

## Predictors of access to meteorological information in Etche Local Government Area, Rivers State: Evidence from cassava-based farmers

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### ABSTRACT

This study evaluated predictors of access to meteorological information among cassava-based farmers in Etche Local Government Area Rivers State, Nigeria. The specific objectives of the study are to: describe the socio-economic characteristics of the cassava-based farmers in the study area; ascertain the accessibility of meteorological information among cassava-based farmers in the study area, among others. Data for the study were collected with the aid of questionnaire and interview schedule from 120 cassava-based farmers using simple random sampling technique. Data were analyzed using descriptive statistics and Logit regression model. Majority (61.7%) of the cassava farmers were females, 70% married with mean of seven (7) household size. 80.8% took farming as their primary occupation, 45.87 years was the average age of the farmers, with mean of 19.72 years farming experience. Results also show that 33.3% of the farmers have access to meteorological information while 66.7 did not access meteorological information. The Logit regression analysis shows that age of the farmers, educational level, household size, farming experience, and annual income are significant at 1% level making them predictors of accessibility of meteorological information on cassava production in the study area. The constraints facing cassava-based farmers in accessing meteorological information are insufficient fund, difficulties in obtaining credits facilities, poor access to good road, irregularity of extension service, difficulty in harvesting during dry season, lack of access to improved crop varieties, weed problems among others. The study therefore advocates the strengthening of agricultural extension services to enlighten the farmers on meteorological information services.

**Keywords:** Predictors, access, meteorological information, cassava-based farmers

### INTRODUCTION

The agricultural sector in Nigeria is the major employer of labour, employing more than 60% of Nigerian farm workforce (Mgbenka *et al.*, 2016; Moyo, 2016). The sector is characterized by small scale traditional farming methods with very low levels of mechanization and modern technologies leading to low level of productivity. The growth in the agricultural sector has been slow, growing at an annual rate of 3.7% to 6.5% during the period 2001-2012 (Eboh, Oduh & Ujah, 2012).

Cassava, *Manihot esculenta* is an important crop that has great potential to support agricultural growth in Nigeria because of its wide range of use spanning from consumption to industrial use. Africa produces 40–50% of the world cassava output; Nigeria and Ghana are the leading producers in Africa (Nweke, 2004 as cited by Awerije & Rahman, 2014). However, the production of cassava is concentrated in the hands of numerous smallholder farmers located primarily in the southern and central

regions of Nigeria (Echebiri & Edaba, 2008 as cited by Adeyemo, Amaza, Okoruwa, Akinyosoye, Salman & Abass, 2019).

Cassava is one of the fastest expanding staple food crops in cassava consuming countries and has continued to gain prominence among farmers while the industrial demand is also rising consistently (Food and Agricultural Organisation (FAO), 2018). Indeed, demand for cassava derivatives such as starch, garri (a type of processed cassava), tapioca, among others has increased (kuemonisan & Akinbola, 2021).

The demand for cassava roots and products are high and fast rising. However, the current food production unable to meet the food needs of the increasing population in the sub-region (Poverty, Oxford and Human Development Initiative, 2017; and FAO, 2018). Globally, Nigeria currently ranks first in cassava production, but the trend in yield performance (production per hectare) remains low. This may be attributed to the non-availability of such indices as meteorological information among others.

Meteorological information is concerned with short term climate parameters such as daily, monthly and seasonal weather forecast and long-term projections over decades, several decades or centuries (Singh et al., 2016). This information should be interpreted and accompanied by advisory services in order to tailor it to the needs of the farmers. World Meteorological Organization (WMO) defines meteorological information as the provision of information that is user-driven for risk management decisions based on scientific knowledge and effective access mechanism (Graham *et.al.*, 2015). Meteorological information such as weathers and climate change are the prevailing environmental problems in the world and has gained universal discourse in recent time because its effects are multi-faceted (Audu,

Audu, Binbol & Gana, 2013). The report on the state of the Global Climate 2020 documents enumerated the indicators of the climate system as greenhouse gas concentrations, increasing land and ocean temperatures, sea level rise, melting ice and glacier retreat and extreme weather (World Meteorological Organization (WMO), 2021). These effects have also metamorphosed into some impacts such as the decline in agricultural activities, drought, migration, health problems, crises among farmers and herds men, flooding, erosion, hunger and poverty and this have negative effect on cassava production. Rising trend in temperature, extreme heat waves, drought, changes in rainfall patterns and increased drought have been identified as evidence of climate change (Bello, Ganiyu and Wahad, 2010; Intergovernmental Panel on Climate Change (IPCC), 2018). Meteorological information is beneficial to farmers especially in guiding structured decision making (Aura et al., 2015). It also has the potential to significantly enhance agricultural production, improve food security and contribute further to the GDP of developing countries (Aura *et al.*, 2015). Cassava production is inclusive. Climate information enhances the resilience and adaptive capacity of farmers to climate change, through the reduction of the effects of climate-related risk and uncertainty (Quedraogo et al. 2018).

