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Social-Economic Factors Influencing Ginger (Zingiber Officinale) Productivity among Smallholders Growers in Tanzania - Case of Same District

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Abstract
The study aimed to investigate the social economic factors influencing ginger productivity among smallholders growers. A cross sectional research design was adopted; the sample size of 251 respondents was obtained through purposive and non-purposive sampling techniques. The study used both quantitative and qualitative methods for data analysis. Statistical Package of Social Sciences (SPSS) and Excel software were used to analyze the data. The data revealed that the factors included in the model explain the variation obtained in ginger yield with determination coefficients R^2 (adjusted) indicates that 78.3% of the variation in ginger yield obtained by farmers is explained by the variable included in the estimated model. Generally It can thus be concluded that farmer's education level, the use of fertilizer, land size under ginger production and frequency of contacting extension services had significant contribution to ginger farming and hence productivity. It is recommended that to expand extension services to ensure that smallholder ginger farmers have access to high-yielding ginger seed varieties and improved farm inputs, storage and marketing facilities and encourage ginger farmers to increase land under cultivation. Smallholder farmers own small parcels of land but still cultivate only small portions of it. Smallholder farmers need to be assisted to expand the area under cultivation. This may help transform the current farming system from smallholder farming to larger scale. Hence, it is important to create public awareness on the potential for the ginger crop to contribute to the household income by using labor saving technologies and improved varieties.
Keywords: Ginger production extension farming yield

LIST OF ABBREVIATION

BOT	Bank of Tanzania
CDOs	Community Development Officers
DAICOs	District Agricultural Irrigation Cooperative Officers
DPLOs	District Planning Officers
EDL	Education level of the household head
EU	European Union
FAO	Food and Agriculture Organization
FAOSTAT	Food And Agriculture Organization Statistics
FTRL	Fertilizer
GDP	Gross Domestic Product
IPCC	Intergovernmental Panel On Climate Change
ITC	International Trade Centre
LA	Land ownership in terms of acreage
LDCs	Least Developed Countries
LRRI	Land Rights Research & Resources Institute
MAFS	Ministry Of Agriculture And Food Security
NBS	National Bureau Of Statistics
NEMC	National Environmental Management Council
NSGRP	National Strategy for Growth and Reduction of Poverty.
NVE	Number of Visits by the Extension Agent
OLS	Ordinary Least Squares
OLSE	Ordinary Least Squares Estimation.
SPSS	Statistical Package for the Social Sciences
TATEPA	Tanzania Tea Packers
TMA	Tanzania Meteorological Agency
TOAM	Tanzania Organic Agriculture Movement
URT	United Republic of Tanzania
US	United States

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VEOs Village Executive Officers

1.0 Introduction

Agriculture is the backbone of Tanzania's economy (URT, 2003b). It provides an employment to more than three quarters of the population; it accounts for 15% of exports, and contributes almost 27.8% of Tanzania's Gross Domestic Product (GDP) (URT, 2011b). However, according to MAFS (2008) recently, mining, tourism and services industries have been playing an increasingly active role in GDP contribution.

Despite its importance to the nation's economy, the sector is constrained by many problems such as high transaction costs, weather fluctuations (drought or floods), biotic stress and other external shocks, notably food price fluctuations which lead to insufficient returns as compared to the production costs, poor access to information, innovations, value added initiatives, improved varieties and good quality seeds. These had caused a stagnant growth of agriculture sector in the last decades (growth stood at 4% per year since 2006) (NBS, 2012).

World production for ginger in 2009 was 1.6 million metric tonnes. Ginger is cultivated in India, China, Japan, Indonesia, Australia, Nigeria and West Indies islands. India is the largest producer and consumer of ginger in the world. Indian ginger is produced in the states of *Orissa, Kerala, Karnataka, Arunachal Pradesh, West Bengal, Sikkim and Madhya Pradesh*. Kerala is the largest ginger producing state, accounting for 33 per cent of the total production in India (FAO, 2011), globally, the annual imports of culinary herbs and spices are in excess of US$ 2.0 billion with an annual growth rate of 8.5%. However, import markets for spices are concentrated with European Union (EU) and United States (US), purchasing more than half of the total world exports (Jaffee, 2004; ITC, 2001). Between 1995 and 1999, Tanzania ranked the third among LDCs by exporting 5% of LDCs' total spice exports. Madagascar was the largest LDC exporter (72%) followed by Comoros (6%), but in total, LDC exports fulfilled only 5.5% of the global import demands (ITC, 2001).

Ginger is produced in many parts of the country: Coast, Tanga, Mbeya, Ruvuma, Morogoro, Kilimanjaro, Kigoma and Kagera regions (URT, 2011b). Ginger production in Tanzania, is dominated by small holders who use a little or no agricultural inputs at all. Therefore, many of them produce organically by default. Although only a small share of them is organically certified (by third party certification), efforts by TOAM have been initiated to certify the main producing associations in Tanga, Kilimanjaro and Ruvuma regions. The Tanzanian production of ginger amounted to approximately 4.3 thousand metric tonnes in 2010/11, which is considerably more than the production levels of the years before (URT, 2011b). Therefore most of literatures have been empirically indicate the benefits, constraints and the major determinants of ginger production activity. However it has shown that ginger activity is a potential opportunity source of income to the majority especially those living in rural areas (Fones, 1987).

The empirical evidence shows that few researches have been conducted to assess the social economic factors affecting ginger productivity among small scale growers in Tanzania specifically in Same District. By employing a multiple linear regression analysis technique this study therefore intends to make an analysis of socio economic factors affecting ginger production to farmers in Same District. Despite the adoption of several agricultural approach like contract farming in ginger, the production per unit area in Tanzania has remained low compared to other major ginger growing countries like India, China, Nepal, Thailand, Nigeria, Madagascar and Comoro.

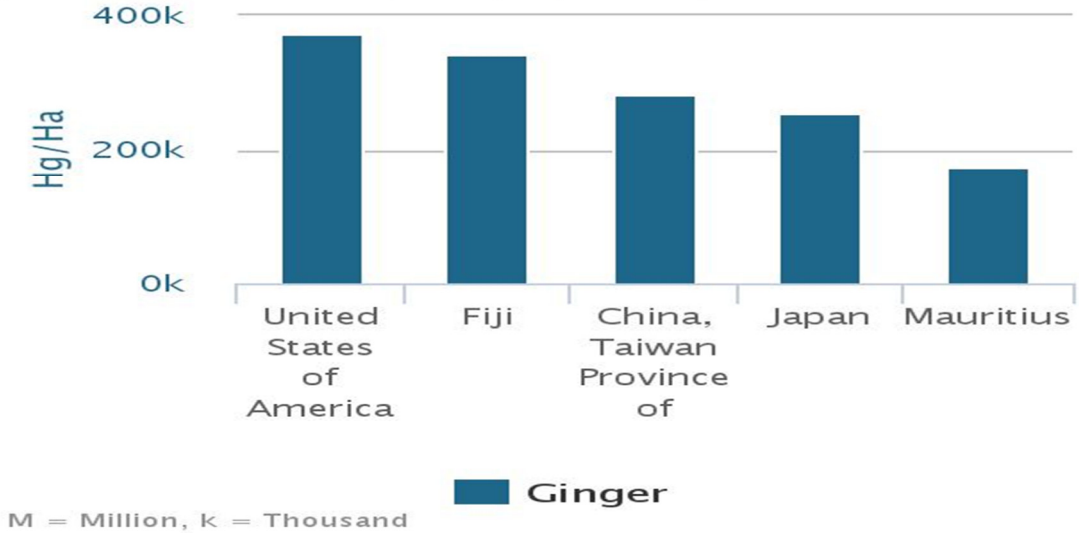
It is hypothesized that, the low productivity and low returns from the ginger farming might be due to lack of knowledge on proper agronomical cultivation practices, the use of poor quality seeds, lack of proper post-harvest handling skills, facilities and packaging, limit farmers productivity and the quality of products, limited business knowledge and access to market information prevent farmers to optimize their revenues and no value addition in general. Therefore, this study intends to investigate social and economic factors affecting productivity among smallholders growers to fill the existing knowledge gap.

