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Socio-Economic Factors Limiting Smallholder Groundnut Production in Tabora Region

by

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ABSTRACT

Groundnut is among the dominant crops in Tanzania which enables most smallholder farmers earn both food and income. It is among main sources of fats, protein, carbohydrates, and vitamins for human consumption. The crop is also a source of nutritious minerals for humans as well as manufactured animal feeds. This study identifies factors which contributes to stagnation of groundnut production among smallholder producers in Tabora region. Multistage, simple random and purposive sampling were applied. Qualitative data were collected using focus group discussions, key informant interviews, and personal observation while, quantitative data were gathered using documentary review and survey. A total of 400 smallholder farmers were involved in the study. Multivariate regression technique was used to capture socio-economic factors influencing small scale groundnuts production in the district. Besides, profitability of various crops produced in the study area was assessed using gross margin analysis. Results indicate that sex of the farmer; cultivated land size and price of the previous season significantly limit groundnuts production in the area. Furthermore, groundnut was the third most profitable crop in the area after beans and rice. In addition, it was also found that there was gender disparity in land-ownership in which very few women owned land despite of being major provider of family labour. It is recommended that among other things, the government through extension department should ensure that smallholder groundnuts farmers have access to high yielding groundnuts seed varieties, agro chemicals, improved farm inputs, storage and marketing facilities.

***Keywords*:** Groundnuts, socio-economic factors, gross margin, smallholder farmers, and poverty reduction.

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1.0 INTRODUCTION

1.1 Background Information

Groundnuts (*Arachis hypogaea L.*) of the family *leguminasea,* is an annual legume which bears many local names, including: peanut, earthnut, monkey-nut and goobers. It originated from Latin America and the Portuguese introduced it into African continent from Brazil in the 16th century (Abalu and Etuk, 1986; Adinya *et al.,* 2010; Hamidu *et al,.* 2007). The crop is mainly grown for oilseed, food, and animal feed (Pande *et al.,* 2003; Upadhyaya *et al.,* 2006). It is the world's 13th most important food crop, 4th most important source of edible oil and 3rd most important source of vegetable protein (Taru *et al.,* 2010).

Groundnuts-seeds known as kernels contain 40-50% fats, 20-50% protein and 10-20 % carbohydrates (Sorrensen *et al.,* 2004). They are a nutritional source of vitamin E and other minerals for human health including *niacin, falacin, calcium, phosphorus, magnesium, zinc, iron, riboflavin, thiamine* and *potassium*. Groundnut is useful in treatment of *haemophilia*, and can cure *stomatitis,* prevent *diarrhoea* and is beneficial for growing children, and for both pregnant and nursing mothers (Akobundu, 1998). Kernels are consumed directly as raw, roasted or boiled nuts and vines are used as fodder for cattle (Pompeu, 1980; Hong *et al.,* 1994). The crop is used as industrial materials for producing oil-cakes and fertilizer. Extracted oil from kernel is used as culinary oil and other crop-extracts are used as animal feeds (Nigam, and Lenné, 1996). Almost each part of the crop is used in some way. These multiple uses of groundnuts plant make it important for both food and cash-crop for the available domestic, or worldwide external markets in several developing, and developed countries.

Globally, 50% of the produce is used for oil extraction, 37% for confectionery use and 12% for seed purpose (Taru *et al.,* 2010).

Groundnuts are grown in nearly 100 countries worldwide. China, India, Nigeria, USA, Indonesia Senegal and Sudan are major producers growing an estimated total area of 21.8 million ha (Taru *et al.,* 2010). Developing countries accounts for 96% of the global groundnuts area and 92% of the global production. Asia accounts for 58% of the global groundnuts area and 67% of the groundnuts production with annual growth rate of 1.28% for area, 2% for production and 0.71% of productivity. Twenty five countries in Asia produce 71.7% of the crop while 46 countries in Africa produce 18.6% of the total produce. North-Central America produces 7.5% from a small area of 3.7% of the overall estimated global area of producers. These countries produce about 28.5 million Tonnes of shelled-nuts (ICRISAT, 2009). Most important growing

regions in Tanzania are Mtwara, Tabora, Shinyanga, Kigoma, Dodoma, and Mwanza.

While groundnuts production is considered a profitable venture (Adinya et al., 2010; Taru et al., 2010; Taru et al., 2008), globally its total production of groundnuts with shells has not increased much. Global production increased from 35,880,941 tonnes in 2001 to 38,614,053 tonnes in 2011 (FAOSTAT, 2011). Groundnuts in African countries such as Tanzania are grown at a small scale level and with less application of modern inputs (Taru et al., 2010). For example, during the previous decade, its production had not exceeded 8% of the world output (ITC, 2011).

According to FAOST (2011) groundnuts production in Africa in 2011 was 9,435,493 tonnes, while Tanzania produced 651,397 tonnes. Besides, Tanzania produces fewer groundnuts compared with other African countries. For example, in 2011 groundnuts yield in the country was 964.7 kg/ha while Nigeria recorded a yield of 1264.6 kg/ha and Guinea-Bissau had 1724 kg/ha of groundnuts with shell (FAOSTAT, 2011). Hitherto, the annual yield per hectare has not increased substantially. However, factors associate with lower yields in Tanzania particularly Tabora region are not well known and consequently not documented.

1.2 Statement of the Research Problem

Tabora region is currently experiencing the problem of low groundnuts yield which ranges between 500 and 600 kg/ha as compared to potential yield of 1000 kg /ha (FAOSTAT, 2008). The region is dominated by smallholders who mostly depend on tobacco, maize and groundnuts-production for livelihood-earning (Bucheyeki et al., 2008, Ramadhani et al., 2002). Moreover, crops like tobacco, maize and groundnuts production, which are the chief sources of income for the majority of people in the region, are currently experiencing a sharp yield-decline. For example, the grown groundnuts varieties are older than 30 years. Mamboleo, the only groundnuts variety which was introduced in the 1960s has lower yield-capacity and had forced farmers to abandon it (Bucheyeki et al., 2008; Bucheyeki et al., 2010). Bucheyeki *et al.* (2010) conducted a study to curb this situation, after which two varieties Pendo and Johari were identified by respondents as high yielding which possessed preferred traits. These varieties were recommended to be grown by farmers in the region. Despite all these attempts to improve the situation in growing areas, low groundnuts yield still persists. This study identifies socio-economic factors which contribute to low yield and stagnation of groundnuts production in Tanzania with evidences from Tabora region.

1.3 Objectives

The primary objective of this study was to determine and document key actors in groundnuts production and identify socio-economic factors limiting the groundnuts production in the study area. Specifically this study aimed at:

(i) Examining land tenure systems commonly practiced in the study area and their influence on quantity of groundnuts harvested;

(ii) Analysing the nature and process of groundnuts production in the study area;

(iii) Determining the contribution of groundnuts production on overall household income of a smallholder farmer;

(iv) Determining and document type of groundnuts processing and value addition mechanisms commonly used by smallholder farmers in the study area;

(v) Identifying and documenting socio-economic factors influencing groundnuts production in the study area.

1.4 Research Questions

In order to achieve the above objectives, this study was set to answer the following research questions:

(i) How do various land tenure systems in the study area influence quantity of groundnuts harvested?

(ii) What features and processes that typically explain the nature of groundnuts production in the studied area?