Unfortunately, most farmers do not have access to meteorological information (Aura et al., 2015). Meteorological information can be sourced through such channels as radio, print media short mobile messages, television and contact with informed people (Kirui et al., 2012), although radio has been reported as the major dissemination channel of climate information due to its easy accessibility, reaching a wider audience. Studies on farmers access to climate information have been widely documented (Nyadzi et al.,

2018; Ouedraogo et al., 2018), but none of these works addressed the ability of cassava-based farmers' to have access to meteorological information in the study area. This therefore created a gap in knowledge which this study intends to fill. Against this backdrop, it became imperative to empirically investigate the accessibility of meteorological information in relation to cassava production in the study area. Therefore, this study examines the predictors of accessibility of meteorological information among cassava-based farmers in Etche Local Government Area, Rivers State, Nigeria. The specific objectives of the study are to:

- i. describe the socio-economic characteristics of the cassava-based farmers in the study area;
- ii. ascertain the accessibility of meteorological information among cassava-based farmers in the study area; and
- iii. determine factors influencing accessibility of meteorological information among cassava-based farmers in the study area.
- iv. identify the barriers in accessing meteorological information among cassava-based farmers in the study area.

## MATERIALS AND METHODS

The study was conducted in Etche Local Government Area of Rivers State. The LGA has an area of about 159sq km and a population of 249,939 people (National Bureau of Statistics [NBS], 2001) Etche LGA is located on coordinate of 4°43'0"N and 7°18'0"E. Food crops grown in the area include cassava, maize, yam among others. A two-stage sampling procedure was used in selecting cassava-based farmers in the study area. The first stage was a purposive selection of eight (8) communities based on the predominance of cassava farming in the

study area. The second stage was random sampling of fifteen (15) cassava-based farmers from each community, making a total sample size of one hundred and twenty (120) cassava-based farmers for the study. The study utilized primary data. The primary data was obtained through the use of questionnaire and interview schedule to the 120 cassava-based farmers selected for the study.

Data were analyzed with descriptive statistics such as frequency, percentages and mean. Data were also analyzed with the use of Logit regression model.

### Model specification:

Logit regression model

$$\ln\left(\frac{y_1}{1-y_1}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + e$$

Where;

$y_i = 1, 0$

1= Probability that the cassava farmers will have access to meteorological information

0 = Probability that the cassava farmers do not have access to meteorological information.

$\beta_0$  = Constant

$\beta_1 - \beta_9$  = coefficients

$X_1 - X_9$  = explanatory variables;

$X_1$  = Age of the farmers (years)

$X_2$  = Educational level of the farmer (years)

$X_3$  = Household size (number of persons)

$X_4$  = Farming experience (number)

$X_5$  = Annual income (naira)

$X_6$  = Gender (D: 1= male, 0 = female)

$X_7$  = Marital Status (D: 1= married, 0 = single)

$X_8$  = Extension contact (number of visits per annum)

$X_9$  = Membership of Co-operative (D: 1= Yes, 0= No)

e = error term

## **RESULTS**

Table 1 reveals the socio-economic characteristics of cassava-based farmers in the study area. About 61.7% of the cassava-based farmers were females while 38.3% males. Majority (70%) of the cassava-based farmers were married while 30% were singles. About 35% of the cassava-based farmers age ranges between 41-50 years, 29.5% ranges between 31-40 years, and mean of 45.87 years. About 43.3% and 29.2% obtained secondary and primary schools respectively, with mean of 9.1 year spent to attain the level of education. About 42.5% accounted for the cassava farmers who have farming experience between 16-20 years, 28.3% between 21 years and above, with mean of 19.72 years. About 53.3% of the

cassava- based farmers have household size ranges between 6-10 persons, 45% ranges between 1-5 persons, and mean of seven (7) persons was obtained. However, majority (60%) of the cassava-based farmers had farm size ranges between 0.11-0.15ha, 30.8% between 0.06-0.1ha, with mean of 0.11ha. Majority (80.8%) took farming as their major source of their livelihood while 19.8% took farming as secondary activities to supports their primary source of their income. Majority (70%) of the cassava-based farmers did not have contact with extension agents within a year. On cooperative membership, about 59.2% belong to cooperative societies.

