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Influence of farmer characteristics on the production of groundnuts, a case of Ndhiwa Sub County, Kenya

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Abstract: **Groundnut (*Arachis hypogea* L.) is a major annual oilseed crop and its economic and nutritive quality makes the crop a beneficial enterprise for rural farmers in Ndhiwa Sub-County. Researchers have recommended adoption of technology and increased contact with extension agents as one way of increasing production but productivity remains low. Crop productivity or yield is a function of environment, plant, management and socio-economic factors that interact at optimum levels to give maximum yields. The study focused on farmer characteristics which are part of socio-economic factors using the ex-post facto research design. The objective was to determine the influence of farmer characteristics on the production of groundnuts in Ndhiwa Sub County, Kenya. Purposive, multistage and simple random sampling was used in the study. Data on famer characteristics was obtained from 323 farmers out of the population of 21,820 farmers involved in groundnut production during the 2014 main cropping season. Document analysis was used to collate and analyze secondary data. Cobb-Douglas production function model and multiple regression analysis were used to study the behaviour and effects of independent variables on the dependent variable and test hypotheses. The results of the study showed that majority of the farmers were in households that were male headed with an average of seven persons. The household heads were middle aged, experienced in groundnut farming and had low levels of formal education. Age, gender of head of household, household size, level of formal education and experience in farming all had a positive relationship with groundnut production. However, only gender and experience in farming were significant at p <0.05 level of significance. Based on the findings the study recommended that interventions that target female headed households and improvement of farmers' traditional knowledge on production should be put in place to improve production.**

Keywords: **Farmer characteristics, groundnut and production.**

I. INTRODUCTION

The agriculture sector plays a significant role in the economies of developing countries, especially in Sub Saharan Africa (World Bank, 2008). Agriculture accounts for a large portion of Kenya's Gross Domestic Product (GDP) with an estimated 75% of the population depending on it either directly or indirectly. Majority of this population (80%) live in the rural areas and depend almost entirely on agriculture as a main source of employment and income (Republic of Kenya, 2010). It is worth noting that about 95% of agricultural land in Sub-Saharan Africa, of which Kenya is part, is rain-fed but yields remain low with no likely changes in the near future.

Groundnut is the 13th most important food crop and 4th in oil seed crop of the world. Groundnut seeds (kernels) contain 40-50% fat, 20-50% protein and 10-20% carbohydrates. Groundnut kernels are consumed directly as raw, roasted or boiled kernels or oil extracted from the kernels is used as culinary oil, animal feed and industry raw material. The uses of groundnut plant make it an excellent cash crop for domestic markets as well as for foreign trade in several developing and developed countries (Food and Agriculture Organization, 2006).

Worldwide, groundnut is grown on 26.4 million hectares with a total production of 37.1 million metric tons and an average productivity of 1.4 metric tons /ha. Developing countries constitute 97% of the global area and 94% of the global production of this crop. The production of groundnut is concentrated in Asia and Africa, where the crop is grown mostly by smallholder farmers under rain-fed conditions with limited inputs (Food and Agricultural Organization, 2011). In East Africa of which Kenya is part it is widely grown by small-scale farmers as main crops, relay crops or inter-crops and production is rain fed (Mutegi, Hendriks and Jones, 2012).

In Western Kenya, which is the major groundnut growing zone in Kenya, it is not only a principal source of protein and oil but also a major source of small-holder cash income. Therefore, groundnut plays a critical role in attaining food security among poor rural households. For most of these farmers, increased production will translate directly into higher consumption and better nutrition. Kenya does not produce enough groundnut for its market. Ndungu *et al*., (2013) in their study confirmed that groundnut used in the peanut butter cottage industry in Nairobi was bought from wholesalers within the city who in turn sourced groundnuts from Malawi and Uganda. This finding is consistent with report by Mutegi *et al*., (2012) who found that groundnuts traded in Nairobi are hardly produced in Kenya but purchased from neighbouring countries.

Ndhiwa Sub-County is located in Homa Bay County in South Western Kenya and is one of the major groundnut producing zones locally and nationally. During the 2014 crop year, a total of 19,900 farm families planted groundnuts in 5,590 hectares yielding a total of 3,913 MT of shelled nuts valued at KES. 391.13 Million. Out of this 30% was consumed at the household level, 60% sold unprocessed and 10% was processed within the Sub-County. The average production per hectare was 700 kg against a potential of 1,400/hectare.