(iii) Does groundnuts production contribute significantly to the overall household income of a smallholder farmer? If yes, to what extent?

(iv) To what extent and in what ways do smallholder groundnuts farmers add value to the product?

(v) What are socio-economic factors that severely limit groundnuts production in Urambo district?

1.5 Justification of the Study

For Tanzania to achieve first Millennium Development Goal on eradicating extreme poverty and hunger by 2015 and create broad-based, equitable and sustainable growth as stipulated in the National Strategy for Growth and Reduction of Poverty

(NSGRP) agriculture must receive due priority (URT, 2010c). This entailed the adoption of 'kilimo-kwanza', as a strategy, and comprehensive approach for agricultural development of the time. The strategy is based on ten actionable pillars with clear focus to poverty-reduction. The agricultural sector in the country does not only employ the majority of Tanzanians but also contributes significantly to overall share of the national income. However, groundnuts production in Tanzania is not well developed compared with other African countries such as Nigeria. There is a need to transform the agricultural sector from smallholder subsistence farming into large scale commercial farming. This study addresses socio-economic factors that limit groundnuts production in the study area. In this way policy makers at both local and national level, are informed on short and long term policy responses that are likely to address socio-econoimc factors limiting groundnuts production in the area. By examining the process of land acquisition, ownership and utilization amongst smallholder farmers, the study helps smallholder farmers in planning and utilizing land sustainably. Furthermore, this study contributes significantly in identifying affordable groundnuts value addition techniques that could be used in order to increase sells and profit.

1.6 Organisation of the Report

The report is organized into five chapters. Chapter one presents the introduction which includes: background to the research problem, statements of the problem, objectives and research questions as well as justification of the study. Chapter two covers literature review which includes among other things empirical studies and a theoretical framework underpinning this study. Chapter three describes the methodology and tools used in the study. Chapter four presents and discusses the findings. Finally, concluding remarks and recommendations are provide in chapter five.

2.0 LITERATURE REVIEW

2.1 Theoretical Framework

The theoretical framework underlying this study, borrows insights and empirical contributions from the Farm Household Production Theories, as clearly revisited by Mendola (2007). The author evidently points out that, peasants with access to a piece of land mainly utilize family labour in farm production. According to Ellis (1992) peasants are fundamentally characterized by partial engagement in markets, which are often imperfect or incomplete. On the other hand, Mendola (2007) maintains that, peasants are located in large dominant economic and political systems that can affect production-behaviour. Furthermore, Hunt's (1991) as cited in Mendola (2007) identifies peasant farms as being units for both production and consumption – implying that a proportion of produce is sold to meet their cash requirements and a part is consumed. In this context, Mendola (2007) emphasise that the units involve a variety of market and non-markets tasks such as agriculture, pastoralism, fishing, crafts, and gathering of fruits, nuts, fuel-wood and water. The author further noted that, typically peasant farmers work with developing markets that function sporadically and somewhat disconnectedly across locations and time.

Therefore, the above described farm household production theories have implications on producer-behaviour, as well as the overall smallholder farmer's production-decisions. Taylor and Adelman (2003) identified the classic economic models that incorporate the consumption goals of household into micro-economic models of peasant households' decision-making – as 'agricultural-household' models – that is, they identify them as 'consumption and production' units, in both perfect and incomplete market context. This means that the typical Cobb-Douglas production function, which assumes constant returns to scale, based on restrictive assumptions of perfect competition in both factor and product markets, is inadequate to explain reasons for smallholder production-behaviour. In this way, it is equally inadequate to provide answers for the study objectives.

2.2 Groundnuts Production in Tanzania

Groundnuts production in Tanzania dates back to 1946 (Wood, 1950). At that time mainland Tanzania, the then Tanganyika, was a colony under British rule. Frank Samuel, the then head of the United Africa Company, a subsidiary of Unilever, came up with an idea for the colony to cultivate groundnuts, so as to produce vegetable oils. Both the idea and priority to introduce the groundnuts-production scheme in the colony were exclusively based on the then interests of colonial government. Largely, the scheme intended to have large-scale state-managed commercial production for export. The first site for cultivation was Kongwa in central Tanganyika where local

people had already been cultivating groundnuts for ages before (*ibid*). This scheme which started during the colonial era was abandoned in the same colonial period.

The production of groundnuts in Tanzania is mostly done through smallholder farming. Since groundnuts is one of the key sources of major ingredients for household nutritional foods, women are mostly found labouring more in producing the crop. The crop is ranked third after cotton seeds and sunflower for providing edible oils in the country. Generally, groundnuts is a food crop which is consumed directly though, it can be sold for earning income (Sibuga *et al.,* 1992).

Groundnuts is grown in areas which are below 1,500 m of altitude but mostly smallscale. Important growing regions include Mtwara, Tabora, Shinyanga, Kigoma, Dodoma, and Mwanza. These regions receive annual rainfall varying between 500 mm and 1,200 mm (Mwenda *et al.,* 1985). Two main growing zones however, have different amount of rainfall distribution during growing seasons. One of the zones covers the regions of Mtwara, Ruvuma, Kigoma, Shinyanga and Mwanza; where rainfall is uni-modal, falling from October/November to May/June, with a brief dry spell of some few days to few weeks in January or February (Mwenda, 1985). The other zone covers Morogoro, central and north-eastern parts of the country. This has a bi-modal rainfall distribution, with short rains in November/December, and long rains from March to May/June.

Groundnuts in the country is grown entirely under rain-fed conditions. It is usually grown as intercrop with cereals or cassava. Normally, the crop is grown without application of fertilizers. Farmers grow groundnuts on flat seedbeds on the tops of ridges, or just on the lower sides of these ridges. In part, adverse weather conditions and particularly unreliable rainfall have been recognized as one of the responsible factors leading to low yield (Sibuga *et al.,* 1992).

2.3 Empirical Studies

Bucheyeki *et al.* (2008) conducted on-farm evaluation of promising groundnuts varieties for adaptation and adoption in Tanzania. The study revealed that *Pendo* (1,444 kg/ha) and *Johari* (1,163 kg/ha) outyielding other varieties. The genotypes and environments sum of squares accounted for the most of the variability by contributing 38% and 33% for genotypes and environments respectively. *Mamboleo* and *Sawia* varieties showed high genotype and environmental stability. Farmers and researchers ranked *Pendo* and *Johari* as the most preferred genotypes and the best varieties. In another study, Bucheyeki *et al.* (2010) identified drought and low yielding varieties as the most serious problems in Tabora. The study also revealed that, researchers' and farmers' variety selection criteria coincided. Based on the information generated by the study, *Pendo* and *Johari* were recommended.

Wabbi (2002) assessed factors affecting adoption of agricultural technologies in Kumi district, Eastern Uganda. The study revealed that farmers' participation in on-farm trial demonstrations, accessing agricultural knowledge through researches, and prior participation in pest management training were associated with increased adoption of most Integrated Pest Management (IPM) practices. Size of farmer's land holdings did not affect IPM adoption suggesting that IPM technologies were mostly scale neutral, implying that IPM dissemination may take place regardless of farmer's scale of operation. According to Singh *et al.* (2008) farmers' perception of harmful effects of chemicals did not influence farmers' decisions regarding IPM technology adoption, despite their high knowledge of this issue, suggesting that these farmers did not consider socio-economic, environmental or health impacts as important factors when choosing farming practices. Farmers' managerial capabilities were not important in explaining cowpea IPM technology adoption.