The socioeconomic characteristics of the cassava-based farmers are presented in Table 1.

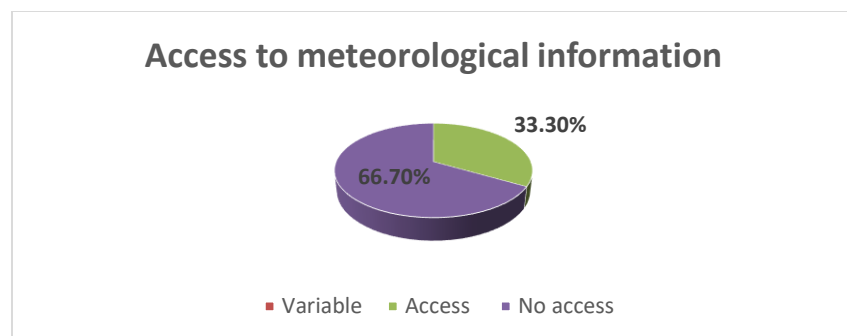
**Table 1:** Socioeconomic characteristics of the cassava-based farmers in the study area

<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Gender</b>		
Male	46	38.3
Female	74	61.7
<b>Marital status</b>		
Married	84	70.0
Single	36	30.0
<b>Age (years)</b>		
30 and below	9	7.5
31-40	35	29.2
41-50	42	35.0
51-60	20	16.7
61-70	8	6.6
70 and above	6	5.0
Mean	45.87	
<b>Educational level</b>		
0 (no formal education)	10	8.3
Primary school	35	29.2
Secondary school	52	43.3
Tertiary	23	19.2
Mean	9.1	
<b>Farming experience (years)</b>		
5 and below	2	1.7
6-10	10	8.3
11-15	23	19.2
16-20	51	42.5
21 and above	34	28.3
Mean	19.72	
<b>Household Size (number)</b>		
1-5	54	45.0
6-10	64	53.3
11-15	2	1.7
Mean	7	
<b>Farm size (ha)</b>		
0.01 -0.05	11	9.2
0.06-0.1	37	30.8
0.11-0.15	72	60.0
Mean	0.11	
<b>Major occupation</b>		
Farming as major	97	80.8
Farming as secondary	23	19.2
<b>Extension contact</b>		
Yes	36	30.0
No	84	70.0
<b>Member of cooperative</b>		
Yes	71	59.2
No	49	40.8
Total	120	100

Source: Field survey, 2020.

Figure 2 shows the accessibility to meteorological information among cassava-based farmers in the study area. Majority (66.7%) of the cassava-based farmers did not

have access to meteorological information, while only 33.3% had access to meteorological information in the study area.



**Fig. 2.** Accessibility of meteorological information among cassava-based farmers in the study area  
Source: Field survey, 2020.

The Logit regression analysis on factors influencing accessibility to meteorological information among cassava-based farmers in the study area is presented in Table 3 above. Log likelihood chi-square of 75.84 is significant at 1%. Age of the cassava-based

farmer is significant at 5% while educational level was significant at 1%. Household size is significant at 1%. Farming experience is significant at 1%. The result also shows that annual income level is significant at 1%.

**Table 2:** Logit regression analysis on determinant factors influencing accessibility of meteorological information among cassava-based farmers in the study area

Variables	Parameters	Coefficient	Std. Error	Z-values
Age	X <sub>1</sub>	0.8616089	0.0462145	18.6437*
Educational level	X <sub>2</sub>	1.358779	0.1564453	8.6853*
Household size	X <sub>3</sub>	0.7069971	0.1910144	3.7013*
Farming experience	X <sub>4</sub>	0.9313704	0.0682468	13.6471*
Annual income	X <sub>5</sub>	0.9999531	0.32151	3.11028*
Gender	X <sub>6</sub>	1.654344	6.076302	0.2723
Marital Status	X <sub>7</sub>	0.1692847	0.6863181	0.2467
Extension contact	X <sub>8</sub>	0.119156	0.5331052	0.2235
Membership of cooperative	X <sub>9</sub>	0.1853101	0.5139572	0.3606

Log likelihood chi-square = 75.84; \* and \*\* significant at 1% and 5% level respectively  
Source: Field survey, 2020.

