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Resource use and technical efficiency of okra production among female headed household: Implication for poverty alleviation in the rural areas of south east, Nigeria

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Abstract

Resource use and technical efficiency of okra production among female headed household; Implication for Poverty alleviation in the rural areas of South East, Nigeria was studied using one hundred and twenty respondents selected using multi-staged random sampling technique. The objectives of the study were to estimate costs and return in okra production by female headed household, determine the technical efficiency and their determinant factors of the respondents, determine the allocative efficiency of the respondents and to identify the constraints to okra production by the respondents in the study area. A structured questionnaire was used to gather information from the respondents on the objectives of the study. Mean, gross margin analysis, maximum likelihood method, allocative efficiency model and percentage responses were used to capture the objectives of the study. The result of the determinants of technical efficiency show that level of education and extension contact were positive and significantly related to technical efficiency, while credit access and age had inverse relationship with technical efficiency. The mean technical efficiency was 0.56, the maximum efficiency was 0.95, while the minimum was 0.23. Result of the resource efficiency showed that the farmers did not achieve optimum allocative efficiency in the use of the any of the resources. Generally, the elasticity of production show that they were operating at increasing returns to scale. The constraints to okra production were poor access to credit, high cost of labour, poor access to extension services and inadequate storage facilities. Policies aimed at enhancing farmers' access to extension contact and educational programme such as adult education, seminars and workshops were suggested. Also, the need to enable farmers to employ more of the resources that were underutilized, while for over utilized resources, farmers should engagement less of the resource in their productions in order to attain greater productivity. Besides, it is indispensable to boost farmers' access to improved production inputs at moderate prices in order to boost their production and productivity.

Keywords: resource use, technical efficiency, okra production, female headed household

Introduction

In many sub Saharan Africa countries, the rural areas have common features of frail infrastructure, low levels of economic activity, and poor financial service benefactor with inadequate capacity and a restricted range of products [20; 34] In this area, agriculture is the engine for economic growth as it contributes about 32 per cent of the nation's Gross Domestic Product (GDP), 48 per cent of foreign exchange, 65 per cent of total employment in the rural areas and 42 per cent of industrial raw materials [10].

The role of *women in agricultural-rural and national development,* although differing among countries and regions of the world is well acknowledged [12; 21]. In agriculture for instance, studies [1; 13; 43] show that women are economically active population and this can be exemplified by their roles as farmers, labourers and entrepreneur. Despite, the noble roles of this farming group, they are usually faced with more severe constraints than men in terms of access to productive resources and social protection, thus making them vulnerable to poverty [7; 24]. Poverty entails a state of low incomeand/or low consumption. People are said to be poor when their standard of living is below a minimum tolerable level of poverty, often known as poverty line [29]. For instance, it is projected that nearly 2.8 billion persons are poor in the world and women constituted about 70 per cent of them [28]. The poverty level and depth of women are more among farming household and these scenario is perpetuate by among others poor access to land, farm inputs, credit facilities, extension services, gender sensitive labour-saving tools and equipment, irregular distribution of decision-making power among the spouses and the resultant sidelining. Consequently, women experience economic denials, illiteracy, diseases and poverty [18; 31]. The other effects are hunger, ignorance, malnutrition, unemployment, poor access to credit facilities, low life expectancy and hopelessness [36; 37]

Globally, however, among the women, over the past four decades, female-headed households dominated the poverty statistics [11].

In Nigeria, successive governmens have formulated programmes aimed at alleviating the poverty of women, female headed household inclusive. These programmes include; Better Life for Rural Women (BLRW), Family Economic Advancement Programme (FEAP), Women in Agriculture (WIA), Women in Nigeria (WIN), Family Support Programme (FSP) and Agricultural Development Programme (ADP), People's Bank of Nigeria (PBN) and National Special Programme on Food Security (NSPFS) [8; 37]. These programmes help to boost the low socio-economic status of the women through boosting farming their major source of livelihoods [7]. In South East Nigeria, among the arrays of `farming vocations, vegetable production particularly okra production stands pre - eminence [18].

Okra (*Abelmoschus*spp) originated from West Africa but nowadays cultivated in the tropics, subtropics, and warmer portions of the temperate region [9]. Okra is consumed by man in different forms; the immature fruit is fried, cooked, the dried seed is used to prepare vegetable curd and coffee additive, as plasma replacement and confectionary, avenue of generating income particularly by women in the study area in form of marketers, labourers and producers [38].

Several studies [6, 18, 47] observed that okra production in Nigeria recorded an increase from 6 per tons per hectare in 2003 to 8 tons per hectare in 2013 as result of increase in area of land cultivated. Nevertheless, although the cultivated area of okra increased its production, but the growth rate declined tremendously from the average of 33.7% between 2004 - 2008 to 4.9% in 2009 - 2013 periods [18]. The declining trend in okra production may not be unrelated to low productivity. According to [47] low production and productivity are common in okra production in South East, Nigeria, hence making the producers predisposed to poverty and food insecurity.

Efficiency is a necessary factor of productivity growth especially in situation where resources are inadequate and the prospects for evolving and adopting improved innovations have recently started declining [33]. Technical efficiency and allocative efficiency are two key concepts of production function. Technical efficiency refers to the capability of producers to obtain a certain level of outputs, while allocative efficiency is the ability to select the level of inputs that maximizes profit at given factor cost [4, 30].

Apart from the limited literature on the subject under discuss in the study area, this article is very important for policy makers in their design of policies aimed at improving resource use and technical efficiency by the farmers in order to enhance the production and profitability of okra in the study area in particular and in the tropics where this crop is grown in general. The objectives of the study were to estimate costs and return in okra production by female headed household, determine the technical efficiency and their determinant factors by the respondents, determine the allocative efficiency of the respondents and to identify the constraints to okra production by the respondents in the study area.

Female headed household and Poverty Links

Female-headed households could be classified as *'de jure'* and „ *de facto*‟ households. A „ *de jure'* female-headed household is when the head of the household is an unmarried woman, divorced or separated, while, a '*de facto*' female-headed household is when the head of the household is a female due to long absence of the male head. In this situation, the woman becomes the bread winner of the family and as well take important decisions as relates to the upkeep of the family [8].

Studies have shown that this farming house hold is more vulnerable to poverty than the male counterpart. Some of the adduced reasons for that scenario are; First, lower earning power of this household compare to male household even in the same job, hence has a much higher likelihood of being underprivileged [28].