2.0 Literature Review

2.1 Global production

World production for ginger in 2009 was 1.6 million metric tonnes and most of the produce comes from United States of America (USA) (FAO, 2015) (Figure 4). However, import markets for spices are concentrated with European Union (EU) and United States (US), purchasing more than half of the total world exports (Jaffee, 2004; ITC, 2001). Between 1995 and 1999, Tanzania ranked the third among Least Developed Countries (LDCs) by exporting 5% of LDCs' total spice exports. Madagascar was the largest LDC exporter (72%) followed by Comoros (6%), but in total, LDC exports fulfilled only 5.5% of the global import demands (ITC, 2001).

Figure 1: Shows Countries delivering the 5 highest yields-averages 2005 - 2013

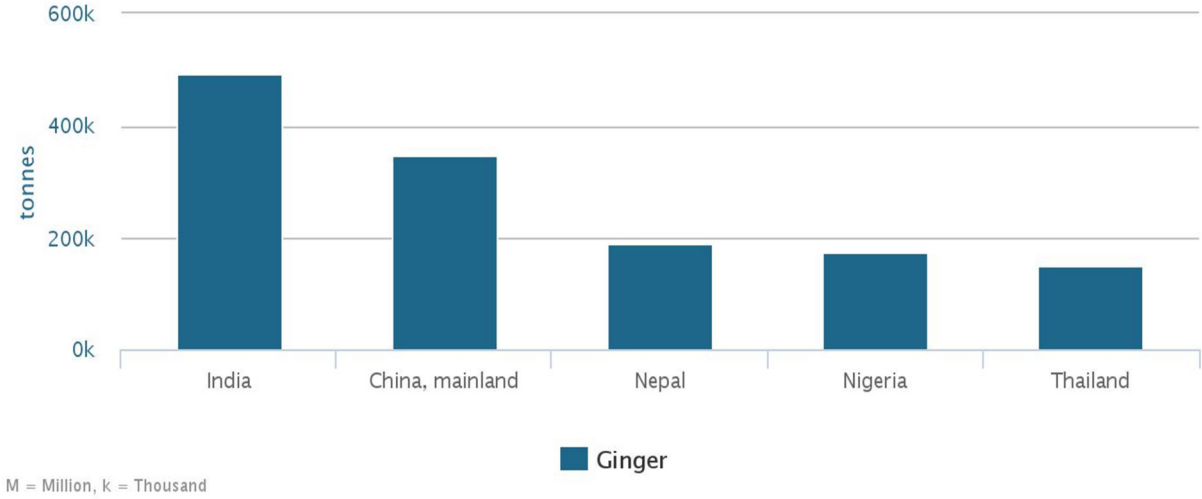


FAOSTAT, 2015

2.1.1 Ginger production of top five (5) producers

Ginger is cultivated in India, China mainland, Nepal, Nigeria and Thailand other big producers are Japan, Indonesia, Australia, and West Indies islands (Figure 2) (FAO, 2015). India is the largest producer and consumer of ginger in the world. Indian ginger is produced in the states of *Orissa, Kerala, Karnataka, Arunachal Pradesh, West Bengal, Sikkim and Madhya Pradesh*. Kerala is the largest ginger producing state, accounting for 33 per cent of the total production in India (FAO, 2011), globally, the annual imports of culinary herbs and spices are in excess of US$ 2.0 billion with an annual growth rate of 8.5%.

Figure 2: Shows ginger production of top five (5) producers- average 2005 - 2013



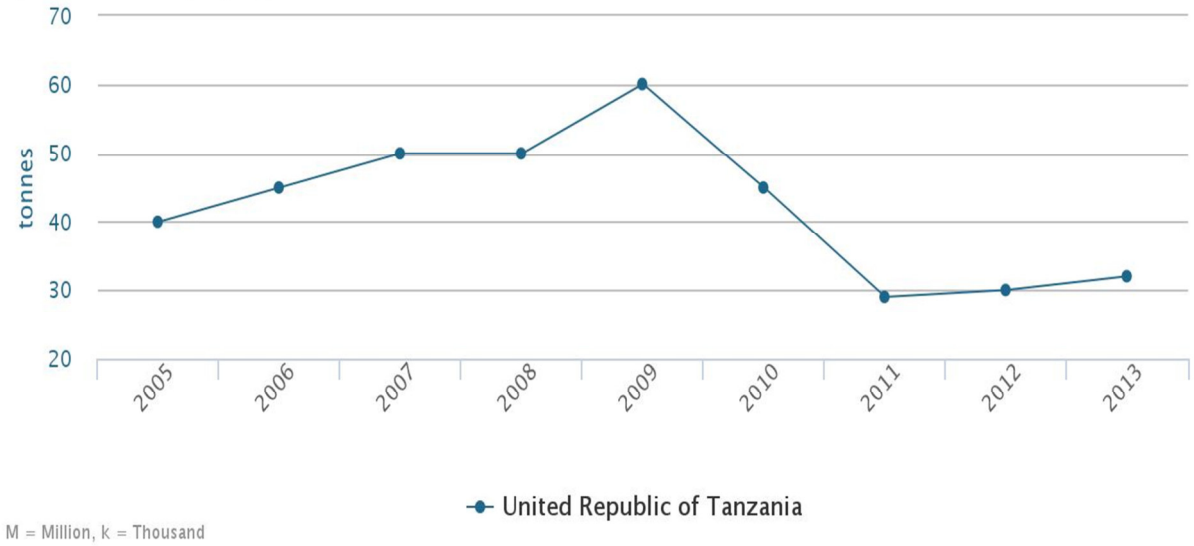
FAOSTAT, 2015

2.2 Ginger production in Tanzania

Ginger production in Tanzania, is dominated by smallholders who apply a little or no agricultural inputs at all, therefore, many of them produce organically by default. Although only a small share of them is organically certified (by third party certification), efforts by TOAM have been initiated to certify the main producing associations in Tanga, Kilimanjaro and Ruvuma regions (Akyoo and Lazaro, 2008)

Tanzanian production of ginger amounted to approximately 60 thousand tonnes in 2008/09, which is considerably more than production levels of the years before and dramatically decrease in two consecutive years (Figure 3) (FAO, 2015). Then attain constant production from 2011 to 2013 (FAO, 2015). The probable reason of the trend could be low prices and poor agronomical practices.

Figure 3: Shows ginger production 2005 – 2014 in Tanzania

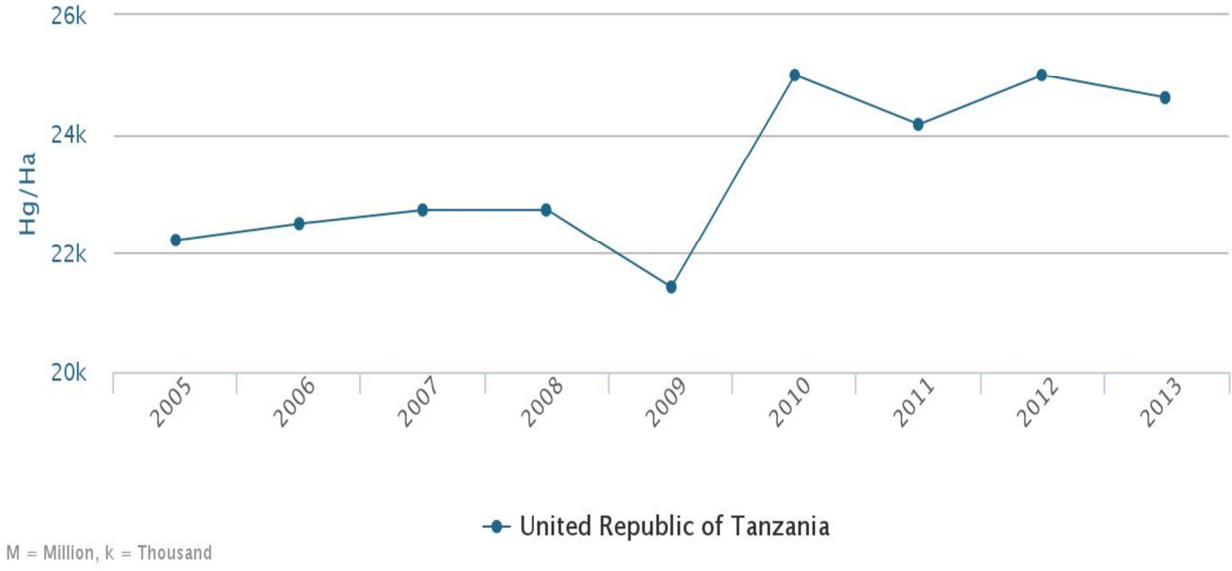


FAOSTAT, 2015

2.3 Ginger yield in Tanzania

Ginger yields in Tanzania is fluctuating, from 2005 2008 the crop shows a constant yield and decline in 2009 and attain high yield in 2010 from there trend fluctuated (Figure 4) (FAO, 2015).