The basic objective of economics of agricultural production at the micro level (farm) is to assist farmers maximize profits through efficient farm allocation of resources over a given time period. Profit maximization could be achieved by maximizing output from given inputs. Agricultural productivity or output is synonymous with resource productivity which is the ratio of total output to the inputs being employed. Crop productivity or yield is a function of environment, plant, management and socio-economic factors and their interactions and maximum yield in a given environment is possible only when all these factors are at optimum levels (Nand, Virupax and Charles, 2010).

Past studies on groundnuts production in Ndhiwa Sub- County have focused on the improvement of plant characteristics as one function of crop productivity, but no studies were found that focused on farmer characteristics which are part of socio-economic factors that influence groundnut production. Most research on groundnut production in Ndhiwa Sub-County have focused on technology improvement to increase production in terms of improved seed varieties; pest and disease control (especially groundnut rosette virus), value addition, and contamination of afflatoxin in groundnuts and agronomic practices; however no studies were found that focused on influence of farmer characteristics on groundnut production specifically in Ndhiwa Sub-County. This study analyzed the influence of farmer characteristics groundnut production using the Cobb Douglas production function approach and regression analysis. The Cobb Douglas functional form is commonly used for its simplicity, flexibility and consistency with economic theory of production in agriculture (Sheppard and Clifton, 1998). Studies in other areas have shown that socio-economic factors have an influence on production of various crops such as bananas, groundnuts, cotton, coffee and maize. The null hypothesis that there is no statistically significant influence of farmer characteristics on the production of groundnuts was tested at 95% confidence levels.

The results from this study is useful to extension service providers and development partners on what farmer characteristics needs to be addressed and on policy options that are viable towards the improvement of groundnuts production in the Ndhiwa Sub-County . The study was based on the assumptions that the respondents would be cooperative and provide the required information and that the farmers are knowledgeable on groundnut production. Production is defined as the creation of goods and service from inputs or resources, such as labour, machines and other

capital equipment, land and raw materials. Production theory explains the relationship between inputs and outputs, which is the transformation of factor inputs into outputs (Thomas and Maurice, 2008). The economic model commonly used to determine the relationship between the various factors and output in agriculture is the production function model. The production function of any farmer is determined by resource availability of the farmer. Agricultural production resources consist of land, labour and capital as the basic factors of production.

The CD production function was the specific model used to study the behaviour and effects of independent variables on the dependent variable. Economists are satisfied that CD production function is a suitable function. Shepard and Clifton (1998) stated that the CD production function is the most common form used in applied studies because it is simple to estimate and is consistent with economic theory of production in agriculture. Bravo-Ureta and Pinheiro, (1993) noted that the main reason for using the Cobb Douglas functional form is its wide use in efficiency studies and that there are more flexible functional forms of the function.

The study used OLS method to estimate the model parameters. The OLS estimators possess characteristics of good estimators which are (a) linear, (b) unbiased and (c) best estimator's property. Koutsoyiannis , (1977) mentioned the importance of OLS methods including the fact that : (a) the parameters obtained by OLS have some optimal properties, (b) the computational procedure of OLS is fairly simple as compared with other econometric techniques, and the data requirements are not excessive, and (c) the mechanics of least squares are simple to understand. Multiple regression analysis was used to develop production function for groundnut production and measure efficiency of resource use. The simplified form of production function is given by: $\mathbf{Q = f (L_{\alpha}K, L),}$ Where: Q – Output, L_{α} – Land, K- Capital and L- Labor force used to produce the same output.

The mathematical form of the CD production function that was employed is given as: $\mathbf{Q = AL^{\alpha}K^{\beta}}$ where Q is the output, A is the technology, and K is Capital employed in the production process, α, β are Elasticities.

The explicit form of the model for the analysis was given as;

$\mathbf{Y= A + \alpha_1X_1 + \alpha_2 X_2 + \alpha_3X_3 + \alpha_4X_4 + \alpha_5X_5 + e,}$ **where:** Y= Output of groundnut in Kg of dry shelled, $X_{1.....}$ X_5 are the variables whose data was collected. A is a constant term and e is an error term to capture the effects of exogenous and endogenous variables not included in the model**;** $\alpha_{1.....}$ α_5 are the regression coefficients of the variable inputs that were estimated using the OLS technique.