Mugisha *et al.* (2004) in their study on the adoption of IPM groundnuts production technologies in Eastern Uganda revealed that adoption was significantly influenced by education, family size, association membership, extension visit, access to credit and household income. A descriptive analysis indicated that lack of seeds, information about the technologies; and costly chemicals, as well as labour-intensiveness and lack of land were reasons for non adoption.

A study by Kimmins *et al.* (1999) proved that in many Sub-Saharan African (SSA) countries, women are predominantly growing and managing the groundnuts. Therefore, cultivation of the crop has a direct bearing on the overall economic, financial well-being, as well as nutritional status of the household women and children. According to the authors, other factors that contribute to declining groundnuts production are drought, disease epidemics and climatic variability.

Ramadhani *et al*. (2002) noted that despite the importance of groundnuts in the country, yield is still low. For the past 10 years, groundnuts production has experienced two production patterns with relatively high yield of about 600 and 500 kg/ha. The reasons for low yields in the country are still not well understood. This paper documents social economic factors limiting groundnuts production in the study area.

2.4 Research Gap

The empirical studies reviewed above show that, most scholars have concentrated on researching agricultural technology, groundnuts diseases, groundnuts varieties, climatic factors hindering groundnuts production and contribution of groundnuts to household income for poverty reduction. Thus, the literature has paid little attention on socio-economic factors limiting groundnuts production among smallholder

farmers. As a result, less is known and documented on socio-economic factors limiting groundnuts production among smallholder farmers in Tanzania especially Tabora region. This study fills this knowledge gap.

3.0 METHODOLOGY

3.1 Location of Study Areas

This study was carried out in Tabora region particularly Urambo district. All divisions of Urambo district namely Urambo, Ussoke, Songambele and Ukondamoyo were involved in the study. A total of five wards were included in the sample. They included Muungano, Vumilia, Songambele, Usisya and Ussoke. Kaliua and Ulyankulu (the former divisions of Urambo District) were not involved in the sample because they now form a new Kaliua district. Urambo is one of the seven districts of Tabora region. Others include Tabora Municipality, Uyui, Nzega, Igunga, Sikonge and Kaliua. The district has an area of 25,995 square kilometres; with a population of 369,329, of whom 340,348 live in rural areas. This proportion comprises about 92.2% of the total population (URT, 2003). Urambo was selected for the study because it is not only the largest district in Tabora region, but also it produces more groundnuts than the rest of the other districts in the region.

3.2 Research Design

1Mixed-method research design that combines both qualitative and quantitative approaches were applied because of the involvedness of the research problem and research questions. Gerring (2007) refers to this design as "*qual quant*" approach. The author used "*qual quant*" as an acronym for a method that combines both qualitative and quantitative methods; with "qual" referring to qualitative methods and "quant" referring to quantitative methods. On the other hand, Saunders *et al.* (2007) refers to this approach as an "integrated research paradigm". Integrated research paradigm essentially combines various philosophy in research such as positivism and realism. According to Saunders *et al. (* 2007) mixed-methods design is normally used when researchers are interested in gaining a rich and deeper understanding of a research problem. Mixed-methods design was necessary for this study because it allowed researchers to gather both qualitative and quantitative information. Furthermore, this design was preferred than any other design because it supported a variety of analytical techniques that exploited the connections between micro - and macro-levels of analysis. Qualitative methods used in this study are: focus group discussion, key informant interviews, and observation. On the other hand, survey and documentary review were applied to gather quantitative information.

3.3 Sampling Techniques

The household was used as the unit of analysis, whereby heads of households within both groundnuts and non-groundnuts farmers sub-samples were included in the study. The sample size for this study was 400 heads of household. This sample size was determined based on the formula developed by Fisher *et al.* (1991) for the total population that exceed 10,000 (Appendix I). Sub-samples were proportionately obtained where, 30 were sampled from Muungano, 27 from Vumilia, 42 from Songambele and 20 were from Usisya. Others were Ussoke (13), Uhuru (18), Usongelani (29), Sipungu (19), Kalemela A (32) and Kalemela B (47). Likewise, 17 were from Mabundulu, 20 from Itegamatwi, 31 from Katungulu and 55 from Jioneemwenyewe (Appendix I).

A sample size of 400 was appropriate and its characteristics were representative of the targeted population because; the larger the sample is, the more consistent is the outcome to estimated parameters in question. Likewise, the larger the sample the more likely it is to have representative number of the target-population from which the sample comes (Saunders *et al.* 2007). This sample size was considered adequate for this study because according to Hair *et al.* (2006), any sample size usually suffices for descriptive statistics. But a good sample size between 200 units and 500 units is needed for multiple regression, analysis of variance (ANOVA), or log-linear analysis. The study sample of 400 was within the required range that was suitable for rigorous statistical and econometric analyses (Amin, 2005; Sudman, 1976).

The sampling procedure adopted a combination of different approaches including multistage, simple random sampling (SRS), and purposive sampling. Multistage sampling was used to identify areas of survey, that is, Divisions, Wards and Villages. Purposive sampling approach was applied to get groundnuts growers as well as non-growers. Using simple random sampling 400 farmers among them 270 groundnuts growers and 130 non-groundnuts growers were selected.

3.4 Types and Methods of Data Collection

Both primary and secondary data were collected. Primary data included acreage, sources of labour, costs of labour and inputs, types of inputs, crops grown in the area, yield, price, demographic characteristics, income and income sources to name just few. Secondary information involved number of growndnuts growers and non-groundnuts growers, the number of inhabitants in each village as well as the population size of the district and its growth rate. Primary data were collected using survey method. Other methods used included: Focus group discussions (FGD), key

informant interviews and observation. Secondary data were collected using documentary review. These methods are explained in detail below.

3.4.1 Focus Group Discussions

Two focus group discussions were conducted based on pre-determined questions. The first FGD was at Jioneemwenyewe village in Songambele division on 16th September 2010. The second FGD was on 21st September 2010 at Uhuru Village, which is located in Vumilia ward,Ukondamoyo division. Each group discussion consisted of 10 members, with at least five female participants. The FGDs were guided by one facilitator, whose duty was to moderate and guide the discussion. The FGD guide consisted of general questions which tackled important aspects of the study, by exploring the basic objectives behind the study.

3.4.2 Survey

A survey was conducted using questionnaire which comprised of open and closed ended questions. The survey method was applied in order to capture information that was not captured using other methods such as FGDs, key informant interviews, personal observation and documentary review. The survey was conducted from September 2010 to January 2011. A total of 400 household heads both groundnuts (270) and non-groundnuts farmers (130) of mixed gender were involved in the survey. Respondents were met at their homes and were asked for their consent to participate in the study. Those who agreed to participate in the study were requested to provide information concerning the previous year production. Luckly, no single potential respondent who was approaches by researchers refused to participate in the study.

3.4.3 Key Informant Interviews

This method was adopted in order to gain indepth understanding of groundnuts sector in the study area. Three key informants were interviewed from three different Wards namely, Vumilia, Kalemela and Songambele. Of these three key informants one was a woman. Generally, informants had different ages, ethnicity, religious affiliation and educational level. The informants were selected based on their training and personal knowledge or experience with the groundnuts sub-sector. One informant was an extension officer who has worked in the study area for more than ten years. The second one was an experienced groundnuts farmer who has been growing the crop for the past 13 years; and the third one was a former groundnuts farmer who had switched to tobacco growing. The informants were also selected based on ability to express themselves clearly. Each interview took about one and

half-hour and was tape recorded. Notes, were made after each interview; from which key themes were jotted down.