From Table 3 above reveals the barriers in accessing meteorological information in the study area. From the result, insufficient fund and difficulties in obtaining credit facilities ranked first (3.71) and second (3.53) respectively. The result on poor access to good road had a mean value of 3.51.

Difficulty in harvesting during dry season (3.46), weed problem (3.3), soil fertility problems (3.19), high cost of agro-chemicals (3.18), lack of modern processing equipment (3.13), and absence of government policy on meteorological information (3.13) among others were considered as major constraints

in accessing meteorological information by cassava-based farmers in the study area. However, marketing problems, inability to give up traditional values and lack of

information were considered to be minor constraints according to their mean values which were 2.22, 2.18, and 2.05 respectively.

**Table 3:** Constraints facing cassava-based farmers in accessing meteorological information in the study area

Constraints	SA	A	D	SD	Mean	Rank
Insufficient fund	93(77.5%)	22(18.3%)	2(1.7%)	3(2.5%)	3.71	1 <sup>st</sup>
Difficulties in obtaining credits facilities	87(72.5%)	14(11.7%)	15(12.5%)	4(3.3%)	3.53	2 <sup>nd</sup>
Poor access to good road	84(70.0%)	17(14.2%)	15(12.5%)	4(3.3%)	3.51	3 <sup>rd</sup>
Irregularity of extension service	66(55.0%)	48(43.3%)	3(2.5%)	3(2.5%)	3.48	4 <sup>th</sup>
Difficulty in harvesting during dry season	81(67.5%)	17(14.2%)	18(15.0%)	4(3.3%)	3.46	5 <sup>th</sup>
Lack of access to improved crop varieties	63(55.0%)	52(43.3)	1(8%)	4(3.3%)	3.45	6 <sup>th</sup>
Weed problem	75(65.8%)	12(10.0%)	15(12.5%)	14(11.7%)	3.30	7 <sup>th</sup>
Soil fertility problems	52(43.3%)	44(36.7%)	19(15.8%)	5(4.2%)	3.19	8 <sup>th</sup>
High cost of agro-chemicals	52(43.3%)	28(23.3%)	30(25.0%)	5(4.2%)	3.18	9 <sup>th</sup>
Lack of modern processing equipment	65(54.2%)	18(15.0%)	25(20.8%)	12(10.0%)	3.13	10 <sup>th</sup>
Absence of government policy on meteorological information	53(44.2%)	35(29.2%)	27(22.5%)	5(4.2%)	3.13	10 <sup>th</sup>
Low institutional capacity	45(37.5%)	45(37.5%)	25(20.8%)	5(4.2%)	3.08	11 <sup>th</sup>
High incidence of pest and diseases infestation	50(41.7%)	46(38.3%)	8(6.7%)	16(13.3%)	3.08	11 <sup>th</sup>
Inadequate technology	44(36.7%)	42(35%)	30(25%)	4(3.3%)	3.05	12 <sup>th</sup>
High cost of labour	69(57.5%)	17(14.2%)	20(16.7%)	14(11.7%)	3.02	13 <sup>th</sup>
Scarcity of farm land	52(43.3%)	23(19.2%)	30(25.0%)	15(12.5%)	2.33	14 <sup>th</sup>
Marketing problem	36(30.0%)	50(41.7%)	23(19.2%)	11(9.2%)	2.22	15 <sup>th</sup>
Inability to give up traditional values	26(21.7%)	53(44.2%)	30(25.0%)	11(9.2%)	2.18	16 <sup>th</sup>
Lack of information	25(20.8%)	23(19.2%)	42(35.0%)	30(25.00)	2.05	17 <sup>th</sup>

SA = Strongly Agree; A = Agree; D = Disagree; Strongly Disagree.

Source: Field survey, 2020.

## DISCUSSION

The result on sex of the farmers indicates that females dominated cassava farming in the study area. This finding is similar with Henri-Ukoha, Anaeto, Chikezie, Ibeagwa, Ukoha, Oshaji and Anyiam (2015) who reported that 64.71% farmers cassava farmers in Ideato South Local Government Area Imo State

Nigeria were females. This is at variance with Muema, Mbunu, Coulibaly and Mutune (2018) whose findings indicated that about 65% males among smallholder farmers accessed and utilized seasonal climate information services in Makueni County Kenya.

