bodied young men and women are no longer interested in planting cassava in Nigeria.

The study further revealed that 63.5% of the respondents were married, indicating a sense of responsibility, (21.4%) widowed, (7.8%) cohabiting, (4.2%) single, (2.6%) divorced and (0.5%) separated. The high percent of the respondents being married implies that marriage is highly cherished in the society while the low percentage of divorcee and separated couples is in compliance with the African tradition that frowns at divorce (Akinwalere and Oggunniyi, 2015). Marriage also contributes to household size and availability of farm labour among the respondents.

The highest educational level attained by the respondents as presented in Table 1 indicated that 22.9% of the respondents completed secondary education, 20.9% completed tertiary education while 18.2% had non-formal education and 14.1% had adult literacy education. The result revealed that majority of the farmers is literate thus having implication for adoption of technology. Okunlola and Jimoh. (1994) and Akinwalere and enhance their level of knowledge and technology adoption because they would be able to access more sources of information and take advantage of ICT.

**Table 1.** Socio-economic characteristics of the respondents.

<b>Variable</b>	<b>Frequency</b>	<b>Percentage</b>	<b>Mean</b>
<b>Sex</b>			
Male	164	85.4	
Female	28	14.6	
<b>Age</b>			
21-30	8	4.2	
31-40	7	3.7	
41-50	32	16.7	60
51-60	90	46.9	
61 and above	55	28.5	
<b>Marital status</b>			
Single	8	4.2	
Married	122	63.5	
Divorced	5	2.6	
Widowed	41	21.4	
Separated	1	0.5	
Cohabiting	15	7.8	
<b>Household size</b>			
1-5	150	78.1	
6-10	34	17.7	5
11-15	08	4.2	
16 and above	00	0.0	
<b>Highest level of education</b>			
No formal education	29	32.2	
Adult literacy	16	17.8	
Attempted primary school	1	1.1	
Completed primary school	13	14.4	
Attempted secondary school	5	5.6	
Completed secondary school	17	18.9	
<b>Farm Size (ha)</b>			
< 1	39	20.3	
1-3	105	54.7	
4-6	21	10.9	2.5
7-9	17	8.9	
10 and above	10	5.2	
<b>Land acquisition</b>			
Inheritance	168	87.5	
Rent	12	6.3	
Gift	07	3.6	
Purchase	04	2.6	

Source: Field Survey (2016).

The average farm size of the respondents was 2.5 ha, 54.7% respondents had farm size of 1-3 ha while 20.3%

had less than one hectare according to Table 1. The result confirmed that most of the farmers were small

**Table 2.** Period of cultivation and source of awareness.

Sources of Information	Frequency	Percentage	Mean
<b>Period of cultivation (year)</b>			
5 – 9	18	9.3	
10 - 15	136	70.7	12.4
>16	42	20.0	
<b>Source of awareness</b>			
Radio/television	58	30.2	
IITA	30	15.6	
ADP extension	60	31.3	
Friend/family member	23	11.9	
Contact farmers	13	6.8	
More than one source	8	4.2	

Source: Field Survey (2016).

**Table 3.** Extent of awareness about improved cassava TME 419 variety.

Characteristics of TME419	Very much aware (F) 4	(%)	Aware (F) 3	(%)	Fairly aware (F) 2	(%)	Not aware (F) 1	(%)	Mean ( $\bar{X}$ )
High yield	30	15.6	69	33.9	65	33.9	28	14.6	2.53*
Drought resistance	25	13	118	61.5	30	15.6	19	9.9	2.78*
Short maturity period	28	14.6	65	33.9	50	26	49	25.5	2.38
Disease and pest resistance	78	40.6	85	44.3	18	9.4	11	5.7	3.20*
High starch	159	82.8	33	17.2	0	0	0	0	3.83*

\* Aware.

Source: Field Survey (2016).

scale farmers who produce cassava to meet household needs and sell to generate income to meet other livelihood needs.

Result in Table 1 further revealed that majority (87.5%) of the respondents acquired land for farming through inheritance. This implies that most of the farmers have permanent ownership thereby spent little or no cost in acquisition of land for farming. Acquisition of land through inheritance has helped reduced capital cost and increase profit margin of the farmers, enhance farmers' potential to increase their farm cultivation size, farm output and income.