Table 1. Summary of Dependent Variable and Independent Variables

Variable	Description
Yield (Y)	Production of dry shelled groundnut (Kg) in the year 2014 main season
Age (X_1)	Age of household head in years
Gender (X_2)	Gender of head of household (Male , Female)
Household size (X_3)	Number of persons in the household
Education (X_4)	Household head years of formal education
Experience (X_5)	Experience in groundnut farming in years

To enable the estimation using the OLS technique, the CD production function was transformed into a model that satisfies the Classical Linear Regression Model. This enabled the application of the usual assumption of OLS, that of Best Linear Unbiased Estimator. The model was transformed into the linear production function by applying the logarithms and the variables regressed against the output of groundnut in the year twenty fourteen. The modified CD production function was stated as:

$$\mathbf{Log\ Y= Log\ A + \alpha_1 Log\ X_1 + \alpha_2 Log\ X_2 + \alpha_3 Log\ X_3 + \alpha_4 Log\ X_4 + \alpha_5 Log\ X_5 + e}$$

Crop productivity or yield is a function of environment, plant, management and socio-economic factors and their interactions and maximum yield in a given environment is possible only when all these factors are at optimum. Some of the factors that have been found to have either positive or negative influence on production include: age, gender, marital status, level of education, household size and years of experience in farming.

Aneesa *et al*., (2012) applying the Chi-Square test and ANOVA test for estimation by using SPSS found that education levels has an impact on agricultural output. Peter *et al*., (2013), using the double log model to study socio-economic

determinants of output of groundnuts found that all the coefficients studied except that of family size had a positive coefficient. The coefficients of farmers' experience, and age were positive and significant at 1%. This implies that increases in the usage of these coefficients will result to an increase production, while the coefficient of family size which was negative implies that an increase in family size will result in a reduction in production.

Ani and Ifah, (2004), found that education level has a significant relationship at 5% confidence level with technology adoption in relation to use of fertilizer, use of improved crop seeds in farming, mechanized farm operations and use of herbicides and insecticides. Age was not significantly related to the adoption of new most of the recommended farm practices except for adoption of mechanized farm operations and use of storage chemicals. This finding is consistent with that of Khuda, Ishtiq and Asif, (2005), who using the modified Cobb- Douglas production function and regression analysis found education plays vital role in attaining higher productivity levels among cotton farmers and was expected to be consistent with study results. The study applied a similar methodology of using the Cobb Douglas production function in the analysis.

2. METHODOLOGY

Research Design:

The study adopted ex-post facto research design. This design helps identify the existing relationships amongst various independent variables and the dependent variable. The design examines whether one or more pre-existing conditions could possibly have caused subsequent differences in groups of subjects. According to Kathuri and Pals, (1993), ex-post facto design refers to an experiment in which the researcher rather than creating a new treatment, examines the effects of a naturally occurring treatment after that treatment has occurred.

Location of Study:

Ndhiwa Sub-County was chosen due to its importance as one of the major groundnuts producing zones in Kenya and in Homa Bay County. Groundnuts production was chosen due its importance as a cash crop in the Sub-County and the challenges it has faced in terms of declining production. Ndhiwa is located within Homa Bay County in South Western Kenya. It borders Homa Bay Sub-County to the Northeast, Rongo Sub-County to the East and Southeast, Uriri Sub-County to the South and Southwest and Nyatike Sub-County to the Northwest. It covers 711 Km^2 with arable land estimated at 638 Km^2 (63,800 ha) Altitude ranges between 1200 m to 1400 m above sea level with Vertisols, Nitosols, Luvisols, Andosols and Gleysols the types of soil existing. Administratively, the Sub-County is divided into six divisions including Riana, Ndhiwa, Nyarongi, Kobama, Pala and Kobodo with a population of 172,212 persons as per the 2009 population census. There are 33,410 farm families according to The Kenya National Bureau of Statistics, Population and Housing Census, 2010.

The Sub-County receives bimodal rainfall (long rains Feb to May; 500-1000mm pa, 60% reliability, short rains Aug-Nov; 250-400 mm Pa., 50% reliability) with an average range of between 500mm-1650 mm per year. Groundnuts are mainly grown in Kobama, Ndhiwa, Pala and Nyarongi divisions with the first two leading in production. It is widely grown by small-scale farmers in four divisions as secondary crops, relay crops or inter-crops of maize or sorghum and production is rain fed (MOA, Ndhiwa Sub-County 2014).