In addition, socio-cultural factors can edge out women's involvement in farming and thus predisposes to abject poverty mostly during economic recession [35].

As well, female-headed households are prone to poverty due to limited income and lesser time to lesiure. This could be buttressed through implementing certain 'activity burden' such sending children to school, family welfare, and domestic chores, thus leaving them with smaller time for leisure This linkage amongst leisure-work trade-off also leads to intergenerational transmission of poverty in female-headed households [36].

Additionally, female headed households in general have more wards and often have more number of non-workers to workers ratio equated to male households. This entails more money for upkeep of them than in male household where there is revise and contribute for family welfare [3, 26].

Barros *et al*. (1997) show that female-headed households have worse social, economic and demographic features compared to male-headed counterparts and have more likelihood to be poor Appleton (1996) presents evidence that irrespective of the way poverty is measured (i.e. by income, consumption or social indicators), female-headed households in Uganda are less subordinate than male-headed counterparts. Fuwa (2000) shows that in Panama, only female-heads such as widows, and single are particularly underprivileged in both income and non-income extents of poverty matched to male-headed households. Poor access to family property and assets, and deficient micro-credit facilities among female headed household in India as asserted by Swarup and Rajput (1994) add to the poor financial situations of female-headed households. Numerous studies have shown that intra-household discernment in education alongside girls, resulting in girls having fewer talents than boys, contributes to meagre economic prospects for women, resulting in greater poverty rates among female-headed households.

In addition, widowed household head could be more vulnerable to poverty compare to the male counterpart in many traditional India as results of cultural and socio stigma attached to their marital status. A case in point, a widow or a divorcee involvements in social gatherings and anniversaries is highly frowned at by the society as such could be termed to be ill-fated [11].

Moreover, if an employer is predominantly conventional in his or her values and beliefs, which is likely to be the case in rural India according to [10], then widows and divorcees could have rarer economic prospects paralleled to married women, other effects alike.

Furthermore, [28] discovered that female-headed households is predisposed to a grander risk of poverty in the presence of size economies and child-adult ratio. Size economies denote to the economies of scale that a household can attain when household size is large.

Resource use and Efficiency of Resource Use in Okra Production

There is a growing concern about the ever worsening food crisis and the capacity of Nigeria and other developing countries to satisfy the food requirement of a fast growing population with declining domestic products despite the sizeable number of farmers engaged in farming [4]. The problem could be attributed to among others, the efficiency in the use of resources (land, labour and capital). A resource is good or services which has the ability of sustaining human wants. However, since the resources are scare, therefore, choices must be made about the use to which a resource are to be used [14]. Resource use denotes the allocation of resources between competing alternative geared towards achieving maximum returns from given resources. These resources are relatively scarce to the farmers and have to be organized efficiently given the many alternative uses to which they can be used [3].

Efficiency of resource use is the relative performance in transforming given input into output [43]. Efficiency is of technical, allocative and economic efficiency;

Technical Efficiency

Technical efficiency is capacity of the farmer to produce maximum output frontier production given inputs and technology [1].

In the word of (2) the concept of overall efficiency (O.E) is a combination of technical (TE) and allocative efficiency (AE) i.e. OE=TE and AE.

The differentials of technical efficiency among farmers could be linked to managerial decisions, environmental conditions (soil quantity, rainfall, temperature, soil relative humidity), non technical and non economic factors and specific-farm features that could influence the farmers/ producers' ability to use technology. This results in technical inefficiency.

According to [17] stated that technical inefficiency ascends when actual or observed output from a given input is less than that of the maximum probable.

There are sever alapproachesin estimating technical efficiency index (TESCORE), which measure the distance of the observed firm from the point of the production frontier [9]. Firms located on the production frontier are 100 percent technically efficient (T.E=1) and technically inefficiency (TE < 1) of the firm increases with the increase in the distance from the production frontier [41].

Allocative Efficiency

It is the degree to which farmers make decision on inputs use to the level at which the marginal value product (MVP) equal to the Marginal Factor Cost (MFC) [24]. Allocative efficiency could be used as an estimation of the extent to which an analyzed Diminishing Marginal Utility (DMU) produces its outputs in a production that minimizes cost of production, with assumption that the unit is previously fully technical efficient. A firm is allocative efficient in the use of resources, when the value of the marginal value product (MVP) of the factor is equated to factor price in order to maximize profit with regard to given input [46, 48].

Economic Efficiency

Economic efficiency is also known as production efficiency is the capacity of a firm to maximize profit (when marginal value product is enough to counterbalance marginal cost). It is An economically efficient input/output combination must be attained in equally on the frontier and the expansion path way [30]. Economic efficiency occurs when MVP = MFC. To achieve economic efficiency, the ratio of MVP to MFC must be equal to one.

The MVP is estimated from the respective regression coefficients by means of using suitable optimal levels of output price with respect to the lead equation of the functional forms. The MFC is the market price of a unit of input. A ratio of less than one implies that input is being over utilized while a ratio greater than one implies that input is underutilized [24, 26].

Farm efficiency measurement is very vital especially among farmers in developing countries. This is true when one considers that majority of the farmers on this economy is resource poor [48]. Generally, the factors that affect farmers' efficiency could be grouped into agent and structural factors. Agent factors are those factors as linked to the farm manager such as level of education, family size, age and social capital. Structural factors are either on-farm such as farm location, farm size and fertility, while, off-farm include market and transport infrastructure. [9] categorized these factors into farm-specific variables (intensity of inputs likelabour, fertilizers and seeds), economic factors (prices of inputs and output), and environmental factors (rainfall; relative humidity, temperature). Efficiency is vital to economic analysis since it offers the yard stick for appraising judgments on choices concerning the use of scarce resources. If these resources are not proficiently employed, low productivity and unwanted materials ensues. The prominence of efficiency as avenue of promoting production which has led to increases in studies in agriculture on efficiency around the globe especially in developing countries [15]

Farm efficiency measurement is commonly through frontier approach and this has been extensively studied. Frontier encompasses the concept of maximally in which the function sets a boundary to the range of likely observation. The observation of points below the maximum possible output can occur but there cannot be any point above the production frontier given the technology. Deviations from the frontier are linked to inefficiency [14].