Figure 4: Shows ginger yield 2005 – 2014 in Tanzania



FAOSTAT, 2015

2.4 Social and economic importance of the ginger industry in Tanzania

Ginger production is an important agricultural occupation in Tanzania. The crop has a wide geographical coverage in the country. It is produced in eight regions out of twenty one regions of Tanzania mainland, which include Tanga, Mbeya, Ruvuma, Morogoro, Kilimanjaro, Kigoma and Kagera regions and involved about more than 20 districts.

The value of Tanzania's exports has risen up from $8.46 billion recorded in December 2013 to $8.81 billion for the year ended December 2014 due to the good performance in exports of manufactured goods and travel receipts**.** The monthly economic review of the Bank of Tanzania (BOT) suggests that, a significant increase of 33.8 percent was recorded in the export value of goods such as edible oil, textile apparels, plastic goods, fertilizers and paper products. The collective value of these goods consequently rose to $1.43 billion (BOT, 2012).

Tanzanian exports of ginger are directed towards Kenya and Germany. Ginger exports have been fluctuating strongly. While exports reached 256 tonnes in 2008 and 164 tonnes in 2009, exports diminished to

only 15 metric tonnes in 2010. Most of the ginger exports normally are destined for Kenya, however, in 2010 Kenyan demand fell short.

2.5 A review of the current state of ginger industry in Tanzania

Ginger (*Zingiber officinale*) is a flowering plant, in the family *Zingiberaceae* whose rhizome, ginger root or simply ginger, is widely used as a spice or a folk medicine. The ginger industry is comprised of the following key players; the small-scale growers under cooperative, marketing agent and ginger value added manufacturers/plant.

2.6 Ginger marketing and pricing

Tanzanian ginger farmers, sell their ginger to collectors from processors or independent collectors/intermediaries that go from farm to farm to buy small amounts, often of a low quality at a low price. Through these processors and independent intermediaries, the ginger reaches the local end market**.** Usage of ginger is widespread in Tanzania. In the fresh form which takes the bulk of it, ginger is used as a tenderiser in barbeque which is very common in Tanzania. Besides, its use in masalas, ginger is used as an ingredient in drinks such as tea and coffee. Ginger is also used in flavouring of some carbonated drinks such as the ginger soda and treatment of some ailments by traditional practitioners. Dried ginger gets a better price. It is sent to the local markets of Dar, Moshi, Tanga and Arusha where the price per kilo of chopped dried ginger is 1,000 Tsh.

Non-certified organic ginger is commonly sold to small local processors, mainly in Kilimanjaro, Dar es Salaam, Arusha, Tanga and Zanzibar. They process the ginger into powder and pack it either as a single spice or make some 'masalas'. Packaging remains a problem to many of these companies. The ground ginger, is packed into transparent polyethene consumer bags/packets which are not attractive and do not protect the product inside. The Dada Women Group, sells dry non-certified organic ginger and ginger mustard and ginger candy through the newly opened Bio-shop Tanzania Ltd, amongst others. Non-certified organic ginger is also sold to tea and coffee blenders, like Afri Tea and Coffee Blenders (1963) ltd, International Food Packers Ltd and TATEPA.

2.7 Ginger production in Same District

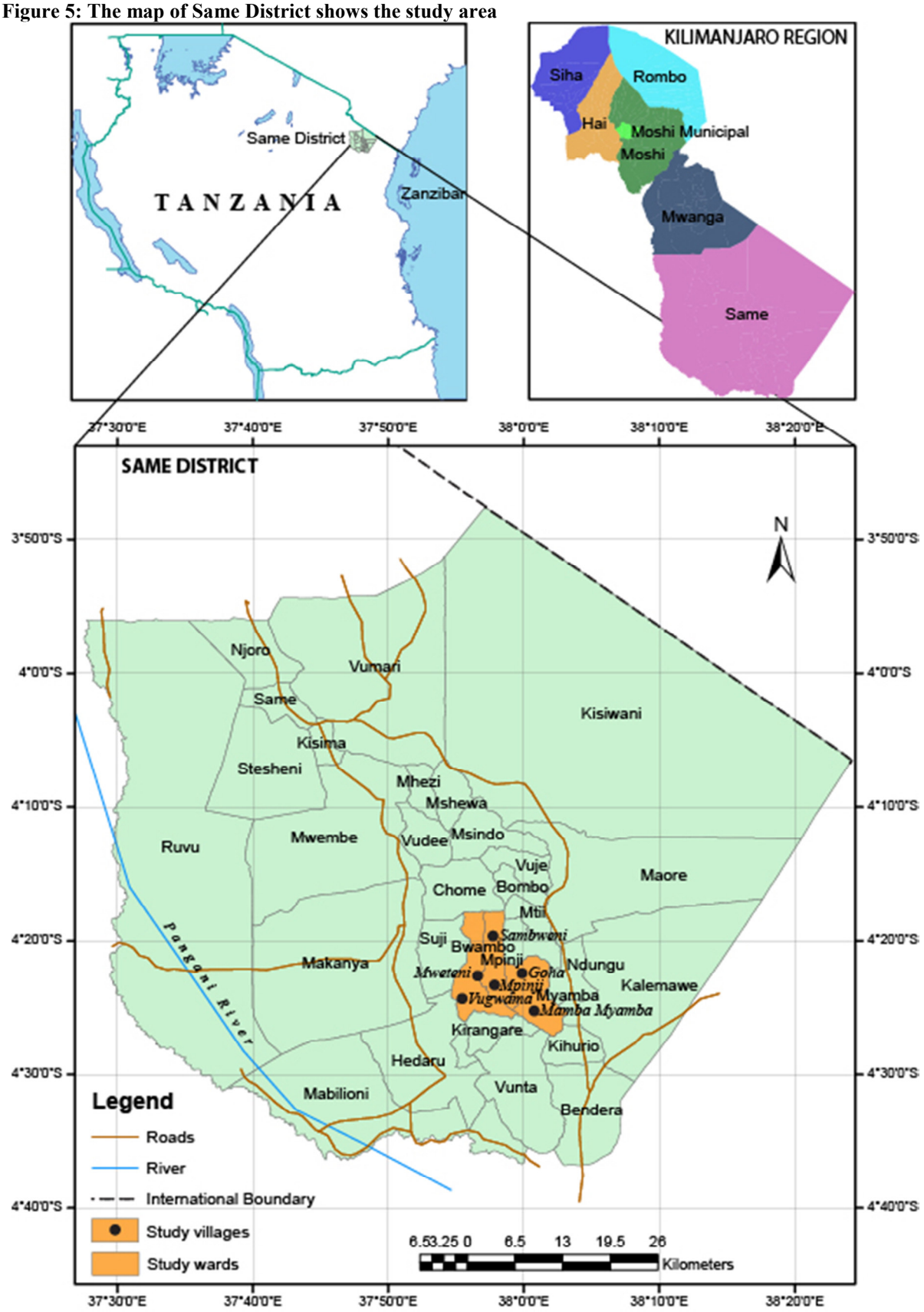
Ginger was introduced in Same District over ten years ago. The current yearly production is around six thousand metric tons. A third of its population is involved in ginger production. They also grow some cardamom coffee and cinnamon. The crop is increasing yearly at an average of 46%. In 2005/2006, six thousand tons were produced from six hundred hectares. The yield per hectare is for the low farmers as farmers are only getting 10 tonnes per ha instead of a possible 20 tonnes.