Target Population:

Olive and Abel (2003) define a target population as consisting of a people or objects to which we generalize the results of our investigation. The target population for this study was 21,820 which was the total number of farm families in the four divisions (Kobama, Ndhiwa, Pala and Nyarongi) according to MOA (Ndhiwa Sub-County) reports.

Sampling design procedure:

Purposive, multistage and simple random sampling was used in the study. Ndhiwa Sub-County was purposively selected because it is one of the groundnut rich producing zones in Kenya. Due to the different characteristics of respondents, the following sampling technique was used: The Sub-County was stratified into administrative divisions. Four divisions viz. Ndhiwa, Kobama, Pala and Nyarongi were selected since they were major groundnuts producing areas. The sampling population was the total number of farm families in the four divisions which was given as 21,820.

Sample proportions per division were determined based on number of farms per division, with division with the highest number of farms taking the highest. The divisions were divided into locations.

The sampling frame was obtained through consultation between the researcher, Ministry of Agriculture extension staff, stakeholders, locational chiefs and village elders who gave locations of groundnuts growing households. A sample was drawn and the total number of households interviewed in location was determined through proportional allocation. Respondents were drawn from location using systematic random sampling procedure. Interviews were conducted to the household head or the spouses for the targeted households. If the occupants of an identified farm family were absent for the entire period of data collection or were unwilling to respond, they were replaced by the nearest household in the location. A total of 323 respondents were interviewed.

The formula below was adopted since the target population of 21,820 was greater than 10,000 Olive and Mugenda (2003).

$$n = \frac{Z^2 (1-p)\, p}{e^2}$$

n- The desired sample size.

Z- The standard normal deviate at the required confidence level (= 1.96, 2-tailedtest)

p- The proportion in the target population estimated to have characteristics being measured.

e- The level of statistical significance test. (= 0.05)

Table 2. Proportions of respondents by divisions

Division	Proportion of farm families to total	Number of respondents
Kobama	26.3%	85
Ndhiwa	29.4%	95
Pala	24.9%	80
Nyarongi	19.4%	63
Total	**100**	**323**

Research instruments:

Data was collected using two instruments:

Questionnaires:

The questionnaires was prepared and administered on respondents by the researcher through guided interviews. The questionnaires contained both open and closed ended questions that allowed collection of variety and in-depth information. The questionnaire was used to collect primary data on farmer characteristics (independent variables) and data on yield of groundnuts (dependent variable).

Content Analysis:

Content analysis reviews focused on documentations relevant to the study such as text books, journals, reports and publications. The analysis was used to collect data on background information on the study area, literature on past study findings and review of relevant literature on methodology. Note taking was used to record the information gathered.

Validity and reliability of the Research Instruments:

Mugenda and Mugenda (2003), defined validity as the degree to which the sample of test item represent the content that it is designed to measure, that is, the instrument measures the characteristic or trait it is intended to measure. The study adopted content validity which refers to the extent to which the measuring instrument provides adequate coverage of the topic under study. Validity was established by giving the instruments to two experts at the University of Kabianga who are experienced researchers to determine both face and content validity.

A pilot study using the instrument was done by initially administering 40 questionnaires to respondents. The data was entered and analyzed. Cronbach alpha coefficient was used to calculate reliability coefficient. A reliability coefficient of 0.809 was obtained and this was considered adequate. Areas of inconsistencies and ambiguity and were reviewed before the final instrument was developed.

Data Collection Procedures:

A research permit was obtained from the National Commission of Science, Technology and Innovation (NACOSTI) through an introductory letter from the Graduate School, University of Kabianga. The permit was presented to the County Commissioner, Homa Bay County and County Director of Education, Homa Bay County. A reconnaissance survey was done in Ndhiwa Sub-County to familiarize with the area and groundnut production.

The study used both primary and secondary data. Primary data: Data on farmer characteristics were obtained using a structured questionnaire administered to through face to face interviews. A total of 323 questionnaires were produced and administered. Secondary data: Was collected from review of projects documents, annual reports, baseline data and other relevant literature.

Data Analysis and Presentation:

Data collected from secondary sources was recorded in field note books, edited and used in the study report. Primary data was recorded by filling in responses into the questionnaires. Manual editing was done to check for validity. Secondary data was recorded in note books. The data was entered and analyzed using the Statistical Package for Social Scientist (SPSS) version 20 after editing and coding. The data was subjected to descriptive analysis such as frequencies, percentages and means. A correlation matrix was developed to help weed out variables that tend to explain the same effect. Those that were highly correlated were dropped and the variables considered critical for analysis were picked. The units of analysis were the household and divisions in the Sub-County.