Frontier studies are divided according to method of estimation. Coell (1994) grouped these methods into broad categories – parametric and non-parametric method. The parametric method can be deterministic programming and stochastic frontier. These two forms of parametric are called Data Envelopment Analysis (DEA). The stochastic frontier analysis and the DEA are the commonly used method. Both methods estimate the efficiency frontier and calculate the firms technical, cost and profit efficiency related to it [16].

The use of deterministic approach is affected by noise and measurement error, while stochastic frontier is generally preferred because of its inherent stochasticity [33]. The foremost characteristics of the stochastic production frontier are that the disturbance term is a composite error consisting of two components, one symmetric, the other one sided component. The symmetric component, V_1 captures the random effects due to measurement error, statistical noise and other influence and assumed to be normally distributed. The one sided components, U_1 captures randomness under the control of the firm. It gives the deviation from the frontier attributed to inefficiency, it is assumed to be either half normally distributed or exponentially distributed.

Stochastic frontier production function was independently proposed by [9] and represented as specified:

$$U_1 = f(X_1B) \exp (V_1 - U_i)_i = 12 \text{ …...N …………(1)}$$

Where U_1 = output of J^{th} firm.

X_1 is the corresponding M_{x2} = vectors of input quantities used by the farmers

B is a vector of unknown parameter to be estimated

f denotes the appropriate functional form (such as Cobb Douglas and translog) [9]

Empirical studies on Allocative Efficiency

There are numerous empirical applications of allocative efficiency in agriculture and among them, [46] found that fertilizer, labour and planting material were underutilized, while farm land and capital were over utilised among cocoyam farmers in IvoLocal Government Area of Ebonyi State of Nigeria. Kadiri, *et al* (2015) work on resource-use and allocative efficiency of paddy rice production in Niger Delta Region of Nigeria, revealed *that rice producers in the area did not attain optimal allocative efficiency, seed input (0.94) had the highest allocative efficiency, while land input (0.05) showed the least allocative efficient input.* Furthermore, [23], studied the resource use efficiency among small-scale irrigated maize producers in Northern Taraba State of Nigeria. The empirical results showed that fertilizer, seeds, labour and land were underutilized, while water was overutilized. Additionally, [47] on allocative efficiency of polyculture of catfish (heterobranchusspp) and tilapila (oreachromisnitoticus) production in Anambra state Nigeria, disclosed that feed, capital and fish seed were underutilized, while water and labour were underutilized. Too [40] analyzed the efficiency of resource use in hybrid and open-pollinated maize production in Giwa LGA of Kaduna State, Nigeria. The findings were that fertilizer and insecticides were underutilized, whereas seeds, labour and herbicides were overutilized. In a similar study, (47) studied allocative efficiency of fruited pumpkin (Telferia Occidentalis) production in Ayamelum L.G.A of Anambra State, Nigeria. The finding shows that farmers in the study area had the scope of increasing their production through increasing the use of labour, capital and fertilizer, whereas, there were need to reduce use of land and seed. Furthermore, [49] reported on the allocative efficiency of cocoyam production among smallholder farmers in South-South Nigeria. Results of the analyses shows that Colocasia and Xanthosoma spp. farmers showed varying levels of allocative efficiency with no farmer attaining 100%allocative efficiency level. The mean, minimum and maximum efficiency levels for the two varieties were; 0.56, 0.31 and 0.86 and then 0.42, 0.22 and 0.82 respectively. Also, [24] examined resource use efficiency and productivity in cassava production in Owerri West local Government Area of Imo state, Southeast Nigeria. The results on productivity showed that inputssuch a as fertilizer, labour cost, capital and other inputs were over-utilized. Farmers should reduce the rate of input use for efficiency to been enhanced.

Also, [48] worked on the resource use efficiency in rice production in Kwande Local Government Area of Benue State, Nigeria. In this study, the results showed that while fertilizer, family and hired labour were overutilized, land and seeds were underutilized. The allocative efficiency analysis by [23] on resource use efficiency of maize (*Zea mays* L.) production study in Sri Lanka showed that profitability can be boosted by increasing land, seed and fertilizer and limiting the use of agrochemicals and labour. The results of [26] on resource use efficiency in maize production under two systems of technologies in Western Ethiopia showed the mean technical, allocative and economic efficiencies under improved technology to be estimated at 74, 82 and 61%, respectively, while the equivalent results under the traditional technology were 92, 80 and 73%, respectively.

Empirical Review of Stochastic Frontier Models

Stochastic Production functions have been widely applied in agricultural management and production analysis. The first application of the stochastic frontier model to farm level agricultural data was presented by [9]. Data from the 1973-74 Australian Grazing Industry Survey were used to estimate deterministic and stochastic Cobb-Douglas sheep production frontiers for the pastoral zone of Eastern Australia. It was concluded in this work that the stochastic frontier production functions were significantly different from their corresponding deterministic frontiers. More-so, the technical efficiency of yam production in South eastern, Nigeria was studied by [45]. He analyzed primary data generated from a sample of 260 farmers by stochastic frontier modeling using maximum likelihood estimation. Results of the analysis show that material input, labour and wage rate affected the output of yam production. The spread of technical efficiency indices was large with the best farm having 0.12 and the worst farm having 0.9 and the mean being 55. He observed that improve technology could be applied to improve current resource endowment to boast Hausa potato output. A study was made by [17] on a technical efficiency of commercial vegetable production in AkwaIbom State, Nigeria. The estimated results show that technical efficiency of the farms varied between 0.71 - 0.99 with mean technical efficiency of 0.86 implying average technical efficiency as 81.7% of the difference between observed and best practical output among the sampled farms was explained by technical inefficiencies.

Moreover, [40] estimated the resourceuse efficiency among dry season vegetable gardeners in Enugu urban of Enugu State, Nigeria was analyzed using 120 farmers fitted in stochastic frontier production function approach. Result indicated range in the technical efficiencies ranging from 68.01 to 98.64 with mean of 56.4. They also estimated the following factors as determinants to dry season vegetables in the study area to include, level of education and household size.

Stochastic production frontier model was applied by [44] in estimating production frontier for the upland rice farmers across gender in Anambra agricultural zone of Anambra State. Data from 120 sample farmers were used in the empirical analysis, 60 males and 60 females. The result showed that only level of education and access to credit were found to be positive and significant at 1% between the two farmers groups. The mean economic efficiencies for the male and female farmers were 0.65 and 0.61 respectively, indicating wide range of opportunities for improvement of upland rice farmers which could be through the use of improved production inputs.