The marital status of the farmers indicates that married people could use family labour to reduce the cost of labour of the cassava farmers in study area. This study agrees with Obayelu, Akintunde and Obayelu (2015) who reported that 75.6% of the cassava farmers in Ogun State Nigeria were married.

The age of the cassava-based farmers implies that they were in their productive age of accepting and making farm decisions with regards to coping with effects of meteorological information. This is similar to Obayelu *et al.*, (2015) who obtained a mean age of 47.72 years among cassava farmers in Ogun State Nigeria.

The result on education indicates that educated cassava-based farmers in the study area could be expected to actively access meteorological information for optimal output. This result is similar to Muema *et al.*, (2018) who reported a mean of 9.7 years spent schooling among smallholder farmers in Makueni County Kenya.

Their farming experience implies that the farmers have sufficient farming experience which could improve accessibility of meteorological information potentials in cassava farming. This result is similar to the finding of Obayelu *et al.*, (2015) and Itam *et al.*, (2018) who obtained a mean farming experience of 17.42 years and 17.8 years among cassava farmers in Ogun State and Ibesikpo Asutan LGA, Akwa-Ibom State Nigeria respectively. Hence, farming experience improve the accessibility of meteorological information potential in cassava farming enterprise.

The result on household size suggests that the cassava-based farmers had a large household size. The consequence of these large household sizes is that there would be more hands to support the activities involved in

cassava farming, thus reducing the cost of hired labour. This result agrees with Henri-Ukoha *et al.*, (2015) and Obayelu *et al.*, (2015) who also obtained a large household size mean of eight (8) persons and seven (7) persons among cassava farmers in Ideato South Local Government Area Imo State and Ogun State Nigeria respectively. Therefore, large household size makes most of the labour force needed for the cassava farming available in the study area.

The farm size shows that most of the cassava-based farmers were subsistent farmers. This finding is similar to that of Obayelu *et al.*, (2015) and Itam *et al.*, (2018) who obtained 0.64ha and 0.75ha in their studies among cassava farmers in Ogun State and Ibesikpo Asutan LGA, Akwa-Ibom State Nigeria respectively. The result on occupation indicates that farming is the major occupation in the study area. This result is similar to that of Henri-Ukoha *et al.*, (2015) who reported that 76.47percent of the respondents took farming as their major job in Ideato South Local Government Area Imo State Nigeria.

The result on access to agricultural extension services implies that the farmers would not be able to get adequate meteorological information from the extension agents in the study area. This result agrees with Muema *et al.*, (2018) who opined that 73percent of the smallholder farmers in Makueni County Kenya, do not have access to extension agents within a year. It is therefore, important for the cassava farmers to be involved in all stages of agricultural research and technology development, which should empower them to test and validate the best information in their own fields (FAO, 2013). About 59.2% belong to cooperative members. This shows that the cassava farmers in the study area understand the importance of cooperative organization. This is similar to findings of Muema *et al.* (2018) who reported that 78% of the smallholder



farmers who belonged to cooperative societies accessed seasonal climate information services in Makueni County Kenya.

The result indicates that most of cassava-based farmers in the study area do not have access to meteorological information such as climate change, global warming. This has negative implications for cassava production. This may be attributed to poor extension contact. Extension agents are change agents who should transmit the meteorological information to the rural farming population. Communication of climate information to support adaptation action in Africa is hindered by several contextual factors, Socio-cultural, content-related and technological barriers (Ifejika Speranza, Kiteme, Ambenje, Wiesman & Makali, 2010). If cassava-based farmers would have access to meteorological information effectively, adequate accessibility to communication channels transmitting meteorological information such as radio, television and internet among others were indispensable.

The Logit regression analysis on factors influencing accessibility and use of meteorological information among cassava-based farmers in the study area is presented in Table 3 above. Log likelihood chi-square of 75.84 is significant at 1% indicating that the model had good fit to the data. The result shows that four out of the nine explanatory variables used in the model significantly affect the accessibility of meteorological information on cassava production. These variables were age, educational level, farming experience, and annual income all were positively influencing accessibility of meteorological information on cassava production in the study in area.