The data was summarized using descriptive statistics. Cobb Douglas Production function and regression analysis were used to analyze the data to determine input – output relationships. All continuous variables were regressed in linear logarithmic form and categorical variables in the linear form. Hypotheses were tested at 0.05 significance level using regression analysis by applying t-test statistic used with n-1 degrees of freedom and" p" values to observe the significance levels.

TABLE 3. SUMMARY OF HYPOTHESIS TESTING

Hypothesis	Independent Variable	Statistical Test
There is no statistically significant influence of farmer characteristics on the production of groundnuts	Farmer characteristics (Age, gender, household size, education level and experience in farming)	Regression analysis

The dependent variable is production of groundnut in kilograms of dry shelled for the 2014 main season.

A regression model was developed to show the production function relationship between the dependent and independent variables. The regression model was composed of a constant and the coefficients of each of the independent variables. The data was checked for multicolinearity and heteroscedsiticity. The effects of multicolinearity were tested using Variance Inflation Factor (VIF). Multicolinearity is a statistical phenomenon in which two or more predictor variables in a multiple regression model are highly correlated (O'Brien 2007; Hollar, 2010). The VIF test is regarded as one of the most rigorous tests for multicolinearity in a regression model and multicolinearity is a problem if the VIF is greater than 10 (Belsley, Kuh and Welsch 1980). The model was subjected to statistical test of significance using the F-test.

3. RESULTS

3.1 Farmer characteristics:

Gender of head of household:

The respondents were asked to state who the head of the household was and the gender of the head of household was noted. The study found that majority of the households (74 percent) was male headed. 26 percent were found to be female headed. The finding on head of household is in line with African culture where males head households. The head of households were the ones who make major decisions that affect production.

Age of Household head in years:

Majority of the household heads were found to be middle age, aged between 36 and 55 years. The mean age was 46 years. The number of household heads in the age group of 36 to 55 years was highest in all the four divisions. Kobama division had the highest proportion of household heads over 55 years of age while Nyarongi had the highest population of household heads in the youth category that is below 36 years. The finding on average age was consistent with that of Asekenye, 2012 who found that the mean age of household heads among groundnut farmers in Kenya was 45 years. With a significant number of farmers being middle age, the future of groundnut farming in the study area can be said to be guaranteed. Interventions should be targeted at this age group.

Household Size:

The number of persons who lived in the household for a period of one year was used as a proxy to measure household size. The study revealed that the proportion of households with over 10 persons was the lowest across all the divisions. Majority of the households had between 5 to 10 persons. The mean household size was 7 across all the divisions. Family members are critical source of labour in the rural areas.

Household Head Number of Years of Formal Education:

Overall, a large percentage of the households (82%) were headed by persons with at least some years of formal education. Majority of the household heads (58.5%) had primary education. 18 % of the household heads had no formal education. Apparently the results were also showing that the most of the household heads spent an average of 5 years for formal school which is lower than the national standard of 8 years for the current system and 7 for the old system implying that majority did not complete primary school. Across divisions, it was found that the number of persons with post - secondary education was low with none of the household heads in Nyarongi division having post-secondary education. Kobama division had the highest number of household heads with post-secondary education at 11 percent while Nyarongi had the highest number of household heads with primary education at 75 percent. The proportion of household heads with no formal education at all was considerably highest in Pala at 29 percent followed by Kobama at 18 percent and Ndhiwa at 17 percent. Despite Nyarongi division having no head of household with post-secondary education, it reported the least number with no education. Farmers with higher levels of formal education are more likely to be knowledgeable and able to adopt technologies and make sound production decisions. Any intervention that relies on education levels is therefore more likely to succeed in Kobama division.

This finding agrees with that of Wanyama *et al*., 2013, who found that slightly more than half the target population (55.2%) had accessed primary education among the groundnut farmers in Ndhiwa and Rongo Districts.