Besides, [43] studied the relative economic efficiency among gender cassava farmers in Anambra State of Nigeria. Primary data generated from 120 sample farmers (60 males and 60 females) was analyzed by stochastic frontier modeling using maximum likelihood estimation. The result shows that educational level and membership of cooperative were positive and significant in the same farmer groups. Moreso, among the male group, the best practicing farmer having 0.78 and the worst farmer having 0.56 with mean efficiency of 0.65. The female group had best practicing farmer and worst farmer having 0.72 and 0.52 respectively with mean of 0.62.

Additionally, [1] studied the technical efficiency in food crop production in Gombe State, Nigeria. They analysed primary data generated from a sample of 123 food crop farmers by stochastic frontier modeling using maximum likelihood estimation. Results of this analysis revealed that family labour, hired labour and material inputs were the major factors that affected the output of food crops. The distribution of technical efficiency indices revealed that the current state of technology used by the sample farmers was inferior. The spread of technical efficiency indices was large with the best farm having 0.89 and the worst farm having 0.13 and the mean being 0.69. Although they did not examine the factors responsible for this wide variation, these scholars observed that a superior technology is needed, which could be applied to the current resources endowment to enhance food crop output. This would involve the use of improved seeds and the application of agro-chemicals in food crop production. Also, the excess and hence inefficient use of family labour could be reduced through the creation of alternative use of family labour could be reduced through the creation of alternative employment opportunities in the study area. This will tend to absorb excess family labour and hence enhance efficiency in food crop production, having 0.72 and 0.52 respectively with mean of 0.62.

Similarly, [32] studies economics of cocoyam production in Anambra State using Translog stochastic frontier cost function approach. They analysed primary data derived from a sample of 120 cocoyam farmers. The result of the analysis showcased that labour, material inputs and wage were the determinant factors to the output of cocoyam. The distribution of economic efficiency indicated that the current state of technology used by the sampled farmers was inferior was large with the best farm having 0.87 and the worst farm having 0.14 with the mean of 0.56. This wide variation could be improved through use of improved planting materials, use of fertilizer and herbicides in other to enhance farmers' output. Likewise, [42] applied Cobb Douglas stochastic frontier production in analyzing 120 cocoyam farmers in Anambra State of Nigeria. The maximum likelihood method was employed to estimate the parameters of the model. The result indicated that level of educational attainment, number of years of farming experience, farm size, number of extension contact and membership of cooperative organization were significant to the variation of the estimated farm level technical efficiencies.

Equally, [14] using stochastic frontier function x-rayed the productive efficiency of cocoyam farms in AkwaIbom State. They found that non farm income, farming experience and educational level were significant to production efficiency, while credit was not. Also, [2] studied economic efficiency of crice farmers in Kwara State of Nigeria. The result showed that educational level and farm size had positive impact on the level of efficiency both technically and economically. Too (12) used 120 farmers (60 male and 60 females) to study gender efficiency among cocoyam farmers in Nsukka agricultural zone of Enugu State, Nigeria. The primary data generated were analysed to estimate the parameters of the model using maximum likelihood method. The result revealed that farming experience, educational level and household size were positive and significant in both farmer groups. The maximum, minimum and mean technical efficiencies for the male farmers were 0.96, 0.63 and 0.56 respectively, while the female group had 0.98, 0.74 and 0.65. The mean technical efficiency among the groups indicated that opportunities still exist for increasing productivity and income of cocoyam farmers in the zone by increasing the efficiency with which resources were used in the farm level.

Furthermore, (15) reported that the efficiency of rabbit production among AkwaIbom farmers was significantly related to their household size, age and educational status of the farmers. In the same vein (45) emphasized that educational level of cereal farmers in Ethiopia positively influenced their level of efficiency, technically and economically. Also, (16) studied the determinants of cotton production and economic efficiency in Nigeria. Using a stochastic frontier production function that incorporates a model for inefficiency effects, farm level data collected from a sample of 250 cotton farmers from cotton growing areas of Nigeria were analysed. The empirical results indicated that labour and material inputs are the major factors that were associated with changes in the output of cotton. The model for the inefficiency effects in the frontier production function includes status of the farmer, whether out grower or none out grower, farming experience, education, extension and credit. All the farmer specific variables, except extension contact, were found to be significant factors that account for the observed variation in efficiency among the cotton farmers. In addition, (32) studied the effects of training on labour productivity and efficiency among oil palm farmers in Okitipupa local government area, Ondo state, Nigeria, using stochastic frontier production function. Data were generated from a sample of 100 farmers consisting of 50 who had undergone one form of training or the order in oil palm production (group A) and 50 without such training (Group B). Results indicated that fresh fruit bunches (FFB) production in Group A was higher. Also, labour and capital was more efficient in this Group. The coefficient for labour was significant in both Groups, indicating that labour is a significant input in oil palm production. The coefficient for training in the inefficiency model was negative for Group A and positive for Group B, implying that training of oil palm farmers in the art of cultivating the crop tended to increase technical efficiency for the farmers that were given training (Group A) was estimated to be 0.93 while those without training (Group B) was 0.51, implying that farmers with basic and formal training were more technically efficient in the allocation and utilization of resources and were more productive than those without such training.

Materials and Methods

The study was conducted in south east of Nigeria. The zone lies between 5 9'and 7 75'N of equator and longitude 6 85' and 8 46' East of Greenwich Meridian.It has a population of 16,381, 729 people (47) with land area of 10952400 hectares. It comprises of five states; Imo, Anambra, Ebonyi, Abia and Enugu. It is bounded in the North by Benue and Kogi States, in the West by Delta and Rivers States, in the South by AkwaIbom State and in the East by Cross River State. Southeast states have two major seasons; rainy season (April – October) and dryseason(November to March). It has temperature between 18^0C – 34^0C and relative of about 68%. The inhabitants are agrarians and still engage in non-agricultural activities such as civil service, petty trading, vulcanizing, driving, carpentry, mechanics and others.

Multistage random sampling technique and purposive selection were used to select states, agricultural zones, local government areas, communities and respondents. In stage one, four out of five states in South East Nigeria were purposely selected because of high intensity of okra production (18). The selected states were Abia, Anambra, Ebonyiand Enugu. Stage two involved the random selection of ten Local Government Areas (LGAs)from each of the of the four states. This brought to a total of forty LGAs. In stage three, three communities were selected from each of the selected LGA, bringing to a total of one hundred and twenty communities. Finally, a female headed household okra farmer from the lists of farmers from the extension agent covering the area was selected from each of the communities. This brought to a total of one hundred and twenty farmers for the detailed study.