3.0 Research Methodology

3.1 Description of the study area

Same is one of the seven districts of the Kilimanjaro Region of Tanzania. It is bordered to the north by the Mwanga District, to the northeast by Kenya, to the south and southeast by the Tanga Region, and to the west by the Manyara Region.

Figure 5: The map of Same District shows the study area



Source: Same District Profile (2016)

Same district was selected because is the first largest producer of ginger in Kilimanjaro region. Ginger was introduced in Same District over ten years ago. The current yearly production is six thousand tons (6000). A

third of its population is involved in ginger production. They also grow some cardamom coffee and Cinnamon. There is Mamba Ginger Growers Rural Cooperative Society in Same District ,owned factory that would observe all ginger produced in the area, and 70 per cent of the country's ginger production, purchased by the cooperative at 2,500/- Tsh up from the previous prices of between 200/- and 500/- per kilogram.

3.2. Population

According to the 2012 Tanzania National Census, the population of the Same District was 269,807 (NBS, 2012).

3.3 Economic activities

Main economic activities include crop and animal husbandry, beekeeping, petty businesses and employment in the Government and Private sectors. Major crops include ginger, coffee, bananas, maize and beans. Key livestock are cattle, goats, sheep, donkey and pigs.

3.4 Research Design

Borg and Gall (2003), defines a research design as the procedures selected by the researcher for studying a particular set of questions or hypotheses, with the aim of obtaining the relevant data. The design of this study was across section by using a survey method. By cross sectional survey, data was collected by interviewing a representative sample at a single point in time i.e. between March 2016 and May 2016, addressing the research problem, objectives and questions.

3.5 Sampling Frame

The sample frame of the study was selected in Mamba Miamba Wards, Mpinji and Bwambo wards which comprise the total of 13,168 people in the study area.

3.6 Sample Unit

The sampling unit adopted in the study included small-scale ginger growers, traders and processing company.

3. 7 Sampling Techniques and Sample Size

Multistage sampling technique employed to the sample from the study area. The technique was chosen because it takes into consideration the representation from divisions, wards and villages scattered in a wide geographical area. From each division, three wards were purposively chosen from the respective sampling frame, and from the list in each selected ward, two villages were purposively selected to get a total of six (6) villages namely sambweni, mamba myamba, goha, mweteni, vugwama and mpinji. Therefore, the targeted study population is 31,100 people from three wards; Mamba Miamba (13,168 people); Mpinji (8,453 people) and Bwambo (9,479 people) (NBS, 2012).

From a list of ginger farmers linked to the ginger buying companies through primary co-operative societies; the researcher proportionate selected farmers from each village. This made the sample size to be 244 ginger growers, which is large enough to allow for the statistical analysis.

A total sample size was 251 respondents whom were surveyed in the field, where by 244, respondents (growers) will be surveyed by questionnaires and 7 respondents (officials) was surveyed by interview method in the study area.

The sample size of the population was obtained using the following formulas:

$$n_o = \frac{Z^2 pq}{e^2}$$ Equation…… (i)

In this equation, the "no" stands for the sample size, p is the estimated proportion of an attribute that is present in the population; 'q' is 1-p and "e" for the level of precision. The sample size is 5%, with the precision level being 5%, the confidence level being 95%, and variability 0.2.

$n_o = \frac{(1.96)^2 \times 0.2 \times 0.8}{(0.05)^2} = 245.8624 \approx 246$……..(ii)

To calculate the sample size by using the infinite population formula first as we have done above. Then apply the sample size derived from that calculation to calculate a sample size for a finite population. The following formula was also be applied;

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$

Where n is the sample size and N is the population size.

$$n = \frac{246}{1+\left(\frac{246-1}{31{,}000}\right)} \approx 244.07 \approx 244 \qquad \text{Equations……(iii)}$$

Where,
Z= Value example 1.96 for 95% confidence level
P = percentage picking a choice expressed as decimals example 0.2
q = 1−p in this case is 1−0.2 = 0.8
e = precession error (marginal error)
N = Population size
n = sample size
After deciding that the sample size should be 244, then the sampling fraction is
244= or 0.007871
31,000
From each stratum we require **0.0078** of the stratum size**.**

Table 2 : Category of the sample size distribution

Category of the respondents	Actors	Sample size
Small-scale ginger growers	Mamba Miamba ward growers	103
	Mpinji ward growers	66
	Bwambo ward growers	75
Main actors	District officials	3
	Marketing agents	2
	Processing Plant officials	2
	Total	**251**

Source: Survey on data, 2016

From the Table 1 above represents the sampling frame to be used in the data collections. Purposive sampling to get sample for officials and systematic sampling for ginger growers.

That means Mamba Miamba ward was 13,168

$$\text{Sample} = \frac{13{,}168}{31{,}100} \times 244 = 103.3 \approx \mathbf{103}$$

That means Mpinji ward was 8,453

$$\text{Sample} = \frac{8453}{31000} \times 244 = 66.5 \approx \mathbf{66}$$

That means Bwambo ward was 9,479

$$\text{Sample} = \frac{9479}{31000} \times 244 = 74.6 \approx \mathbf{75}$$

3.8 Sampling procedure

The researcher applied three types of sampling procedures namely stratification sampling, systematic random sampling and judgmental sampling**.**

3.8.1 Stratification Sampling

This technique is often referred to as deliberate sampling for heterogeneity (Baradyana and Ame 2009). In this case, the population of study will be divided into strata. That is groups of similar characteristics in the population such as wards. The elements to be included in the sample were then selected from each stratum.

Therefore, to get a sample size for each category of the study population, stratified sampling was used; where population embraces a number of categories, the researcher prefers to organize frame into separate strata whereby each stratum, is sampled as an independent sub – population, out of which individual elements can be randomly selected. Every unit in a stratum has same chance of being selected. In other words, the population is grouped according to their strata such as selected wards.

3.8.2 Purposive Sampling

A purposive sampling is important for officials owning the factory whom they have key information about contract farming and its performance. This technique was used to select key informants such as officials from Same District Council whom monitor and supervise the implementation of the project, these officials including the District Agricultural Irrigation Cooperative Officers (DAICOs), District Planning Officers (DPLO), Community Development Officer (CDO) and Village Executive Officers (VEOs). Likewise cooperative and marketing officials were also selected purposively. A purposive sampling technique enables the researcher to

choose respondents basing on the fact that, they have desirable characteristics related to the issue being studied (Kothari, 2004). The mentioned officers were selected by the virtual of their positions because they were well informed on contract farming**.**

3.8.3 Systematic Sampling

A systematic sampling is a statistical method involving the selection of elements from an ordered sampling frame. The most common form of systematic sampling is an equal-probability method. In this approach, the progression through the list is treated circularly, with a return to the top once the end of the list is passed. This technique was used to select small-scale farmers by using the available list of ginger growers, whom were engage in ginger farming. The sampling begins by selecting an element from the list at random and then every k^{th} element in the frame is selected, where k, the sampling interval (sometimes known as the skip).

3.9 Data collection tools

Tools for data collection were interview guides and questionnaires. They were translated into Kiswahili, the language that was used to collect data from respondents then the translated tools in Swahili was translated back to English. After the translation the two English versions was compared for difference. Areas that would show a significant difference were harmonized.

3.10 Model Specification

To facilitate the realization of objective of this paper the researcher use regression analysis to analyze the social economic factors affecting ginger productivity among small scale growers under the contract farming a linear multiple regression equation, with the number of visits by the extension agent per season (NVE), Use of fertilizer (FTRL) and Urea in ginger production (dummy variable) as independent variables will be fitted; Land ownership in terms of acreage cultivated (LA); and Education level of the household head (EDL) will be used as variables in the equation in which, Ordinary Least Squares Estimation (OLS) technique was employed..

According to Gujarati (1995), the OLS technique, is commonly used in estimating a linear and non-linear regression models. This technique is appropriate for single equation models. The OLS estimation requires selecting a population parameter estimator such that, the ordinary sum of squares of errors is minimized. Errors are defined as the difference of observed values, say Xi and the expected value of the variable X or the population of parameter.

$$E = X - E(Xi)$$

The OLS estimation technique is simple to use, eloquent and gives the best estimator and it does not require the knowledge of probability distribution of the underlying population being studied. Of all estimation methods, Ordinary Least Square Estimation (OLSE) leads to the best linear unbiased estimator and hence, its popularity in applied econometrics (Gujarati, 1995).