Years of Experience in Groundnut Farming:

The number of years a household has engaged in groundnut farming was used as proxy to indicate level of experience in farming. The average years of experience in groundnut farming was found to be 9 years across all the four divisions with a majority (63 percent) of the households having engaged in groundnut farming for more than 10 years. Kobama division had the highest number of famers with over 10 years' experience at 69 percent followed by Pala at and Ndhiwa both at 63 percent and Nyarongi at 56 percent. Households with 5 to 10 years' experience were found mainly in Nyarongi at 40% followed by Pala at 28 percent. Ndhiwa and Kobama had 22 percent. The long years in groundnut farming implies that farmers in the study area have good knowledge of groundnut farming. Their long stay in the groundnut production enterprise indicates that they usually had good returns that keep them in the groundnut enterprise for a long period of time.

3.2 Influence of farmer characteristics on groundnut production:

Summary of the Regression Model:

To estimate the groundnut production function, the linearized form of the CD production function was used. Regression was performed with quantity of groundnut produced in 2014 as the dependent variable and farmer characteristics, production characteristics and institutional factors as independent variables. The model was summarized as;

$Y= -212.55 + 0.3X_1 + 6\ X_2 + 15.4X_3 + 30.8\ X_{4+} 0.1X_5$

The model was subjected to statistical tests and the results are displayed in Table 4.

Table 4. Summary of statistical tests for the regression model

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson	Mean Variance Inflation Factor
.728	.530	.511	220.08108	2.024	1.5164

F – value 26.853 with p value 0.000
Dependent variable – Groundnut production; Independent variable – Farmers characteristics

The regression shows an adjusted R^2 (Coefficient of determination) of 51.1%, it means that 51.1% of the variation in groundnut yield can be explained by the independent variables in the model. The R of 72.8% (the Pearson Correlation Coefficient) shows that correlation between the dependent and independent variables is high. The model F- value of 26.853 is significant at 5% (p-value = 0.000 implying that the independent variables significantly explained the variation in the dependent variable at 5% level.

The independent variables in the model were tested for multicolinearity and they showed no serious level of multicolinearity as supported by the mean VIF of 1.516 which is less than 10 (Edriss, 2003). This further confirmed by the tolerance of 0.7384 which is greater than 0.05. The Durbin Watson Coefficient of 2.024 is within the critical values of $1.5 < d < 2.5$ implying that there was no serial correlation in the multiple regression data.

Gender of household head:

This variable had a coefficient of – 0.080. Since it was coded as 0= Male and 1 = Female, it implies that the production of groundnut will be lower in female headed households compared to male headed households. Male headed households are more likely to have access to more resource for the production process than female headed households. The coefficient was tested at $p < 0.05$ and produced a statistically significant result (t-value = -1.972, p-value = 0.049. The null hypothesis that there was no statistically significant relationship between gender of household head and groundnut production was rejected and the alternative hypothesis that there was statistically significant relationship between gender of household head and groundnut production was accepted. This finding disagreed with that of Mangasini *et al*., 2013 who found the influence of gender on groundnut production in Tabora region was not statistically significant. The variation could be perhaps due to the different in cultures between the study areas.

Age of Head of household in years:

The age head of household had a positive influence on production with a coefficient of 0.01 implying that an increase in age by 1 year would result in 1% increase in groundnut production holding other factors constant. The coefficient for age with beta value = 0.32, t-value = 0.16 and p-value = 0.872 was not statistically significant at $p < 0.05$. The null hypothesis that there is no statistically significant relationship between age of household head and groundnut production was not rejected and the alternative hypothesis that there statistically significant relationship between age of household head and groundnut production was rejected. This agreed with the expectations of the study on the sign of the coefficient of the variable. The older the farmer, the more experience in farming and probably the less resource allocation mistakes in production.

Household size:

Household size was measured in terms of the number of persons who live in the household for a period of 12 months in the 2014 calendar year. It had a coefficient of 0.012 indicating a positive relationship with groundnut production. Despite the positive relationship, it was not statistically significant at $p < 0.05$ with beta = 19.996, t-value = 0.278 and p-value = 0.781. The null hypothesis that there is no statistically significant relationship between household size head and groundnut production was not rejected and the alternative hypothesis that there statistically significant relationship between household size and groundnut production was rejected. Although not statistically significant, the study found that family was a major source of labour for groundnut production. The non-statistical significance result may be due to the fact that the individual contribution to household labour supply was not quantified during the study. This finding though not statistically significant, agrees with the *apriori* expectation of positive contribution of household size to groundnut production.