A structured questionnaire and oral interview were used to collect information from the respondents bothering on the objectives of the study. Gross margin was used to determine objective 1, maximum likelihood method and allocative efficiency model were used to determine objectivesiiand iii respectively. The objective iv was addressed using descriptive statistics such as percentage responses and frequency distribution.

Model Specification

Multiple Regression Analysis

Multiple regression is used to obtain allocative efficiency indices b_i coefficient was estimated by means of ordinary least squared regressions method. The explicit production function was estimated by

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + e \quad \ldots\ldots\ldots\ldots (8)$$

Where:

Y = value of okra output (N), x_1 = farm size (ha), x_2 = labour (manday), x_3 = Seed (kg), x_4 = fertilizer (kg), x_5 = capital (N)

$x_1 – x_5$ = coefficient of the parameters to be estimated, while e_1 was the error term and b_0 was the coefficient.

Four functional forms of the multiple regressions were employed in order to select the one that has provided the best fit. The functional forms tried were:

Linear function;

$$Y = b_0 + b_1 x_1 b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + ei \quad \ldots\ldots\ldots\ldots(9)$$

Double log function Y:

$$\ln(y) = \ln b_0 + b_1\ln x_1 + b_2\ln x_2 + b_3\ln x_3 + b_4\ln x_4 + b_5\ln x_5 + ei \quad \ldots\ldots\ldots\ldots (10)$$

Semi log;

$$Y = \ln b_0 + b_1\ln x_1 + b_2\ln x_2 + b_3\ln x_3 + b_4\ln x_4 + b_5\ln x_5 + ei \quad \ldots\ldots\ldots\ldots (11)$$

Exponential function;

$$\ln Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + ei \ldots\ldots\ldots\ldots\ldots (12)$$

The choice of the best functional form was based on the magnitude of the R^2 value, the high number of significance, size and signs of the regression coefficients as they conform to *aprioriexpectation*.

Technical efficiency analysis

The technical efficiency was estimated using Cobb-Douglas stochastic frontier production function. In this study, the Cobb Douglas technical efficiency as used by Batteseand Coelli, (1977) which incoporated efficiency determinants into the inefficiency error component such that one could detect the focal point to act in order to ensure that efficiency atgreater levels are used. The explicit form of the empirical stochastic frontier production function model was stated as follows:

$$\ln Y_j = \beta_0 + \beta_1\ln x_1 + \beta_2\ln x_2 + \beta_3\ln x_3 + \beta_4\ln x_4 + \beta_5\ln x_5 + V_1 – U_1 \quad \ldots\ldots\ldots\ldots(13)$$

Where ln = represent the natural logarithm, the subscript represents the i-th sample farmers, Y_i = cocoyam output in kg of the i-th farmer, x_1 = farm size (ha), x_2 = labour used (man day), x_3 = quantity of fertilizer used (kg), x_4 = seed (kg), x_5 = depreciation in capital inputs (in naira), β_0 = intercepts, $\beta_1 – \beta_6$ = coefficient estimated, Vi = random error and Ui = technical efficiency. In addition, U is assumed in this study to follow a half normal distribution as is done in most applied frontier production literatures. Where:

$$Ui = б_0 + б_1z_1 + б_2z_2 + б_3z_3 + б_4z_4 + б_5z_5 + б_6z_6 + б_7z_7 + б_8z_8 + б_9z_9 \quad \ldots\ldots\ldots(14)$$

Where Ui = technical efficiency of the i^{th} famer, z_1 = age of the farmer (Years),

z_2 = level of education (Years), z_3 = household size (No), z_4 = farming experience (Years), z_5 = farm size (ha), z_6 = extension contact (No), z_7 = credit access N),

z_8 = membership of organization (No).

$б_0$ = constant, $б_1 – б_7$ = coefficients to be estimated.

Elasticity of Production and Return to Scale Measurement

Other estimates resulting from our regression equation 13 for okra female headed households are elasticity of production (EOP) and return to scale (RTS). To estimate EOP for Xi from Cobb- Douglass functions;

EOPi = bi(Q)/Xi * Xi/Q = bi…………………(15)

Where; b1= regression coefficient of resource Xi
Q = Output
Xi = Resource whose elasticity of production is to be estimated.
To estimate RTS (v) = bi
And v > 1 (increasing return to scale)
v < 1(decreasing return to scale)
v = 1 (constant return to scale)

Allocative Efficiency Model

Efficiency ratio was used to determine the efficiency of resources used in okra production. The estimated coefficients of the relevant independent variables were used to compute the Marginal Value Products (MVP) and their corresponding Marginal Factor Costs(MFC). The equation is

r = MVP/MFC………………………..(16)

Where r = efficiency ratio; MVP = Marginal Value Product of variable input; MFC = Marginal Factor Cost
The value of MVP was computed using the regression coefficient of each input of okra and the price of the okra output was expressed as stated below:

MVPx= bi × Py …………………………………………(17)

Where
Py = price per unit of output, bi = regression coefficient of input i (i = 1, 2,. ....n)
MVPxi = Marginal Value Product of inputxi The prevailing market price of okra inputs was used as the Marginal Factor Cost (MFC).
The values of the ratios are interpreted thus: i. If r < 1, implies that the resource was over-utilized- hence signifying that increment of the resource in question will boost the profitability of okra.
ii. If r > 1, means under-utilization of the resource. The implication is that ere is inverse relationship between the said resource and profit
iii. If r = 1,, implies efficient of resource use.