3.4.4 Observation

In addition researchers used observation as one of the data collection methods in which. they observed the stored groundnuts and types storage facilities "*vihenge*". Furthermore, the resaerch team observed a typical market day at Urambo district market place; were groundnuts seen parked in sacks ready for selling. Each sack comprised of six tins. In this market place groundnuts are normally sold in sacks without weighing. Very few groundnuts sellers sold unshelled groundnuts by weighing them in kilogrammes.

3.4.5 Documentary Review

This method was employed to gather secondary information which otherwise could not be gathered using other methods. The information obtained consisted of number of growndnuts growers and non-groundnuts growers, number of inhabitants in each village as well as the population size of the district and its growth rate which were obtained from district reports and village records. Other vital document reviewed was the poverty and human development report of 2011. The document was useful in triangulating information regarding poverty and livelihood status in the country.

3.5 Data Analysis Techniques

The gathered information were analysed using Statistical Package for Social Sciences (SPSS), as well as Microsoft Office Excel 2007. Descriptive statistics such as mean, mode, range, sum, frequencies, percentages, maximum, minimum, variance and standard deviations were generated and then employed to examine the process of land acquisition, ownership and utilization amongst smallholder farmers. These statistics were further used to analyse the nature and process of groundnuts production in the study area and determine and document type of groundnuts processing and value addition mechanisms. In addition, the generated statistics were employed to examine land tenure systems practiced in the study area. ANOVA was used to examine variations in quantity of groundnuts harvested between various land tenure systems. To determine the contribution of groundnuts production on overall household income of a smallholder farmer, descriptive statistics and gross margin analysis were used. A multivariate regression technique was applied to identify and document socio-economic factors influencing groundnuts production in the study area.

3.5.1 Model Specification

There are several ways of specifying the production function. In a general mathematical form, a production function can be expressed as:

$$Y = f(X_1, X_2, X_3, ...X_n) ....(1)$$

where,

$Y =$ output

$X_1, X_2, X_3, ...X_n =$ inputs

This general form does not encompass joint production (that is a production process, which has multiple co-products) or outputs (Heathfield, 1971). The model has the left hand side which specifies the dependent variable Y for groundnuts output depending on an array of factors, or explanatory variables known as independent variables. Using an equation usually implies continual variation of output with minute variation in inputs, which is simply not realistic. Fixed ratios of factors, as in the case of labourers and their tools, might imply that only discrete input combinations, and therefore, discrete maximum outputs, are of practical interest (Shephard, 1970). In its estimated form, the model can be represented as:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + ...\beta_n X_n ....(2)$$

where,

$\alpha, \beta_1 - \beta_n =$ are coefficients or parameters that are quantitatively determined empirically.

The effects of multicollinearity was tested using Variance Inflation Factor (VIF). Multicollinearity is a statistical phenomenon in which two or more predictor variables in a multiple regression model are highly correlated (Farrar and Glauber,1967, O'Brien, 2007; Hollar, 2010). In this situation the coefficient estimates may change erratically in response to small changes in the model or the data. The variance inflation factor (VIF) test is regarded as one of the most rigorous diagnostic tests for multicollinearity in the regression model (Belsley, Kuh, and Welsch, 1980). Multicollinearity is a problem if the VIF is greater than 10 (Belsley, Kuh, and Welsch 1980; Wooldridge, 2001). The VIF test shows that all the variance inflation factors are smaller than 2, indicating that there is no serious multicollinearity problem. Therefore all variables with VIF of 10 and above were not included in the model. Bearing that in mind and on the basis of equation 2, the following model was estimated:

$$Y = \alpha + \beta_1 HHS + \beta_2 FMS + \beta_3 SEX + \beta_4 CRD + \beta_5 PRI + \beta_6 MRK + \beta_7 EDC + \beta_8 CIP + \beta_9 AGE + \varepsilon + \text{.....(3)}$$

where,

Y = Quantity of groundnuts produced (kg./acre)

HHS = Household size (Number of adults aged 18-60 in a household)

FMS = Cultivated farm-size (acres)

SEX = Sex of a farmer (dummy: 1 = male, 0 = female)

CRD = Availability of credit (measured as amount of money in Tshs a smallholder farmer received as credit)

MRK = Market access (dummy: 1 = if a farmer has access to the market; 0 = if a farmer has limited access to the market)

PRI = Previous year's Price of groundnuts in (Tsh. kg-1.)

EDC = Education level of a farmer (measured as number of years a farmer spent schooling)

CIP = Costs of inputs in Tshs

AGE = Age of a farmer in years

ε = Error term

$\beta_1 - \beta_n$ = Regression coefficient to be estimated

α = constant term.

3.5.2 Gross Margin Analysis

Gross margin analysis was used to assess the profitability of various major crops produced in the district. Gross margin or Gross margin ratio or gross profit margin ratio is the ratio of gross profit of a business to its revenue (Aburajab-Tamimi and AlQouqa, 2009). Gross profit margin ratio is calculated as follows:

Gross profit margin ratio = $\frac{Gross\ \Pr ofit}{\Re evenue} x100$ ……..1

In this study, gross profit was calculated as Total Average Annual Earnings (TAAE) from sales of a crop in Tshs minus Total Average Cost (TAC) of inputs in Tshs used in growing a particular crop. Therefore, the formula for calculating gross profit margin ratio for various crops was estimated as:

Gross profit margin ratio = $\frac{TAAE - TAC}{TAAE} x100$ ……..2

Where,

TAAE = Total Average Annual Earnings from Sales of a Crop in Tshs.

TAC = Total Average Cost of Inputs in Tshs.

Crops grown in the area include groundnuts, maize, sorghum, millet, cassava, sweet potatoes, fruits, vegetables, tobacco, beans, sunflower, rice, and sugarcane. Out of these crops; maize, tobacco, groundnuts, cassava, beans, vegetables, sweet potatoes and rice are main crops grown by many farmers. In order to perfom gross margin analysis total average cost of inputs such as seeds (Shs/kg), fertilizer (Shs/kg), chemicals (Shs/kg), pesticides (Shs/kg) and farm implements were first estimated. Then total average annual earning from sales of a particular crop (Shs/Kg) was estimated. Value of the yields were estimated using the market price of the season in which crops were grown. The cost for using family labour was not considered in an equation due to complexity involved in its calculations.

3.6 Apriori Expectations

Household size (number of adult aged 18-60) was included in the model to establish how it influenced the scale of groundnunt production in the study area. It was hypothesised that as household size increases, yields also increseases. That is so because in smallholder farming (or farming under peasantry system) the household is the major source of labour (Doss, 1999; Mendola, 2007), and therefore, the larger the household-size the more the labour force and therefore the larger the land to be cultivated. With large land cultivated, one would expect more yields.

Cultivated farm-size (in acres) was expected to influence yields. The larger the farm size the more the yields. Onaiah *et al.* (2007) found that farm size significantly increased output of sweet potato. Based on these findings, the author recommended that for farmers to increase their output of sweet potato significantly, they should employ and manage efficiently, labour resource and increase land under cultivation (farm size) with the limited amount of capital resource at their disposal.