Household head years of formal education:

There was a positive relationship between years of formal education and groundnut production since education had a coefficient of 0.019. This implies that one more year spent in school would increase production by 1.9%, holding other factors constant. The increased yield would result from better management practices for the farm enterprise.

Despite having a positive coefficient, it was not statistically significant $p < 0.05$, with t-value = 0.386 and p-value =0.700. Therefore, the null hypothesis that there is no statistically significant relationship between education level of household head and groundnut production was not rejected and the alternative hypothesis that there statistically significant relationship between education level of household head and groundnut production was rejected. Non significance of education level implies that farmers learn production through learning by doing that does not necessarily depend on levels of formal education. This finding agreed with Mangasini *et al*., 2013, Fasoranti, 2005, Joel, 2005 and Southavilay et al., 2013 who found that education level had a positive but not statistically significant relationship with output of groundnuts, agricultural production, bananas and maize respectively.

Experience in Farming:

Number of years the farmer has engaged in groundnut production is a proxy used to show experience in groundnut farming. Experience had a positive coefficient of 0.219 showing that other factors constant, the output of groundnut in the study area increases as the number of years in farming increases. With a t-value = 2.263 and p-value = 0.024, the null hypothesis that there is no statistically significant relationship between experience in farming and groundnut production was rejected and the alternative hypothesis that there statistically significant relationship between experience in farming and groundnut production was not rejected. This finding was consistent with that of Southavilay *et al.*, (2013) who found positive significant relationship between experience in farming and maize production. Similarly Adah *et al*., (2007) stated that the greater the years of farming experience, the greater the farmers ability to manage general and specific factors that affect the business and hence the farmer will be in a better position to invest wisely.

This finding was expected since as the farmer cultivates groundnuts year in year out, he/she is aware of his mistakes and accomplishments. He/she interacts with other farmers on the challenges and achievements and is able to accumulate knowledge on groundnut production through training, learning by doing and sharing techniques with other farmers. It means that farmers with more years of farming experiences in farming tend to be more efficient in groundnut production and hence harvest more other factors constant.

4. CONCLUSIONS AND RECOMENDATIONS

Results from the study showed that majority of the farmers are in households that are male headed with an average of seven persons, middle aged, are experienced in groundnut farming and have low levels of formal education.

The study found that gender, age of household head, household size, household years of formal education and years of experience in farming all had a positive relationship with groundnut production. The hypothesis tested for this objective was: H_{o1} There is no statistically significant influence of farmer characteristics on the production of groundnuts. Gender and experience in farming had statistically significant influence and the null hypothesis was rejected and alternative hypothesis accepted while age of household head, household size and years of formal education had non-statistically significant influence and the null hypothesis was accepted and alternative hypothesis rejected.

Age and gender of head of household head, household size, level of formal education and experience in farming all had a positive relationship with groundnut production. However, only gender and experience in farming were significant at $p < 0.05$ level of significance and hence.

Based on the findings the study recommended that interventions to increase production should target the female headed households whose production was found to be lower compared to the male headed households. Since farmers have long years of experience in groundnut farming it is important that the interventions target what the farmers have done right over the years to improve on it and what they have not done to remedy the situation.

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REFERENCES

[1] Adah, O.I. , Olukosi, O. J., Ahmed, B. and Bologun, O. S. (2007). Determinants of payment ability of farmers' cooperative societies in Kogi State. In U. Haruna, S. A Jibril, Y.P. Mancha and M.N Nasiru (Eds.). Proceedings of the 9th Annual National Conference of the Nigerian Association of Agricultural Economists, Abubakar Tafawa Balewa University, Bauchi. 84-89.

[2] Aneesa, M., Nazima, E. and Zamara, B., (2012). Causes of low agricultural output and impact on socio-economic status of farmers: A case study of rural Potohar in Pakistan; International Journal of Basic and Applied Science, 1(2), 343-351

[3] Ani, A. O., Ogunnika, O and Ifah, S.S. (2004). Relationship between socio- economic characteristics of rural women farmers and their adoption of farm technologies in Southern Ebonyi State, Nigeria; International Journal of Agriculture and Biology; 6 (5) 802-805.

[4] Edriss, A.K and F. Simtowe (2002). Technical efficiency of in Groundnut Production in Malawi: An application of a Frontier Production Function UNISWA Journal, 45-60

[5] Food and Agricultural Organization (2011). Report- FAOSTAT Production Year 2011. http://www.fao.org.