The estimated specific model for ginger output per unit area in linear form is as follows:

$$Output\ per\ Unit\ area = \beta_0 + \beta_1 NVE + \beta_2 FTRL + \beta_3 LA + \beta_4 EDL + \varepsilon$$

Where' β_s 's regression coefficients and ε is the error term.

The expected results are that the output per unit area would be positively related with all the independent variables included in the model.

3.11 Measurements of Variables

The dependent and of independent variables in this study were measured as shown below.

3.11.1 Dependent variable

3.11.1.1 Output per unit area under ginger production

The dependent variable in this study was the output per unit area under ginger production. The household participates in gingers production from production to marketing. Data on output was obtained by asking respondents the number of kg harvested and sold in a season.

3.11.2 Independent variables

3.11.2.1 Personal attributes

Personal attributes of heads of households that were measured were; age, sex, marital status, education level and occupation of the head. The variables of age, sex, marital status, educational level and occupation were measured as follows: age in years, sex (1=female, 2 = male) and marital status (1=married, 2 – single, 3 = widowed, 4 = divorced). Education variable was measured by four-point scales ranging from 1 for primary school, 2 for secondary education, 3 for adult education and 4 for none. Occupation variable was measured by three point scales as 1 for agriculture, 2 for business and 3 for employment.

3.11.2.2 Land size

The land ownership was measured as follows: Data on land sizes was obtained by asking respondents the total number of land parcels that he/she owns and their sizes Then percentages was calculated.

3.11.2.3 Extension services

The study measures the number of extension visits. Respondents was asked to determine the numbers visits that extension officers did for farmers advice offer they will be required respond on the "frequencies " Basing on the frequencies of the responses, percentages was calculated.

3.11.2.4 Fertilizer application

The study measures the application of fertilizer. Respondents were asked whether there are applying fertilizer or not and they were required respond "Yes" or "No". Basing on the frequencies of the responses, percentages were calculated and this was dummy variable input in regression model.

3.11.2.5 Education level

The study measures the level of education and its association with ginger output. Education variable was measured by four-point scales ranging from 1 for primary school, 2 for secondary education, 3 above secondary level and 4 for none. The number of years in schooling was then entered in regression model. Then, basing on the frequencies of the responses, percentages were calculated.

3.12 Data Analysis Methods

Data analysis consists of examining, categorizing, tabulating testing or otherwise combining both quantitative and qualitative data address the initial propositions of the study (Yin, 2003). Data were entered into a computer and checked for errors before being quantitatively analysed using the statistical Package for the Social Sciences (SPSS).

3.12.1 Quantitative data analysis

i. **Methods for analyzing household characteristics**

Household characteristic obtained through a questionnaire was analysed through descriptive statistics, Descriptive statistics entailed percentages in sex, age, age, marital status, occupation and education level of households.

Methods for analyzing social economic factors affecting ginger productivity

Regression analysis was used to analyze the social economic factors affecting ginger productivity among small scale growers. The output per unit area was regressed with the number of visits by the extension agent per season, fertilizer application ginger production (dummy variable) as independent variables was fitted; Land ownership) and education level of the household head was used as variables in the equation in which, Ordinary Least Squares Estimation (OLS) technique was employed.

3.13 Ethical Issues

Ethics aims to protect participants from harm and to promote their welfare. Data was only be accessed by the researcher and respondents participated in the research voluntarily, no one was forced into participation. The researcher avoided all events that would have brought embarrassments to the respondents by making them feel free to provide information. Researcher informed the respondents the purpose and objectives of the study so that, they were aware with the situation and confidentiality were maintained. "Respondents were protected by keeping the information given confidential (Mugenda & Mugenda, 1999).

3.14 Reliability

The researcher ensured reliability of data. According to Trochim (2006) reliability has to do with the quality of measurement. The researcher intended to analysed the potential of ginger production on income generation among smallholder farmers in Tanzania Also, to ensure the confidence of the research findings, the various data collection approach namely qualitative and quantitative approach (triangulation) was used.

3.15 Validity

Kothari, (2004), defines validity as the most critical criterion that indicates the degree to which an instrument measures what it is intended to measure. To test the validity of this research tool, the pre-test of the questionnaires was done at Morogoro District Council as a pilot study area. Moreover, the study used scientific tools including descriptive analysis, explanatory data analysis to test the collected data and ensure its validity

4.0 Results and Discussion of the Findings

4.1 Social Economic Characteristics of Respondents

This section presents background characteristics of the respondents; it presents respondents variability in their profiles. This section intended to explore respondents' composition in terms of age, sex, marital status and level of education.

4.1.1 Age of the Respondents

The researcher was interested to know the age of respondents in the study area with an idea that it can influence ginger production and hence productivity. The results were as shown in Table 2.

Table 3 : Percentage of distribution of respondents by Age (N=244)

Age	Frequency	Percent
17 -27	43	17.6
28-38	72	29.5
39-49	86	35.2
50-60	14	5.7
61-71	29	11.9
Total	**244**	**100.0**

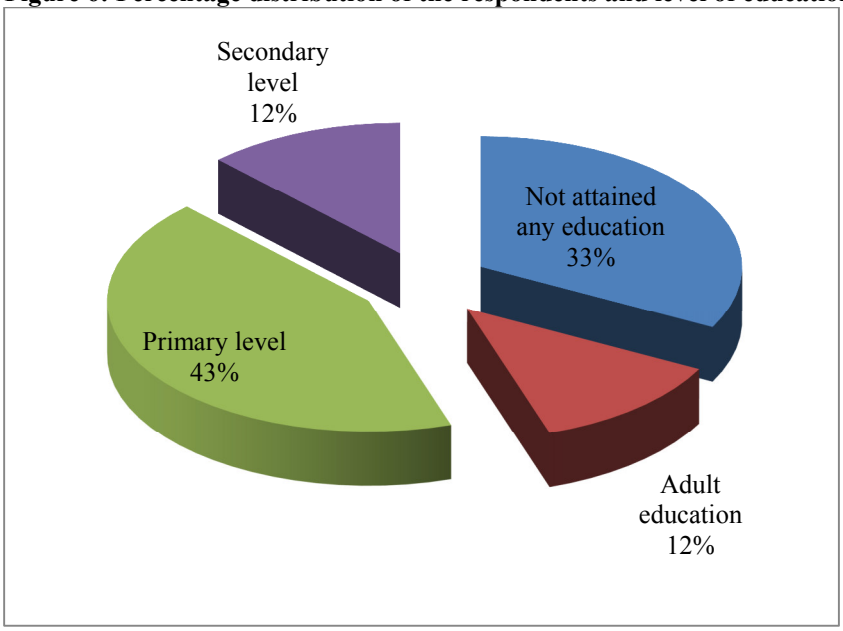
Source: Survey Data, 2016

Table 2 found majority of the interviewed respondents (35%) were aged between 39 to 49 years. The study found significant Frequency of the interviewed respondents (29.5%) was aged between 28 to 38 years; others (17%) were aged between 17 – 27 years. The results also show that minority portion of interviewed respondents (12%) above 61 (Table 2). This implies that the study involves mainly the active labour force that in turn will influence production.

4.2. Respondents distribution by level of education

The researcher was interested to know the level of education of the respondents and its implication to ginger production. The results were as shown in Figure 6.