Sex of a farmer was included in the model as dummy variable and was measured as, 1 if the farmer was a male and 0 if a farmer was a female. It was hypothesised that, yields correlates with the sex of a farmer. As Doss (1999) clearly put it, as farm size increases, women (on a per capita basis) allocate more labour to both household maintenance and agriculture, while men work slightly less in agriculture and much less in non-agricultural activities.

Concerning availability of credit it was assumed that, the more the amount of credit a farmer receives the more the yields. This is because, the availability of credit to smallholder farmers is always crucial to enable them acquire farming implements, better varieties of seeds, and farming inputs. According to Chirwa (2002) access to credit alleviates capital constraints on households by enabling them acquire inputs for investments that they would otherwise not afford. Diagne and Zeller (2001) observe that access to credit also reduces the opportunity costs of capital-intensive

assets in relation to family labour, thus encouraging labour-saving technologies and raising labour productivity.

Market access was another dummy variable and it was included in the model as, 1 if a farmer had access to the market; and 0 if a farmer had limited access to the market. It was further assumed that, market access positively influenced groundnuts yields. Simtowe *et al.* (2009) argue that the livelihoods of rural farmers are most often constrained by poor access to markets. Indeed, improving access of rural farmers to markets enhances the ability of resource-poor rural farmers to diversify their links with markets. Minten, (1999) argue that good market access is one of the factors that influence price levels.

Concerning the effects of previous year's price on yields it was assumed that, higher price of the previous agricultural season will induced farmers to produce more the following season in order to get more profit. Hence, the higher the previous year's price the more the yields. This actually follows the laws of demand and supply which entails that quantity supplied correlates positively with price while quantity demanded correlates negatively with price. However due to time lag in farmers responsiveness to changes in product price, previous year price is taken to be a good guide to farmers production decisions in current year.

Education of a farmer was also included in the model to test the extent it affects yields and it was measured using number of years a farmer spent schooling. It was assumed that, the higher the level of education a farmer has the more the yields. According to Weir (1999), education may have both cognitive and non-cognitive effects upon labour productivity. Cognitive outputs of schooling include the transmission of specific information as well as the formation of general skills and proficiencies. Education also produces non-cognitive changes in attitudes, beliefs and habits. Increasing literacy and numeracy may help farmers to acquire and understand information and to calculate appropriate input quantities in a modernizing or rapidly changing environment. Improved attitudes, beliefs and habits may lead to greater willingness to accept risk, adopt innovations, save for investment and generally to embrace productive practices.

It was important to include the costs of inputs in the model because inputs may affect yields. It was hypothesised that, cost of inputs affects negatively the groundnuts yields. The higher the costs of inputs the lower the yields. This is because, smallholder farmers with low capital in most cases can not afford to pay for higher prices.

Age of a farmer was hypothesised to affect yields positively. As farmers' age increases yields also increases. This is because aged farmers have accumulated huge experience about the crop and therefore, are capable of managing well the crop hence get more output. According to Doss (1999) in women dominated smallholder farming where the household is a major source of labour, age of farmers significantly affect the farmers' annual output. For more details see Table 1.

Table 1: Variables

S/No.	Variable	Code	Unit	Scale	Category	Expected significance
1	Yields	Y	kg/acre	Ratio	Dependent	
2	Household Size	HHS	Number of Adults	Ratio	Independent	Positive correlation
3	Farmsize	FMS	Acre	Interval	Independent	Positive correlation
4	Sex	SEX	dummy: 1 = male, 0 = female	Nominal	Independent	Positive correlation
5	Credit	CRD	Tsh	Ratio	Independent	Positive correlation
6	Market Access	MRT	dummy: 1= access; 0 = if no access	Nominal	Independent	Positive correlation
7	Previous year price	PRI	Tsh/kg	Ratio	Independent	Positive correlation
8	Education Level	EDC	Number of years	Ratio	Independent	Positive correlation
9	Costs of inputs	CIP	Tsh	Ratio	Independent	Negative correlation
10	Age of a farmer	AGE	Number of years	Ratio	Independent	Positive correlation

Source: *Authors' own construction*

3.7 Ethical Consideration

This study considers ethical issues as advocated by Driscoll and Brizee (2012). In social science research, a code of ethical principles requires researchers to obtain informed consent from all respondents, protect respondents from harm and discomfort, treat all information confidentially; and explain the experiment and the results to the respondents afterward.

3.8 Limitations of the Study

This study encountered a number of methodological and researcher limitations which if not addressed would have affected the validity of the research findings. The limitations were:

(i) Self-reported data

This study relied on information provided by the respondents. These self-reported data were limited by the fact that they could rarely be independently verified. In other words, researchers had to record what people said, whether in interviews, focus group discussions, or on questionnaries, at face value. However, these data contain potential sources of bias that should be noted as limitations. One of them is selective memory, that is, remembering or not remembering experiences or events that occurred at some point in the past such as previous years price or yield.

Another limitation that was noted within this category is attribution. It is the act of attributing positive events and outcomes to one's own agency but attributing negative events and outcomes to external forces. For example, high yields were attributed to household's good performance and hard working while low yields were attributed to government failure to provide extension services and subsidies. Furthermore, exaggeration was also noted. It is the act of representing outcomes or embelishing events as more significant than is actually suggested from other data.

These limitations were overcomed through triangulation method in which village and district level records were gathered for verification of some data from respondents. In addition to this the few available extension officers were also consulted. Other methods used to verify the validity of the information provided by individual respondents were focus group discussions and key informant interviews.

(ii) Access

This study depended on access to the household head. In some cases, the households head were not available or not easily accessible for whatever reason. This was solved by interviewing a spouse if the household head was married. In case the head of household was single or both head of household and spouse were not available, researchers opted for another household.

(iii) Being viewed as government officials

In some cases researchers were viewed as government agents and therefore respondents requested them to provide solutions to their problems such as poor roads, low prices, limited access to clean and safe water, high primary school drop-outs to name just a few. To overcome this, researchers requested the Village Executive Officer (VEO) to accompany them to the respondents' households and explain the role of the researchers.