[6] Food and Agriculture Organization (2003-2010). Statistical data base. http://www.fao.org

[7] Food and Agriculture Organization (2006), Production Year Book, Vol. 60, Rome, Italy.

[8] Joel, M. (2005). Analysis of Socio-Economic factors affecting the production of Bananas in Rwanda: A case study of Kanama District. Unpublished Masters Thesis, University of Nairobi.

[9] Kathuri, N,J. and Pals, D. R. (1993). Introduction to educational research Egerton University, Educational Media Centre, Njoro Kenya.

[10] Khuda, B., Ishtiq, H. and Asif, M. (2005). Factors affecting Cotton yield: A case study of Sargodha (Pakistan). Journal of Agriculture and Social Sciences: 01 (4); 332-334. World Journal, 2(1): 15-21

[11] Koutsoyiannis, A., 1977. Theory of Econometrics: An Introductory Exposition of Econometric Methods. Macmillan Education LTD.

[12] Mangasini A. Katundu; Mwanahawa L. Mhina; Arbogast G. Mbeiyererwa

[13] and Neema P. Kumburu (2013) "Socio-Economic Factors Limiting Smallholder Groundnut Production in Tabora Region" Research Report 14/1, Dar es Salaam, REPOA

[14] Ministry of Agriculture (2012). Economic Review of Agriculture 2012, The Central Planning and Project Monitoring Unit, March 2012. : 39-40

[15] Ministry of Agriculture (2014). Ndhiwa Sub-County Profile Mugenda, O.M and Mugenda A. G. (2003). Research Methods : Quantitative and Qualitative Approach . Nairobi: Act Press.

[16] Mutegi C. K, Hendriks S. Land Jones R. B, (2012). Factors associated with the incidence of Aspergillus section Flavi and afflatoxin contamination of peanuts in the Busia and Homa Bay districts of Western Kenya. Plant Pathology 61: 1143-1153

[17] Mutegi CK, Wagacha J M, Christie ME, Kimani J and Karanja L (2013) Effect of storage conditions on quality and afflatoxin contamination of peanuts (Arachis hypogea L.). International Journal of Agri-Science, 3 (10). pp. 746-758

[18] Mutegi CK, Wagacha M, Kimani J, Otieno G, Wanyama R, Hell K and Christiee , ME (2013) Incidence of aflatoxin in peanuts (Arachis hypogaea Linnaeus) from markets in Western, Nyanza and Nairobi Provinces of Kenya and related market traits. Journal of Stored Products Research, 52. pp. 118-127

[19] Nand, K. F., Virupax C. B. and Charles A. J (2010). Growth and Mineral Nutrition in Field crops, Third edition, pages 13-55. CRC Press,

[20] Ndungu, J.W., Makhoha, A.O, Onyango, C. A. , Mutegi, C. K. ,

[21] Wagacha, J. M., Christie, M.E. and Wanjoya, A.K (2013). Prevalence and potential for afflatoxin contamination in groundnuts and peanut butter from farmers and traders in Nairobi and Nyanza Provinces of Kenya, Journal of Applied Biosciences 65: 4922-4934

[22] O'Brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. Quality and Quantity 41(5), 673-690.

[23] Peter, A. E., Christopher, O. Emokaro and Grace, A. Aigba (2013). Socio- economic determinants of output of groundnut production in Etsako West Local Government area of Edo State, Nigeria; Albanian Journal of Agricultural Sciences; 12(1): 111-116.

[24] Republic of Kenya (2013). Ministry of Agriculture, Horticultural Development Authority and USAID Horticulture Validated Report 2012.

[25] Republic of Kenya, (2000). The Economic Survey. Government Printers, Nairobi

[26] Republic of Kenya, (2010). Report for the Agriculture and Rural Development Sector.

[27] Republic of Kenya, (2011). Kenya National Bureau of Statistics, Population and Housing census, 2010, Nairobi.

[28] Republic of Kenya, (2014). Economic Survey 2014, Kenya National Bureau of Statistics.

[29] Shepard, C. E., (1998). Drug testing and labor productivity estimates. Applying a production function model. Le Moyne College, Institute of Industrial Relations, 1-30.

[30] Southavilay, B., Teruaki N. and Shigeyoshi T., (2010). Policies and socio- economic influencing on agricultural production: A case study on maize production in Bokeo Province, Laos. Sustainable Agriculture Research; 2 (1); 70-75.