Gross Margin Analysis Model

The objective 3, estimation of cost and returns was determined using gross margin analysis, which is the difference between the total revenue (TR) and the total variable cost (TVC)

g.m. = tr – tvc………………………………… (18)

i.e. G.M = $\sum_{1-1}^{n} P_1 Q_1 - \sum_{j-i}^{m} r_i x_i$ …………………….. (19)

The net farm income can be calculated by gross margin less fixed input. The net farm income can be expressed as thus:

NFI = $\sum_{1-1}^{n} P_1 Q_1 - \left[\left(\sum_{j-i}^{m} r_i x_i \right) + k \right]$ ……………………. (20)

Where:
GM = Gross margin of okra production measured in Naira (N)
NFI = Net farm income farm income of okra production measured in Naira (N)
P1 = Market (unit) price of output of okra measured in Naira (N)
Q = Quantity of output of okra measured in kilograms (kg)
ri = Unit price of the variable input of okra measured in kilogram(kg)
xi = q3uantity of the variable input of okra measured in kilogram (kg)
K = Annual fixed cost (depreciation)of okra measured in Naira (N)
i = 1 2 3 …….. n
j = 1 2 3 …….. m

Results and Discussion

Table 1: Summary of Statistics of Variables in the Resource and Technical Efficiency

Variable	Mean	Minimum	Maximum	Standard Deviation
Age	36	26	64	0.632
Household size	6	4	12	4.643
Farming Experience	9	5	23.4	5.721
Farm Size	0.456	0.234	2.3	0.0032
Labour	280	114	365	16.908
Fertilizer	120	150	200	12.541
Educational Level	7	4	16	7.543
Output	5893	4532	7000	45.436

Source, Field Survey, 2016.

Table 1 shows that the mean age of female headed household farmers in the study area was 36 years old and household size of 6 persons. The average okra farmer had 9 years of farming experience, with years of 7 years of schooling, cultivated farm size of 0.456 hectare using 280man-days of labour. Also, 120kgof fertilizer were used to realize 5943.4kg of okra.

Table 2: Costs and Return in Okra Production

Item		Unit	Quantity	Cost/ Unit	Total Return	Percentage
Revenue		**Kg**	**7000**	**200**	**1,400,000**	
Variable cost	Planting material kg	Kg	20	500	10,000	5.02
	Fertilizer input kg	Kg	200	7200	28,800	14.46
	Miscellaneous kg	Kg			45,000	22.60
	Total physical output				83, 800	
Labour cost	Clearing	man-day	40 hrs	2500	12500	6.27
	Land preparation	man-day	96 hrs	3000	36000	18.08
	Planting	man-day	32 hrs	1200	4,800	2.41
	Weeding	man-day	80 hrs	2500	25,000	12.6
	Fertilizer	man-day	48 hrs	1500	9,000	4.52
	Harvesting and Packing	man-day	72 hrs	2000	18,000	9.04
	Total		368hrs		105300	

Total Variable Cost 189,100

GM = (TR – TVC) = N1, 210,900

Total fixed cost = Depreciation on (hoe, cutlass, rake and basket) = N10,000

Total cost = (TVC + Depreciation) = N 199, 100

Net farm income = (TR – TC) = N 1, 200,900

$$BCR = \left(\frac{NFI}{TC}\right) = 6.0$$

Source; Field Survey, 2017.

Table 2. shows that an average 20kg of okra seeds, costing N10, 000 and accounted about 5.02% of total cost of production was used to produce a hectare of okra farm. The cost of purchasing okra seeds in the study area is relatively cheap and. This could be as a result of high availability of okra seed particularly local varieties in the study area. This is contrary to (43) on upland rice production, who found that cost of planting material to be high,, since the same planting material is the edible portion. Also, 4 bags (200kg) of NPK fertilizer costing N28,800 at N7,200 each, constituting about 14.46% of the total cost of production. The high cost of fertilizer at farm level could be linked to the withdrawal of fertilizer subsidy by federal Government of Nigeria, hence the importers of the resource maximize the business (45).

A total of 368 man hours equivalent was used to produce one hectare of okra. Among the labour cost, cost of land preparation had the highest percentage contribution of 18.0% to the total cost of production. The high cost associated with the operation could be ascribed to the tedious nature of the operation. This result concurred with (30), who reported that labour constitutes about two-third of total cost of production. Nevertheless, the least of the labour variable costs considered was planting, 2.41%. A total of N1, 400, 000 was realized from 7000kg of okra harvested per hectare. The gross margin was N 1, 210, 900 and net farm income was N 1, 200, 900, implying that the enterprise is profitable. The return per investment was N6.0, which means that for every N1 invested in okra production, N 6.0 would be realized.

Table 3: Maximum Likelihood Estimation of the Cobb Douglas Stochastic Production Function

Production Factor	Parameter	Coefficient	Standard Error	t-value
Constant	β_0	9.064	2.107	4.302***
Farm size	β_1	1.456	1.506	0.967
Planting material	β_2	0.944	0.237	3.928***
Labour input	β_3	4.041	1.033	3.912***
Fertilizer used	β_4	0.907	0.338	2.683**
Depreciation	β_5	-0.441	0.486	-0.908
Efficiency factor				
Constant	σ_0	0.778	0.041	18.976***
Age	σ_1	-0.0408	0.285	-1.720*
level of schooling	σ_2	0.912	0.261	3.494***
Household size	σ_3	0.812	0.271	2.996**
Farming experience	σ_4	0.866	0.220	3.936**
Farm size	σ_5	0.039	0.012	3.25***
Extension visit	σ_6	1.483	0.898	1651*
Credit access	σ_7	0.508	0.041	3.603***
Membership of organization	σ_8	0.51	0.662	0.773
Marital status	σ_9	0.774	0.842	0.919s
Diagnostic statistic				
Total variance	(σ^2)	1.3004	0.3421	4.8012***
Variance ratio		0.8631	0.0017	507.706***
Likelihood ratio test		307.765		
Log-likelihood	463.373			

Source: Field Survey, 2017

Note: ***, **, * indicate statistically significant at 1.0, 5.0, and 10.0 percent respectively.

Table 3 revealed that the coefficients of production factors such as planting material, labour input and fertilizer used in the production of okra were positive and significant at 1%, 1% and 5% respectively. Thus, leading to increase in their technical efficiency to the tune of 0.944%, 4.041%, and 0.907% respectively. In the words of (1), the positive sign of the coefficient of labour to technical efficiency could mean increasing return in farm output usually associated with increase in use of labour over a period of time before diminishing returns set in. Fertilizer according to (36) is an important determinant of agricultural productivity as it has the capacity to shift production upwards, especially when applied in the right time, form and proportion. The coefficient for depreciation on tools was negatively signed in line with *apriori* expectation. The sign identity of the coefficient is consistent with the findings of (3).The diagnostic statistics had coefficients that were all statistically significant at 1.0% alpha level. The coefficient of total variance (σ^2) was 1.3004, while the variance ratio was 0.8631. This could mean that 86.3.4% in the variation in output among the okra farms was due to the differences in technical efficiency. The log likelihood function was 463.37.