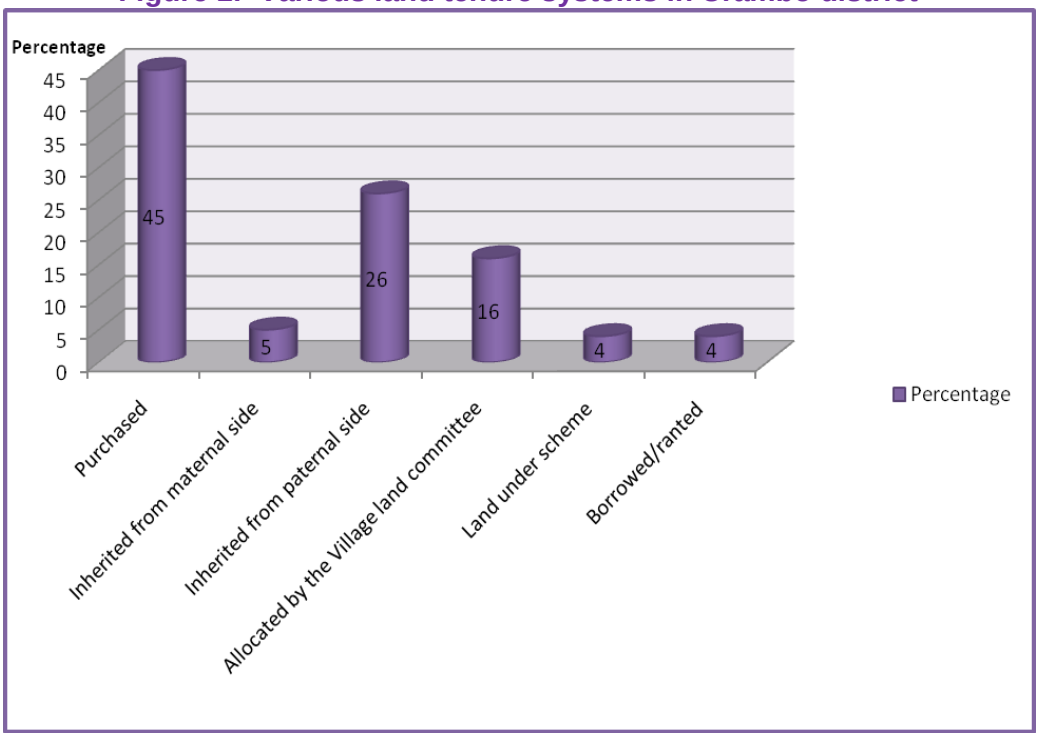
4.0 RESULTS AND DISCUSSION

4.1 Land tenure systems commonly practiced in the study area

Most smallholders (45%) in Urambo district purchased their land as compared to 26 % who acquired land through inheritance from paternal side and 16 % of respondents who acquired land through the village land committees. Importantly, it was observed that, most of the smallholder farmers in Urambo district acquired land through customary rights of occupancy. Various land tenure systems practised in the study area are illustrated in Figure1. Basically, there are two ways in which a person can own or acquire land in Tanzania. One is through “granted right of occupancy” and the other is through “customary right of occupancy”. Nevertheless, both of these two ways are legally restricted to Tanzania citizens only (LRRRI, 2011). However, there is a third way, that is, investing, which accommodates non-citizens’ land acquisition.

The Tanzania Investment Centre has listed five forms in which a foreign investor may occupy land in Tanzania. They include: derivative rights under Section 20(2) of the Land Act 1999; application to the Commissioner for Lands for grant of right of occupancy under Section 25 (1) (h) and (i) of the Land Act 1999; sub-leasing from private sector; licensed from the Government; and lastly, purchase from other holders of granted right of occupancy (URT, 2010b). Under this Act 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 in the Minister responsible for Lands, Commissioner of Lands and the land administration system revolving around that office. Under this system, the land user briefly owns the land rights and developments made 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).

Figure 1: Various land tenure systems in Urambo district



Source: Survey data, 2010

Multiple comparisons were performed using ANOVA Tukey HSD to test whether there was any statistically significant difference in quantity of groundnuts harvested between and within various land tenure systems. Results showed that there were no statistically significant difference in terms of quantity of groundnuts harvested within and between various land tenure systems. For example, there was no statistically significant difference in quantity of groundnuts harvested under purchased land and quantity of groundnuts harvested when growing groundnuts using inherited land from either paternal (p-value = .662) or maternal side (p-value = .979). Likewise, there was no statistically significant difference in quantity of groundnuts harvested using village land and quantity of groundnuts harvested when growing groundnuts using purchased (p-value = .997), borrowed or rented land (p-value = 1.000). These findings were tested at 95% confidence Interval. More results on multiple comparisons are presented in Table 2.

Table 2: Multiple comparisons

Tukey HSD

(I) Land tenure system	(J) Land tenure system	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Purchased	Inherited from maternal side	-1.45159	2.01660	.979	-7.2267	4.3235
	Inherited from paternal side	-1.52675	1.01488	.662	-4.4332	1.3797

(I) Land tenure system	(J) Land tenure system	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
					Lower Bound	Upper Bound
	Village land	-.56964	1.19011	.997	-3.9779	2.8386
	Land under scheme	-.88214	2.12781	.998	-6.9758	5.2115
	Borrowed/ranted	-.63714	1.74189	.999	-5.6256	4.3513
Inherited from maternal side	Purchased	1.45159	2.01660	.979	-4.3235	7.2267
	Inherited from paternal side	-.07516	2.08281	1.000	-6.0399	5.8896
	Village land	.88194	2.17358	.999	-5.3428	7.1067
	Land under scheme	.56944	2.79923	1.000	-7.4470	8.5859
	Borrowed/ranted	.81444	2.51839	1.000	-6.3977	8.0266
Inherited from paternal side	Purchased	1.52675	1.01488	.662	-1.3797	4.4332
	Inherited from maternal side	.07516	2.08281	1.000	-5.8896	6.0399
	Village land	.95711	1.29915	.977	-2.7634	4.6776
	Land under scheme	.64461	2.19067	1.000	-5.6290	6.9182
	Borrowed/ranted	.88961	1.81814	.997	-4.3172	6.0964
Village land	Purchased	.56964	1.19011	.997	-2.8386	3.9779
	Inherited from maternal side	-.88194	2.17358	.999	-7.1067	5.3428
	Inherited from paternal side	-.95711	1.29915	.977	-4.6776	2.7634
	Land under scheme	-.31250	2.27715	1.000	-6.8338	6.2088
	Borrowed/ranted	-.06750	1.92146	1.000	-5.5702	5.4352
Land under scheme	Purchased	.88214	2.12781	.998	-5.2115	6.9758
	Inherited from maternal side	-.56944	2.79923	1.000	-8.5859	7.4470
	Inherited from paternal side	-.64461	2.19067	1.000	-6.9182	5.6290
	Village land	.31250	2.27715	1.000	-6.2088	6.8338
	Borrowed/ranted	.24500	2.60830	1.000	-7.2247	7.7147
Borrowed/ranted	Purchased	.63714	1.74189	.999	-4.3513	5.6256
	Inherited from maternal side	-.81444	2.51839	1.000	-8.0266	6.3977
	Inherited from paternal side	-.88961	1.81814	.997	-6.0964	4.3172
	Village land	.06750	1.92146	1.000	-5.4352	5.5702
	Land under scheme	-.24500	2.60830	1.000	-7.7147	7.2247

Dependent Variable: Yields Kg/Acre

4.2 Nature and Process of Groundnuts Production in the Studied Area

An average of 7 bags equivalent to 171 kg/ha of groundnuts were harvested per annum from each groundnut growing household. This could imply that groundnuts production per unit area is low as compared to the minimum production of local

varieties. Bucheyeki *et al.* (2010) established that local varieties produce between 499 kg/ ha and 772 kg /ha.

The study further revealed that, out of the harvest 4 bags equivalent to 98kg are consumed at the household level. Moreover, part of the harvest was retained as seeds for the following farming season. Statistics show that 3 bags (73) kg of groundnuts were being sold after harvest. In part, the results have also showed an average market price of Tshs. 7,372 of shelled groundnuts, and an average of Tshs. 6,326 as market-price of the unshelled groundnuts per bag. This could mean that the price of the shelled groundnuts was relatively high compared to shelled groundnuts. This rate of price shows that there was a difference of only Tshs. 1,045.50 (about 14%) between processed and unprocessed groundnuts which could not induce farmers to process their produce.