The result on age implies that the more the older the farmers, the more experience they

have about access and use of meteorological information. This would increase the likelihood of the cassava-based farmers to have more access to meteorological information. This result agrees with Muema, Mbunu, Coulibaly and Mutune (2018) who recorded that age was significant in accessing seasonal climate information services access among smallholder farmers in Makueni County, Kenya. The result on education suggests that 1% in education level of cassava-based farmers would result in about 1.4% increase in accessibility meteorological information of the farmers in the study area. This indicates that the farmers are educated and can have access to meteorological information. This had been demonstrated in several studies that high level of education makes introduction of new innovation/technologies by extension agents to the farmers easier. This result agrees with Umanakwe, Nnadi, Chikaire and Nnadi (2014) who recorded that education was significant in information needs for climate change adaptation among rural farmers in Owerri West Local Area Imo State, Nigeria. High educational level provides facts on accessibility of meteorological information and equips the cassava-based farmers with the right and accurate cognitive domain to access meteorological information in cassava production optimally in the study area.

The result on farming experience indicates that 1% increase in farming experience would result in 0.93% increase in the farmer's access meteorological information in the study area. This finding is in line with Umanakwe *et al.*, (2014) who reported that farming experience was significant in information needs for climate change adaptation among rural farmers in Owerri West Local Area Imo State, Nigeria. The annual income implies that 1% increase in annual income could significantly increase the likelihood of cassava-based farmers

accessibility meteorological information by 0.99%. This indicates that the farmers would not be operating at subsistence level since increase in income could lead to farmer having more purchasing power. Therefore, they will buy the agricultural inputs to increase their production. This finding corroborates with that of Muema *et al.*, (2018) who reported that farmers' income was significant in access to seasonal climate information services access among smallholder farmers in Makueni County Kenya.

The result shows that majority of the cassava-based farmers operated at a subsistence level, since they do not have enough money to buy major farm inputs that could have help them cope with the effect of the changing climate and climate-related risks. This result agrees with Itam *et al.* (2018) who recorded high rate of inadequate finance among cassava farmers in Ibesikpo Asutan LGA, Akwa-Ibom State, Nigeria. The hectic and difficult processes associated with the acquisition of agricultural credits make it very difficult for smallholder farmers to obtain loan or agricultural credits.

The poor state of numerous rural roads in many nations not only limits the farmers' access to inputs and financial services, it is also severely restricting farmers' access to markets (FAO, 2013) that could increase their profits. The condition of the road affects the transport cost of vehicles transporting goods and passengers as well as the price charged by the transport operators. Transport costs and prices, and the level of accessibility of a rural area, also play a significant role in the development of agricultural sector. Irregularity of extension service with mean of 3.48 was obtained. This implies that the farmers hardly have extension agents visiting them and this therefore pose a problem to them because they will not be exposed/access

to improved crop varieties (with mean of 3.45) to be planted which will improved their yield as well be resistant to pest and diseases. This result agrees with Itam *et al.* (2018) who recorded that majority of cassava farmers in Ibesikpo Asutan LGA, Akwa Ibom State, Nigeria lack extension agents' contact.

## CONCLUSION

## AND

## RECOMMENDATIONS

The study concluded that most of the farmers were females, majority were also married with large household sizes. The farmers have adequate age and productive farming experience. Farming is the major occupation of the people in the study area, with minimal extension contact. Most of the farmers do not have access to meteorological information in the study area. The Logit regression shows that age of the farmers, educational level, household size, faming experience, and annual income predict accessibility of meteorological information on cassava production in the study in area. The constraints facing cassava-based farmers in accessing of metrological information are insufficient fund, difficulties in obtaining credits facilities, poor access to good road, irregularity of extension service, difficulty in harvesting during dry season, lack of access to improve crop varieties, weed problems, soil fertility problems, high cost of agro-chemicals, lack of modern processing equipment, and absence of government policy on meteorological information among others. Based on the findings, the study therefore recommends that:

- i. Concerted efforts should be made by government and relevant stakeholders to strengthen agricultural extension services.
- ii. There is need for redesigning and effective implementation of already existing policies aimed at improving farmer's education in order to increase their level of accessibility of meteorological information services.

- iii. Deliberate policy should be aimed at organizing training for farmers by extension services and relevant agencies on early warnings in coping with meteorological information such as climate change, drastic increase in temperature, change in rainfall patterns in the study area.

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