Determinants of Technical Efficiency

The coefficient of level of education was positive in agreement with a *priori* expectation and significant at 1% alpha level., Education and training produce labour force as asserted by (4)that is more skilled and adaptable to the need of changing economy because *ceteris-peribus*, educated farmers are more amenable to risk taking and change than non-educated ones. In addition, education helps to influence farmers' enthusiasm to accept new ideas and innovations, and get current extension information which in turn enhance farmers' knowledge and skills to enhance farm productivity (18). The coefficient of membership of organization was positive in conformity with(42) and significant at 5% probability level. Organization is capable of influencing the efficiencies of its members through training, input availability sources and provision of inputs at subsidize costs(43).

The coefficient of extension services had direct relationship with technical efficiency at 99% confidence level. Several studies (4; 5; 30) opined that extension is medium in information dissemination, technical assistance and group formation among farmers in order to enhance their productivities through attainment of improved efficiency. Also,increasing numbers of contact with extension agents by the farmers as asserted by (33) could bridge the gap between their efficient and inefficient, thus stimulating the farmers' adoption of agricultural technologies which is capable of pushing the production frontier upward, especially at the long run. Contrary, (5) reported that the bottlenecks to extension services information dissemination to the farmers could change the sign identity of the variable, thus making the farmers to be technically inefficient.

As the coefficient of the age of the female headed household was negative and significant at 5% risk level. This could imply that aged okra female headed farmers are less technically efficient than the youthful counterpart. This is because youthful female headed households could be more motivate, innovative and more rational decision makers compare to the former that is usually conservative (31).

Contrary to expectation, the sign identity of the coefficient of access to credit was negative and significant at 1% probability level. This could imply poor access to credit by the female households okra farmers in the study area. The access to credit improves the farmers efficiency of resources thus permits them to produce at minimum amount input cost (36). Also, credit access aids in shifting the cash limitation away, facilitates the farmers to well-timed purchase of farming inputs that they cannot afford from their own wherewithal (8; 24)

The frequency distribution of technical efficiency indices of farmers engaged in okra production is presented in Table 4 and indicated that the okra farmers mean efficiency was 56%, which implied that there was a large scope for increasing okra production by 44%, by adopting the techniques and technologies employed by the best practice okra female headed household farmers. These figures (56% and 95%) compares favourable with 25% and 95% and 86% and 98% obtained by (2) and (32) respectively. However, according to Udo (2005), farmers who had efficiency values above the mean score were frontier farmers, while those who had values below it were non-frontier farmers. As such, the percentage of the frontier farmers was 59.76 percent, while non-frontier female headed household okra producers represented 38.39 percent. The implication of the result was that the average okra farmer required 41.1%s $(1\text{-}0.56/0.95)^{100}$ cost saving to attain the status of the most efficient cocoyam farmer as sampled best ten category, while the least performing farmer needed 75.8% $(1\text{-}023/0.95)^{100}$ cost saving to become the most efficient okra producer among the worst 10 sampled farmers.

Table 4: Distribution of Technical Efficiency Index

Technical Efficiency Index	Frequency	Percentage
0.00 – 0.20	15	12.5
0.21 – 0.40	11	9.17
0.41 – 0.60	30	25.00
0.61 – 0.80	35	45.83
0.81 - 1.00	9	7.5
Maximum Technical Efficiency	0.95	
Minimum technical efficiency	0.23	
Mean technical efficiency	0.56	
Mean of the best 10	43.4	
Mean of the worst 10	75.8	

***Source*:** Computed from Field Survey, 2017

Elasticity of Production (E_P) and Return to Scale is shown in Table ………

Table 5: Elasticity of Production and Return to Scale

Inputs	Elasticity
Farm size	1.456
Planting material	0.944
Labour	4.041
Fertilizer	0.907
Depreciation	-0.441
Sum of elasticity	6.907

***Source*:** Computed from Table 3

The Table showed that the inputs of farm size (1.648), fertilizer (0.900) and planting material (0.704) had the highest elasticity of production. This implied that they contributed most to farm returns when compared to the other inputs such as labour (-4.238) and depreciation (-0.441).

Elasticity of production (E_P) and return to scale to okra farmers is shown in Table **5**The elasticity of production measures the degree of responsiveness of output to changes in input. It measures the proportionate change in output as result of a unit change in input. The estimates for the parameters of the stochastic frontier production are the direct elasticity's of production for the various inputs, given the Cobb Douglas specification of the model (30).

The summation of the coefficient of elasticity of production for the various inputs (returns to scale) was presented in Table 5. The return to scale was 6.907 which implied that female headed household farmers in South East Nigeria were in stage III of the production phase. This was necessitated by high and negative coefficient of labour with low and negative depreciation coefficient (-0.441). Therefore, it meant that the okra farmers in the study area were either under-utilizing or over-utilizing their farm inputs. The implication was that the farmers needed an overall increase or decrease in the level of their current input employment to achieve technical efficiency.

The allocative efficiency indices for female headed household okra farmers in South East Nigeria is shown in Table 6. The multiple regression production function was used in determining the bi-coefficients of allocative indices of okra farmers and were summarized and presented in Table 6.

Table 6: Estimated Multiple Regression Production Function for Okra

Variable	Linear	Exponential	Double Log+ (Cobb Douglas)	Semi Log
Constant	7.687 (3.006)***	8.809 (4.090)***	5.098 (5.341)***	4.001 (3.201)***
Farm size	1.890 (2.127)**	2.072 (0.033)	0.590 (1.298)*	0.334 (0.090)
Planting material	0.009 (0.427)	0.557 (0.661)	0.128 (2.730)**	1.091 (-0.489)
Fertilizer	0.489 (-1.377)	0.117 (2.900)**	0.236 (3.446)***	-2.705 (2.004)**
Labour	2.002 (3.723)***	0.528 (4.001)***	0.597 (1.292)*	-0.005 (0.407)
Capital	-0.341 (-2.009)	-0.609 (-1.126)	0.753 (0.216)	0.074 (0.i89)
R^2	0.699	0.661	0.896	0.617
F Value	5.286***	6.700***	8.640***	4.808***

***Source*:** Field Survey, 2017

*****, **, *** significant at 1.0%, 5.0% and 10.0% levels of probability respectively

The figure in parenthesis is the t-ratio

In addition, from Table 6, the double log analysis revealed that the coefficients of farm size, planting material, labour and fertilizer were significant at various risk levels. As expressed the coefficient of fertilizer (0.076) was positive and statistically significant at 1.0% alpha level. This conformed to the findings of Ume *et al.* (12), who asserted that fertilizer is an important input factor that greatly influences farmers' output. The coefficient of planting material (0.128) was positive and statistically at 5.0% risk level. This was in agreement to *apriori* expectation that increase in planting material would result in increase in the okra output of the farmer. The coefficient of labour (0.677) and farm size (0.165) were positive in line with *apriori* expectation and significant at 10% risk levels respectively. These implied that any increase in individual or collectively would increase the farmers' output. The R^2 value was 89.6% with f-ratio of 92.64, indicating high intensity of okra production in the study area.