On average, the distance from farmers' homes to the selling points was 2 km, which means there were shorter distances from farmer's homes to respective market-places. There was no evidence whatsoever, to verify that farmers took trouble to search for better markets elsewhere, other than waiting for buyers at their homes. The implication was that, farmers were not always aware of the market situation in distant markets in town. Otherwise, some few needy farmers could only go to market places by just using simple transportation facilities such as bicycles to transport small amounts of groundnuts from their homes to the nearby selling points. More results on groundnut farming are provided in Table 3.

Table 3: Details about groundnuts farming (n = 270)

Variable	Max.	Mini.	Range	Mean	Mode	Median	Sum
Quantity harvested (bags)	70	0	70	7	4	4	2746
Quantity consumed (bags)	72	0	72	4	0	2	1676
Quantity sold (bags)	31	0	31	3	2	2	1078
Price shelled g/nuts (Tshs/bag)	42000	12000	30000	7372	0	18000	6948479
Price of unshelled g/nut (Tshs/bag)	35000	0	35000	6327	0	3500	2530603
Farm gate price of g/nut in Tshs	35000	0	35000	5001	0	1500	2000302
Distance (km) to selling point	90	0	90	2	0	0	650
Cost of seeds TSH/bag	240000	0	240000	15075	0	10000	6029808
Cost of inputs in Tshs	700000	0	700000	8270	0	0	3308000

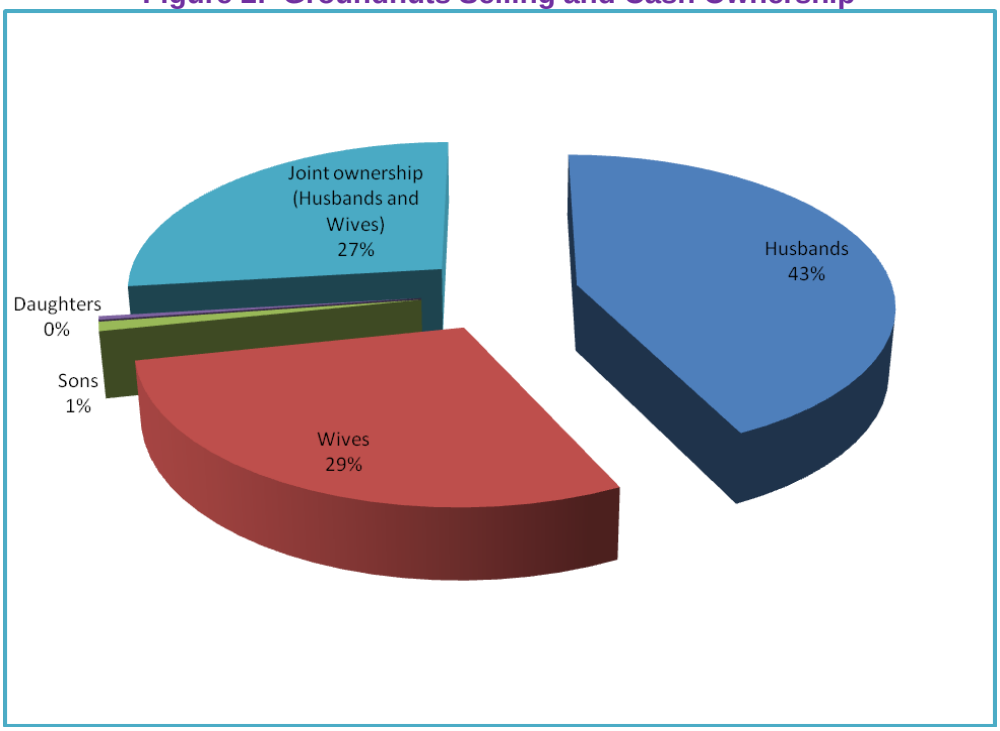
Source: Survey data, 2010.

Findings also show that on average, the cost of seed per bag and the cost of other inputs were Tsh. 15,075 and Tsh. 8,270 respectively. Responses from FGDs showed that the majority of farmers preferred to use part of their produce as seeds, rather than buying. This tendency of apportioning previous produce as seeds for the coming season might have compromised the quality of seed varieties and quantity of yields. The reason is that, in most cases the quantity of yield is determined, among other things, by the quality of seed variety (Bucheyeki *et al.,* 2010). On the other hand, responses from FGDs revealed that most of groundnuts farmers did not buy farm inputs. Few groundnuts farmers used farm inputs such as fertilizers and pesticides; which were meant for tobacco production. Thus, those who could not afford to grow tobacco failed to get inputs, because inputs were normally provided for tobacco production.

In relation to groundnuts selling and cash ownership, 43% of respondents reported that husbands were responsible for selling groundnuts and owning the proceeds. Less than a third (29%) of interviewed household heads reported that wives were responsible for selling and owning the proceeds. In addition, 27% reported joint ownership of cash as well as selling the produce (Fig. 2). In part, these outcomes show a sort of gender inequality in cash ownership, revealing that women were largely responsible for the cultivation of land and growing of the crops; but when it came to selling, husbands took over the business from their wives.

Apart from exploiting the real growers (females) this situation did not provide fair chances of reinvesting the same money into groundnuts production. The reason would be that, men might use the whole money, or a greater part of it on non-farm activities. This might be one of the factors limiting expansion of groundnuts farms in the area. This finding supports the study by Hay and Stichter (1984) who observed that in most of the African settings, women have no rights to own property like land. According to the author, men not only need women to bear children but also for economic motives. Married women are required to perform economic functions on their husband's farms. But the proceeds of the produce are taken by men (Hay and Stichter, 1984).

Figure 2: Groundnuts Selling and Cash Ownership



Source: Survey data, 2010

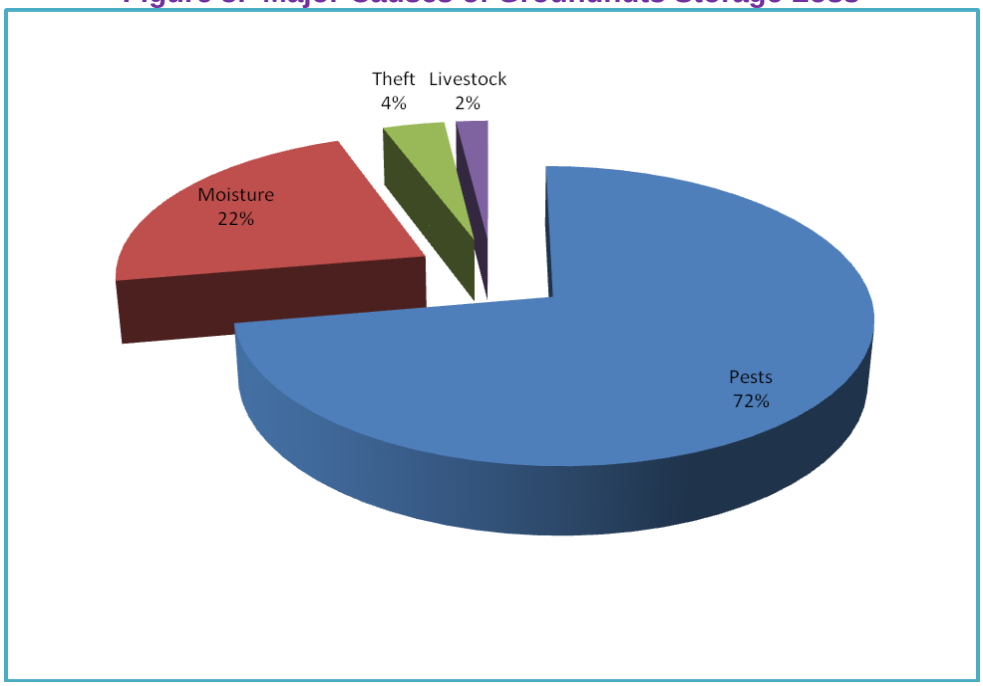
Analysis on the major cause of groundnuts storage loss revealed that pests accounted for 72.2% of the loss, moisture contents caused 22.2%, and theft caused 3.7% of the total loss, while livestock destruction caused 1.9 % loss. The majority of respondents reported that, they reserved one room in their houses for storing their harvest. Other farmers stored their harvests in the traditional store refered to as '*Kihenge*'. This is a locally constructed (grain-shed) facility for storing harvests and it is normally built outside the house. These findings are in line with those by Nautiyal (2002) who observed that farmers generally have inadequate storage facilities, and use their houses to keep bags of groundnuts over long periods of time.