#### Respondents sources of awareness and period of cultivation of improved cassava variety TME 419

Results in Table 2 has shown that most of the respondents (70.7%) have been cultivating cassava for 10-15 years while 31.3% were aware of the improved variety (TME 419) through ADP agricultural Extension Agents, 30.2% through radio/television and 15.6% through IITA activities.

#### Extent of awareness of improved cassava TME 419 variety

The result in Table 3 revealed the extent to which farmers were of awareness cassava variety TME 419 on level of yield, drought resistance, maturity period, disease and pest and starch content. From the table, the mean of respondents who were aware of the high yield characteristic of TME 419 was 2.53, drought resistance of TME 419 mean of 2.7 resistance to pests and diseases 3.20 and high starch content 3.83. This implies that improved variety TME 419 is drought resistance, short maturity period, diseases and pests resistance and high starch content for the industries. This corroborate with the finding of Tijani and Thomas (2011) that most of the farmers are aware of importance in the adoption of cassava variety TME 419.

#### Effects of improved cassava variety TME 419 on farm output

Yields from cassava farms of the respondents before and

**Table 4.** Effect of Improved cassava Variety TME on Farm Output.

Yields (tons)	Before-Adoption			After-Adopted TME 419		
	Frequency	%	( $\bar{X}$ )	Frequency	%	( $\bar{X}$ )
0.1 - 5	67	34.9	1.73	10	5.2	3.17
5.1 10	114	59.4		28	14.6	
10.1 15	6	3.1		103	53.7	
15.1 20	5	2.6		21	10.9	
> 20	0	0		30	15.6	
<b>Annual Income (Naira)</b>						
<10,000	43	22.4	₦30,000	0	0	₦75,000
10,000 - 50,000	127	66.2		27	14.1	
50,001 - 100,000	22	11.4		76	39.6	
> 100,000	0	0		89	46.3	

Source: Field Survey (2016).

after adoption of TME 419 variety presented in Table 4 reveals that just 5% of the respondents recorded a yield of 0.1-5 tons after adoption as against 35% that had same yield before adoption the improved variety. Although about 60% of the respondents indicated they had yield of 5.1-10 tons before adoption and 15% recorded same yield after adoption, 54% of the respondents revealed they had a yield of 10.1-15 tons after adoption while just 3% recorded same yield before the adoption of TME 419 variety. This suggests that a good number of the farmers had a significant yield increase from 5.1-10 tons to 10.1 to 15 tons. To further proof this, none of the respondents had their yield greater than 20 tons before adoption, whereas, 16% of the farmers revealed they recorded yield above 20 tons after adoption. This is in tandem with the submission of Sanni et al. (2009) that farmers in the South South and South East Nigeria recorded increased yield from 11 to 25 ton/hectare because of use of improved varieties. The average cassava yield was 1.73 tons before adoption but increased to 3.17 after adoption of TME 419 variety. This implies that the adoption of improved cassava variety TME 419 has contributed to increase in farmers' output in cassava cultivation. The income level of the farmers was also presented in Table 4. It was revealed that 22% of the farmers made less than ₦10,000 per annum before they adopted TME 419 cassava variety; after adoption however, none of the farmers had their income less than ₦10,000. Also, before adoption, none of the farmers recorded greater than ₦100,000 per annum, 46% of the farmers however reported they made ₦100,000 from cultivation of TME 419 variety. The average income of the farmers increased from ₦30,000 before adoption to ₦75,000 after adoption of TME 419 variety. Thus, the adoption of the improved cassava TME 419 variety introduced by the Ekiti State ADP extension services

have led to increase in the output and consequently income of the farmers.

#### Effects of improved cassava variety TME419 on farmers' livelihood

The result of the effect of improved variety on farmers' livelihood as revealed in Table 5 revealed that 49.5% of the respondents strongly agreed and 32.8% agreed that garri production has improve the livelihood of farmers. The farmers are able to pay their children school fees since they have started the adoption of cassava TME 419 while 17.7 disagreed. The respondents (48.4 and 17.7%) strongly agreed and agreed respectively with that statement in that table that cassava fufu flour production has improve my livelihood by acquiring more properties since they have been adopting cassava TME 419. Also, 15.6% of the respondents strongly agreed and 69.8% agreed that cassava starch production improve their livelihood because paying taxes (Rate) becomes easy since they have adopted cassava TME 419. Cassava TME 419 has improved cassava chips production which improves farmers' livelihood as young and unemployed youths have started the cultivation as 64.1% strongly agreed and 18.2% agreed. Ighoro (2016) asserted that cassava is a major solution to food security and that it will positively influence the level of employment.