The allocative efficiency indices were summarized and presented in Table 7.

Table 7: Distribution of Allocative Efficiency Indices of Female headed Okra Farmers

Variable	$\overline{Y}$	$\overline{X}$	Bi	MPP	MVP	MFC	R	(D)%
Farm size	4,620	0.877	0.590	3108. 096	466,214.6	5,000	93.24	98.9
Seed	4,620	540	0.128	1.095	109.5	150	0.730	-37
Fertilizer	4,620	420	0.236	2.596	259.6	120	2.160	53.7
Labour	4,620	500	0.597	5.516	2206.4	1000	2.206	54.7
Capital	4,620	-217	0.753	-16.031	-1603.1	1000	-1.6031	-35.7

***Source*:** Field Survey, 2017

The result of the estimated Cobb Douglas production function, as shown in Table 6 as lead equation was used to compute the allocative efficiency indices b_1 coefficient which. The ratio of the marginal value product (MVP) of each input to their respective acquisition cost were computed to obtain the relative efficiency of okra female headed farmers in south east Nigeria.

The result revealed that none of the variables considered had efficiency ratio that was equal to 1 (one), which implied efficient utilization of resources. The ratio of marginal value product to marginal factor cost of farm size (93.4), fertilizer (2.16) and labour (2.206) were greater than 1, signified under utilization of resources. The financial limitation among most farmers in sub Saharan Africa especially female headed household hinders their access to these resources, resulting to under-utilization of the resources. The under utilization of the resources has affected production and productivity of the farmers as farming remains in traditional level, which usually characterized of use of crude implement, use of local varieties of crops and breeds of animal and organic manure (Ume, *et al*;

2016). The under- utilization of the resources indicated that more than profit maximization levels of resources were used.
The allocative efficiency indices of planting material (0.730) and capital (– 1.603) were less than unitary, thus, implying over-utilization of the resources. Nwosu and Okoli (2011) and Ume, *et al*; (2016) findings concurred to these assertions. The over-utilization of resource implied that less of the profit maximization of the resource was used. The possible reasons for the over utilization of the resources of labour, could be because of the use of family members in farming of which the farmer bears no cost for the use (Iheke, 2010). Therefore, for profit to be optimized in okra production among female headed household in South-East Nigeria, farm size, fertilizer and labour should be increase from their current level by 98.9%, 53.7% and 54.7%, while seed and capital should be reduced from their current levels by -37% and -35.7% respectively.
Elasticity of okra production and return to scale were summarized and presented in Table 8.

Table 8: Elasticity of Production and Return to Scale of okra

Variable	Elasticity of Production
Farm size	0.590
Seed	0.128
Fertilizer	0.236
Labour	0.597
Capital	0.753
Return to Scale	2.304

***Source*:** Field Survey, 2016

The elasticity of production shows the change in output relative to unit change in input (26). The elasticity of production of okra was estimated directly from Cobb Douglas coefficients and each of the resources had a production elasticity of less than one. These indicated that all the factor inputs and okra output had inelastic relationship and hence, signifying over-utilization of these inputs. However, the return to scale, which is the sum of the elasticity of all inputs, used in okra production (2.304) was greater than 1, indicating that the farmers were in stage 2 of production function. This implied that when all factor inputs were varied by 1%, the responsiveness of okra output to such input variation would be 2.304%

Table 9: Distribution of respondents according to constraints to okra production

Problems	Frequency	Percentage
Poor access to credit	102	85
High labour cost	98	81.7
High cost of fertilizer	37	30.8
Inadequate extension contact	89	74.2
High cost of planting Material	18	15
Long distance from farm	14	11.7
Inadequate storage facilities	96	80

** Multiple responses*
***Source**: Field Survey, 2017*

Poor access to credit was the most outstanding problem that meet head-on with okra farmers and was represented by 85%. percent of the total respondent. The lack of collateral, location of banks in urban areas far away from the farmers and short repayment period could be the reason for poor access to credit by the farmers (24; 43).
Furthermore, high cost of labour was encountered by 81.7% of the sampled female headed households The urban drift of able-bodied youths and feminization of agriculture, could likely to make labour to be inelastic and expensive (23; 46). Additionally, poor storage facilities of okra as reported by 80% of the respondents had resulted in many farms disposing their produce at give-away prices immediately after harvest to avoid spoilage. (48) made similar assertion. Finally, poorextension services were complained by 74.2% of the interviewed farmers. The high extension agents – farmers' ratio could attest to the scarcity of the change agents (5).

Conclusion and Recommendation

Based on the study the following conclusions were deduced;
Okra production was profitable in the study area with Net farm income ofN1, 200,900, gross margin of,N1, 210,900 and benefit cost ratio of 6.0.
In addition, *the determinants of technical efficiency were level of education and extension contact were positive. The mean technical efficiency was 0.56; the maximum efficiency was 0.95, while the minimum was 0.23.* More so, result of the resource efficiency showed that farmers did not achieve optimum allocative efficiency In the use of the any of the resources considered. Finally, the constraints to okra production were poor access to credit, high cost of labour, poor access to extension services and inadequate storage facilities.
Based on the results the following recommendations were suggested;

1. There is need to develop labour saving device such as hand driven plough.
2. There is need to expose the respondents to educational programmes such as adult education, seminars, workshops.
3. There is need to motivate he extension agents to be alive to their functions by paying them their overtime and other out of pocket allowances incurred in discharging their duties.
4. There is urgent need to make farmers to have access to microfinance banks and other commercial banks at subsidized interest rate and zero collaterials.

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