Figure 6: Percentage distribution of the respondents and level of education



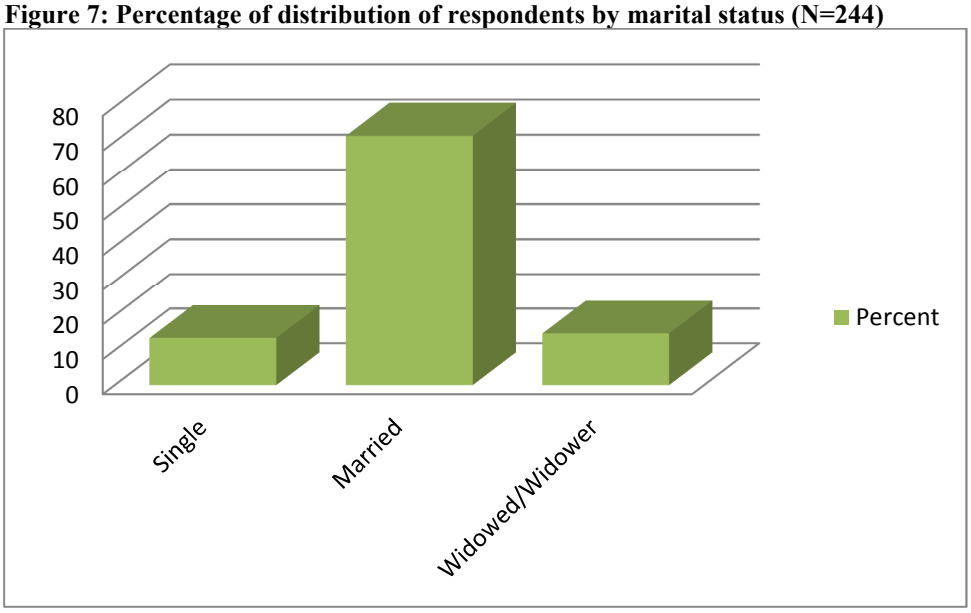
Source: Survey Data, 2016

Figure 6 reveals forty three percent (43%) of the respondents had attained primary school education, 12 percent O -level secondary education qualifications 33percent have not attended school and the rest 12 percent attained adult education. When individual have attained a certain level of education such as secondary school education becomes an advantage towards adopting agricultural technology. Collier, P (2008) said that "in order for a country to get a chance to play in the global economy, it needs to break free of the traps, which is not easy. In order to turn a country around it helps to have a pool of educated people". It is an advantage to have at least 2/3 of the population with Secondary education; otherwise it is very difficult to break from cycle of poverty.

4.3 Marital Status

The researcher was interested to know the marital status of respondents so as to trace its influence on ginger production. The results were as shown in Figure 7.

Figure 7: Percentage of distribution of respondents by marital status (N=244)



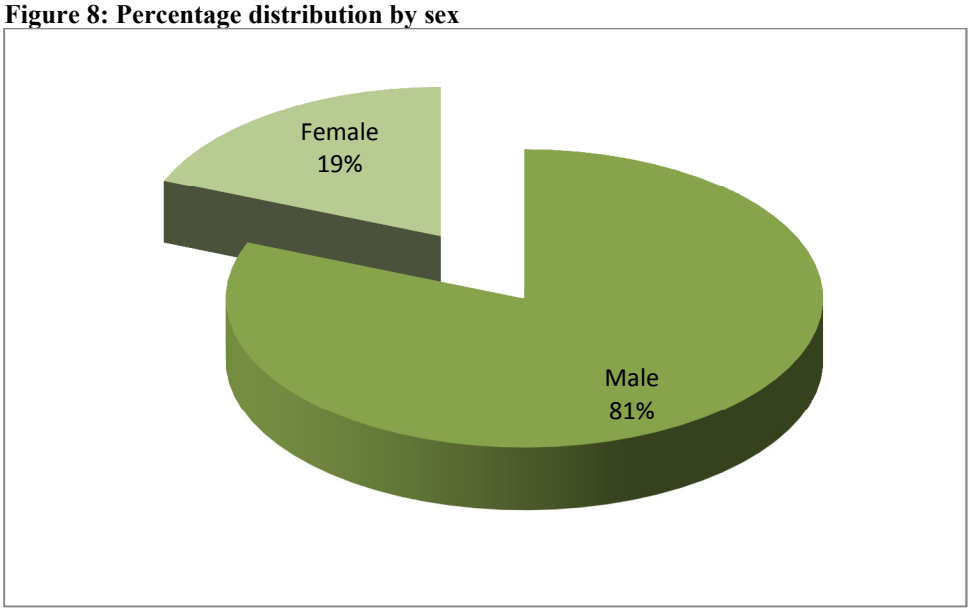
Source: Survey Data, 2016

Table 7 shows that 67 (71.7%) of respondents were married, whereas 36 (15%) were widowed/widower. Among the rest 33 (13%) were single.

4.4 Sex

Researcher was interested to know the sex of respondents so as to trace its influence on ginger production. The results were as shown in Figure 8.

Figure 8: Percentage distribution by sex



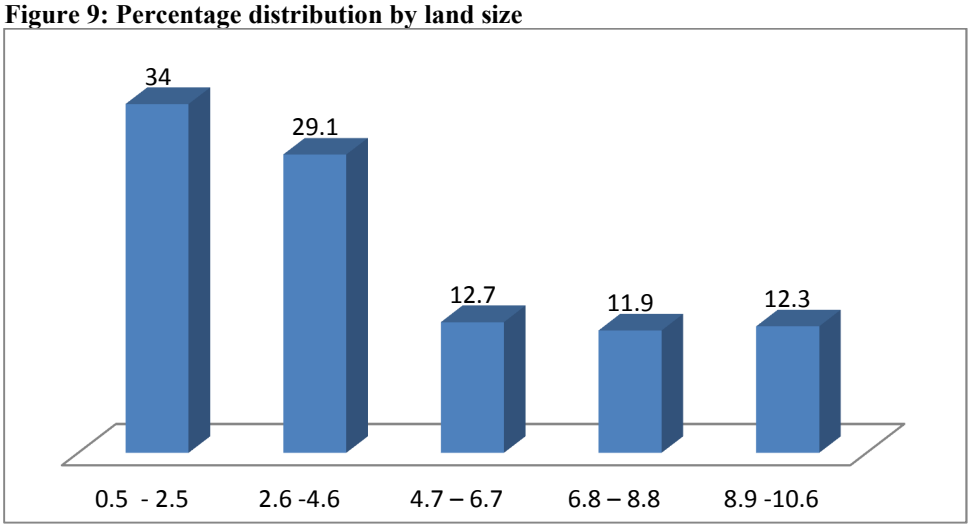
Source: Survey Data, 2016

The study involved both males and females, it was found that majority of the respondents (81%) were male, as presented in Figure 8. Also the study identified that, (19%) of the respondents were female. This implies that men participate more in ginger production than their counterpart.

4.5 Land size

The researcher wanted to know the land size of respondents with an idea that it can its influence on ginger production. The results were as shown in Figure 9.

Figure 9: Percentage distribution by land size



Source: Survey Data, 2016

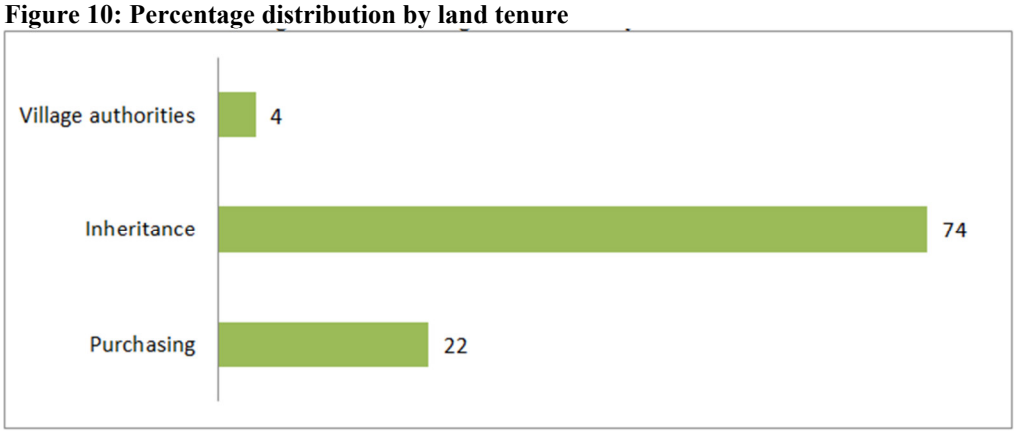
Figure indicated that farmer's total size of land under ginger production substantial number of farmers owned an average of 0.5 – 2.5 acres (34%), 29% 2.6 - 4.6 acres. This data appealed that that this land is under parcels due to nature of same district. The household survey – considering all three communities together – indicates that the percentage of people engaged in farming. This means that farming has become more significant. As the focus on farming and, the overall *in situ* livelihood diversification decreased. Land fragmentation prevalent in both survey areas. All these problems hindered them from having a contiguous land that can be cultivated with tractor and tractor drawn implements (mechanized agriculture) and impeded farm productivity (Mmasa, 2013; Ibekwe *et al.,* 2011; Onumadu, 2009).