Majority of the respondents (64.1%) strongly agreed with the statement that cassava bread production has improve my livelihood due to training children in vocational work since they adopted cassava TME 419 and sales of cassava peelings has improved their livelihood because they can cater for their basic needs of life since the adoption of cassava TME 419. Omonona et al. (2010) stated that cassava and its products are very

**Table 5.** Effects of improved cassava variety on farmers' livelihood.

Effects of TME 419 on Livelihood	SA	A	D	S	$\bar{X}$
Garri Production has improved livelihood by paying my children school fees since I adopted cassava TME 419	95 (49.5)	63(32.8)	34 (17.7)	0 (0.0)	3.31*
Cassava Fufu flour production has improved livelihood by acquiring more properties since I adopted cassava TME 419	93 (48.4)	34 (17.7)	35 (18.2)	30 (15.7)	2.98*
Cassava starch production improved livelihood because paying taxes (Rate) becomes easy since I adopted cassava TME 419	30 (15.6)	134 (69.8)	0 (0.0)	28 (14.6)	2.86*
Cassava chips production has improved livelihood because young and unemployed people have started cultivating cassava TME 419	123 (64.1)	35 (18.2)	34 (17.7)	0 (0.0)	3.46*
Cassava bread production has improved livelihood due to training children in vocational work since I adopted cassava TME 419	123 (64.1)	34 (17.7)	35 (18.2)	0 (0.0)	3.45*
Sales of Cassava peelings has improved livelihood because I can cater for my basic needs of life since I adopted cassava TME 419	28 (14.6)	100 (52.1)	64 (33.3)	0 (0.0)	2.81*

Source: Field Survey (2016).

**Table 6.** t-test analysis of difference in the farmers' livelihood before and after adoption of cassava variety TME 419.

Variable	N	Mean	Standard deviation	Mean difference	t-value	P- Value	Decision
Before adoption	96	1.69	0.76				
After adoption	96	2.18	1.20	0.49	4.02	0.00	Sig.

Source: Field Survey (2016). P < 0.05 (Sig).

important staple foods for most household in Nigeria and can enhance food security. It therefore implies that farmers can favorably acquire necessary materials needful for the up keep of their family through the cultivation of TME 419.

#### **Difference in the farmers' livelihood before and after adoption of cassava variety TME 419**

The result of paired t-test analysis presented in

Table 6 shows that there was significant difference the farmers' livelihood before and after adoption of cassava variety TME 419( $t= 4.02$ ). This result suggests that adoption of variety had positive effects on the livelihood of farmers.

This implies that the livelihood activities of farmers increased after the adoption of TME 419. This result agrees with the finding of Donald et al. (2000) that the introduction of TME 419 has provided the livelihood of up to 500 million farmers and countless processors and trader around the

world.

#### **Relationship between the adoption of cassava variety TME 419 and livelihood of farmer**

Pearson Product Moment Correlation results as presented in Table 7 revealed a positive and significant relationship between the adoption of cassava TME 419 variety ( $r = 0.80$ ,  $p < 0.05$ ) and the livelihood of the farmers. This implies that the

**Table 7.** Pearson Correlation Coefficient for Relationship between the Farmers' Livelihood before and after Adoption of Cassava Variety TME 419.

Parameter	r-value	P-value	Decision
Adoption	1		Sig.
Livelihood of farmers	0.80	0.00	Sig.

Source: Field Survey (2016).  $P < 0.05$  (Sig).

adoption of cassava TME 419 variety has a statistically significant positive impact on the livelihood of the farmers in Ekiti State.

## Conclusion

The study concludes that the adoption of TME 419 variety has increased the farmers output and income, thus improving their livelihood, enhanced access to acquire production for cultivation and improved economic status in the community. It recommends that ADPs and other related NGOs also farmers groups should work in collaboration to create awareness of cassava variety TME 419 for farmers in the rural areas. There is also a need to promote cassava value chain to maximize adoption of the new varieties. NGOs should assist in the provision of more cassava variety TME 419, provide more farm land for cultivation and establish guaranteed markets for the sales of farmers' farm produce in order to reduce wastage from glut of cassava in the market and low income experienced by the farmers from sourcing for markets themselves.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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