4.6 Land acquisition

Under the Land Act 1999 and the 1995 National Land Policy, land is "not owned" but is vested in the Presidency and availed to users through a mechanism which is centred on the Minister responsible for Lands, Commissioner of Lands and the land administration system revolving around that office. Under this system, the land user temporarily owns the land rights and any improvements to the land. Land rights can either be granted or deemed to have been granted, and certificates are issued and registered to prove the identity of the rights owner (Lugoe, 2008). It is important to note that even though all land is regarded as public land, the 1999 Land Act and Village Land Act, which became operational in 2001, created three categories of land: (i) general land, (ii) reserve land and (iii) village land (LRRRI, 2011).

Basically, there are two ways in which a person can own or acquire land in Tanzania: (i) through "granted right of occupancy" and (ii) through "customary right of occupancy". Both of these two ways are legally restricted to Tanzania citizens (LRRRI, 2011). However, a third way of acquiring land, that is, through investment, accommodates land acquisition by non-citizens (Mangasini *et al*., 2014). The researcher wanted to know the land tenure with an idea that it can influence on ginger production. The results were as shown in Figure 10.

Figure 10: Percentage distribution by land tenure



Source: Survey Data, 2016

Land acquisition is the pre-condition for any crop production including tobacco in the study area.

Tobacco farmers acquire land in three major modes namely inheritance, purchasing and offer from the village authorities. From Figure 10, it can be seen that the majority (74%) of sample farmers acquired land inheritance, 22% through purchasing and 4% acquired land by offer from the village authorities. The average total area under cultivation owned by respondents was 1.5 ha. This is above the average landownership and occupation in accordance with the villagisation programme of 1960s and 1970s, which requires a household to have a homestead plot of about 0.5 ha (NEMC, 1998).

However, in most African societies, land is allocated to adult male through inheritance and little variation is expected within village if land is equally accessed. Similarly, Jayne *et al*. (2003) reported unequal land distribution within villages in some of African countries (Zambia, Kenya, Rwanda, Mozambique and Ethiopia). On contrary, Lipton (1985) reported equal land access within village.

4.7 Ginger farming activities

The researcher wanted to reveal the major cash and food crop produced in Same District with an idea that it can influence the ginger production activities. The results were as shown in Table 3.

Table 4: Percentage distribution of important crop enterprises ranked by the sample farmers

Main crop	Frequency	Percent
Maize	53	22.0
Ginger	191	78.0
Total	**244**	**100.0**
Other crops		
Beans	220	90.0
Coffee	24	10.0
Total	**244**	**100.0**

Source: Survey Data, 2016

Table 4.6 revealed that household economy in Same district depends mainly on agriculture production. Farmers grow both cash and food crops. Ginger and maize are the main cash and food crops grown respectively. From Table 3 it can be seen that the majority of sample farmers 78% regard ginger (Plate 1) as the most important crop enterprise with the remaining 22% in favour of maize. Other minor crops such as beans and very small amount of coffee were also ranked by the respondents according to their importance. From Table 4.6 beans was the third most important crop (90%) because it was intercropped with ginger. The fourth crop as ranked by the respondent 10% was coffee because the crop is an important component for income generation. The study is in line with FAO study that revealed that principal crop of subsistence in the study area is maize with an average harvest just above 1 ton/ha (FAO, 2008a) and vegetables are the principal cash crops sold at the Same market. Other food crops include lablab, cowpeas, beans, sweet potatoes and onions. The experts stated that the main challenge facing the communities is the occurrence of droughts that aggravate many problems affecting livelihood and food security in the research site as well as in other areas according to the dependence on agriculture and farming activities.

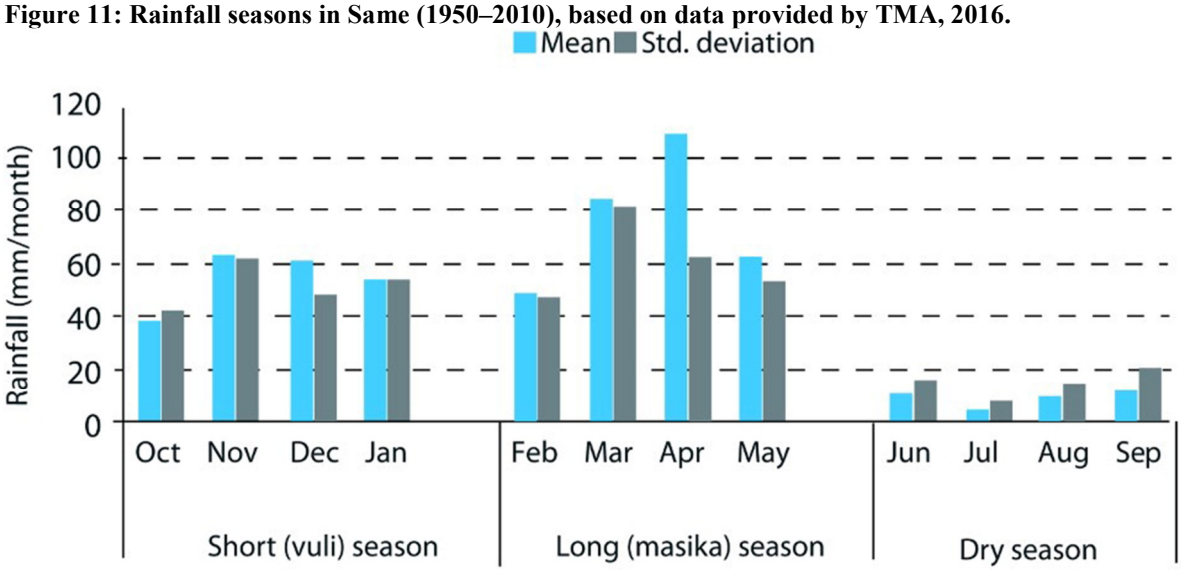
Plate 1: Ginger (*Zingiber Officinale*)

Source: Survey Data, 2016

4.8 Rainfall seasons in Same-District

The researcher wanted to reveal the rainfall seasons (1950–2010) in Same District with an idea that it can influence the ginger production activities. The results were as shown in Figure 11.

Figure 11: Rainfall seasons in Same (1950–2010), based on data provided by TMA, 2016.



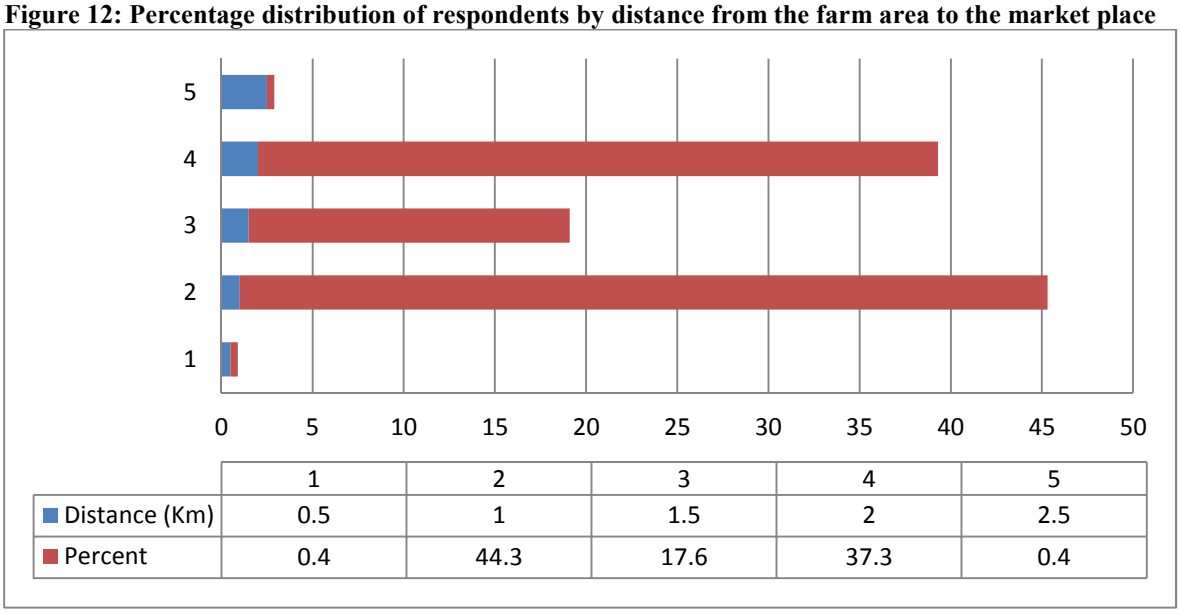
Source: Tanzania Meteorological Agency (TMA), 2012

The three wards selected mamba miamba, bwambo and mpinji are located in the south Pare Mountains, which form part of the Pangani River Basin, where the climate ranges from semi-arid to dry sub-humid, and the rainfall pattern is bimodal with a 'short' rain season called *Vuli* (October to January) and a 'long' rain season (February to May) called *Masika*.. Most simulations predict exacerbated variability and increasing extreme weather events as a result of global warming (IPCC, 2001). Droughts or floods are examples of extreme weather events categorized under climate variability. Generally, such events are characterized by their severe effects on people's livelihoods, especially on agricultural production and associated food security.

4.9 Ginger marketing

The researcher also wanted to reveal that the distance from the homestead/storage point to the market area has significant impact on the selling price of the ginger. The results were as shown in Figure 12.

Figure 12: Percentage distribution of respondents by distance from the farm area to the market place



	1	2	3	4	5
Distance (Km)	0.5	1	1.5	2	2.5
Percent	0.4	44.3	17.6	37.3	0.4

Source: Survey Data, 2016

Figure 12 shows various the results for distance from the homestead/storage to the market areas, About half (44.3%) of the respondents their distance from the market areas was 1km, following 37.3% of the respondents move to 2km from their storage to the market area while the rest 17.6% traveled up to 1.5km and few 0.4% travelled distance of 0.5Km and 2.5 Km from their storage place to the market areas. This information is very important because distance from the selling point to homestead/storage also influence the price of the ginger and in turn affects the ginger production at large.

4.10 Social and economic factors affecting ginger productivity

The results on regression analysis (Table 4.9) show that the regression model was significant as indicated by the significance of F-value ($p < 0.01$). This implies that the factors included in the model explain the variation obtained in ginger yield in the study area. Furthermore, determination coefficients R^2 (adjusted) indicates that 78.3% of the variation in ginger yield obtained by farmers in the study area is explained by the variable included in the estimated model, and only 21.7% of the variation in ginger yield is explained by the variables not included in the model.

Table 5: Regression analysis results

Variable	β - Coefficients	Std Error (μ)	t-ratio	P-value
Dummy Fertilizer (FTRL)	0.093	671.041	2.988	0.003*
LAS	0.057	823.757	1.545	0.004*
EXTN	0.094	357.776	2.763	0.006**
EDL	0.871	177.693	24.126	0.000***

R	0.887
R- Square	0.787
Adjusted R- Square	0.783
Standard Error	4741.579
Observations	4

The coefficient of amount of fertilizer used per unit area as a variable had the expected positive sign and was significant at ($p < 0.01$) (Table 4.9). The positive relationship between the use of fertilizer per acre and ginger yield realized implies that the farmers who use fertilizer at their farm are likely to realize more yield as compared to those who don't use fertilizer.

The results in Table 4.9 shows that the number of visit by extension officers (days) in ginger farming has had a positive effect on the output. The variable was statistically significant at ($p < 0.01$) implying that those farmers which were visited more by extension officers in ginger farming have a higher possibility of producing more ginger per unit area as compared to farmers with fewer contacts with extension officers. This is because extension education exposes the farmer to improved production techniques which results into the increased farm performance. Similar results were reported by Mutayoba (2005) who found a positive relationship between the number of extension visits and farmer's level of education on farm performance in Vanilla production.

Correlation analysis shows that the coefficient of correlation between quantities of ginger produced in relation to the size of land cultivated is statistically significant ($p < 0.01$). Land had a positive sign and was significant at the 1% level. The expansion of household land use by 1% raised would raise income by 0.06%, which is largely as a result of increased agricultural production. The upshot of this finding is that rural income can be improved by expanding production activities to the unused or underutilised land (Aikaeli, 2010). Presumably however, increasing acreage in number of parcels cultivated could be more effective if complemented by improvements of inputs, such us mechanization of agriculture.

The coefficient of the level of education for the farmer has had the expected sign and significant at ($p<0.01$). This may be due to the fact that educated farmers are more likely to understand and follow the advice and directives from the extension agents on the importance of using improved technologies and the use of inputs on recommended rates. A similar conclusion was reached on education by Mmasa *et al.* (2012) on the study to assess social economic factors affecting consumption of sweet potato products. The author concluded that recommended the higher output is associated with a certain level of education that a farmer has that will make him produce in sustainable manner.

Basing on the regression analysis results, the second research question (section 1.4) on what are the social and economic factors, affecting the ginger productivity among small-scale growers. It can thus be concluded that farmer's education level, the use of fertilizer (FYM), land size under ginger production and frequency contact with extension services had the expected positive sign and was significant at $p<0.01$ (Table 4). *Basing on the regression analysis results justify the hypothesis that ginger productivity among smallholders growers is not influenced by social economic factors is rejected*. It can thus be concluded that selected social economic factors has a significant influence on farm productivity.

5.0 Conclusion, Policy Implication and Recommendations

Basing on the regression analysis results justify hypothesis that ginger productivity among smallholders growers is not influenced by social economic factors is rejected. It can thus be concluded that selected social economic factors has a significant influence on farm productivity. Generally. It can thus be concluded that farmer's education level, the use of fertilizer, land size under ginger production and frequency of contacting extension services had significant contribution to ginger farming and hence productivity

5.1 Policy implication

Poverty alleviation remains the highest priority for government policy in Tanzania today. The government recognizes that to alleviate poverty in the country agriculture must be transformed from the current subsistence smallholder farming to large commercialized and highly mechanized agriculture. For that reason, the National Strategy for Growth and Reduction of Poverty (NSGRP) was established as a strategy to meet the Tanzania Development Vision 2025. Among other national goals, Vision 2025 aspires for Tanzania to be a country with a high quality livelihood and a competitive economy capable of producing sustainable growth and shared benefits. It was in. It comprises a holistic set of policy instruments and strategic interventions towards addressing the various sectorial and cross-sectorial challenges, as well as taking advantage of the numerous opportunities to modernize and commercialize agriculture in the country.

The strategy is based on ten actionable pillars. This approach is intended to transform agriculture for the benefit of the majority of Tanzanians. However, the implementation of the strategy seems to have neglected vital aspects of smallholder farming to be included promoting of spices including ginger with full support. To increase production and contribute to improved incomes and livelihoods for ginger farmers, this study recommends the following policy responses:

5.2 Recommendations

i. Expand extension services to ensure that smallholder ginger farmers have access to high-yielding ginger seed varieties, agro-chemicals, and improved farm inputs, storage and marketing facilities
ii. Encourage ginger farmers to increase land under cultivation. Smallholder farmers own small parcels of land but cultivate only small portions. Smallholder farmers need to be assisted to expand the area under cultivation. This may help transform the current farming system from smallholder farming to larger scale.
iii. To define a more constructive role for the "*Chama cha Msingi cha Wakulima wa Tangawizi Mamba"*
iv. Discourage farm gate prices by establishing selling points which also offer value addition and storage facilities. These efforts will likely act to increase the prices received by farmers for ginger produced.
v. The Government to intervene what happened with processing plant at Mamba Miamba collapsed, which was inaugurated by retired president of URT Hon Jakaya Kikwete

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