It can thus be noted that pests caused the major part of the storage loss in the study area. Literature shows that groundnuts is susceptible to distruction by a number of pests and diseases that can cause considerable after harvest losses (Ntare *et al.,* 2007). Various pests attack groundnuts and groundnuts products in stores, generally causing severe damage. Approximately 6 to 10% of the groundnuts kernels stored in bags are destroyed by insects (Nautiyal, 2002). Nautiyal (2002) noted that in order to estimate losses, the quantity- as well as quality-losses should be considered.

Moisture was cited as the second major cause of harvested groundnuts loss. The reason was that; for groundnuts to stay safe and longer in a storage facility; there is need to maintain allowed temperature level that groundnut require to maintain its quality. But, it was noted that farmers did not have clear understanding of this scientific norm to keep their crops, and thus could not always adhere to it. What they

knew about, was to protect crops from moisture but not by how much. More results on groundnuts storage loss are detailed in Figure 3. Ellis (1998) observes that: seeds stored at higher temperatures (50°C) and moisture content of 10.1% deteriorated faster compared to other treatments and complete loss of viability occurred within 10 days in both air- and vacuum-sealed conditions. According to Nautiyal, (2002) smallholder farmers store groundnuts in-shell, in earthen pots, mud bins, bamboo baskets or in other types of wicker receptacles. These containers are often plastered with mud and cow dung with little or no use of pesticides.

Figure 3: Major Causes of Groundnuts Storage Loss



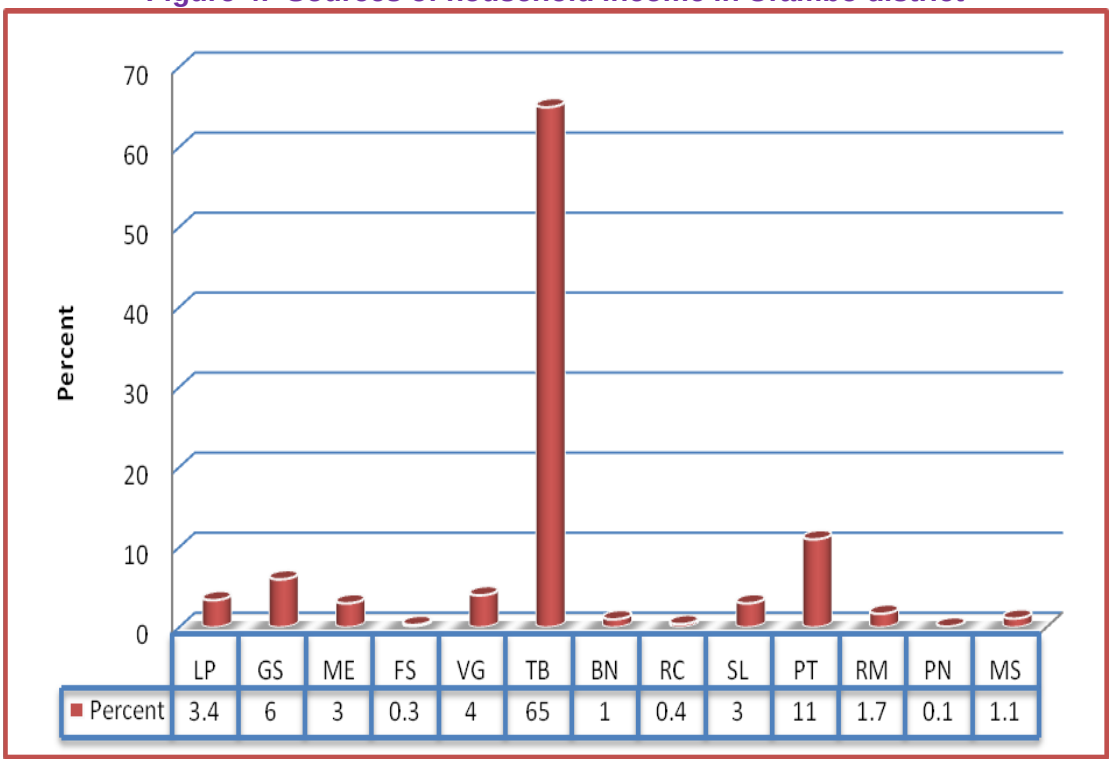
Source: Survey data, 2010

4.3 Contribution of groundnuts production on overall household income

4.3.1 Comparing proportion of the total household income

Sources of household income in the study area were identified, where tobacco production contribute 65%, petty-trading (11%) and groundnuts production (6%). Others, include vegetable production which contribute 4%, livestock and livestock products (3.4%), maize production (3%) as well as salary and wages (3%). Income from other sources like remittances contributed only 1.7% of household income per year. That was followed by beans production and masonry which contributed to 1% each. Rice, fruits and old age pension contributed 0.4%, 0.3% and 0.1% respectively. These results imply that farming is the major income earning activity in the area. More details on income sources are provided in Fig.4.

Figure 4: Sources of household income in Urambo district



Source: Survey data, 2010

Note: *LP = Livestock and livestock products;GS = Groundnuts; ME = Maize; FS =Ftuits; VG = Vegetables; TB= Tobacco; BN = Beans; RC = Rice; SL= Salary and wages; RM = Remittances; PT = Petty - trading; PN = Pension; MS = Masonry*.

4.3.2 Gross margin analysis

Results for gross margin analysis revealed that beans was the most profitable crop and scored the highest gross profit margin ratio of 87.04 while rice ranked second with gross profit margin ratio of 82.70. Likewise, groundnuts ranked third among the most profitable crops in the district with gross profit margin ratio of 77.19. Even if farmers perceived tobacco to be the most profitable crop in the area, gross profit margin ration indicates otherwise. Tobacco scored a gross profit margin ratio of 46.10 and ranked number eight among major sources of income. The major reason being the high cost of inputs involved in growing the crop. Tobacco requires more inputs such as fertilizers, agro chemicals, pesticides and farm implements than any other crop in the district. More on gross margin analysis are presented in Table 4.

Table 4: Gross margin analysis of selected crops in the study area

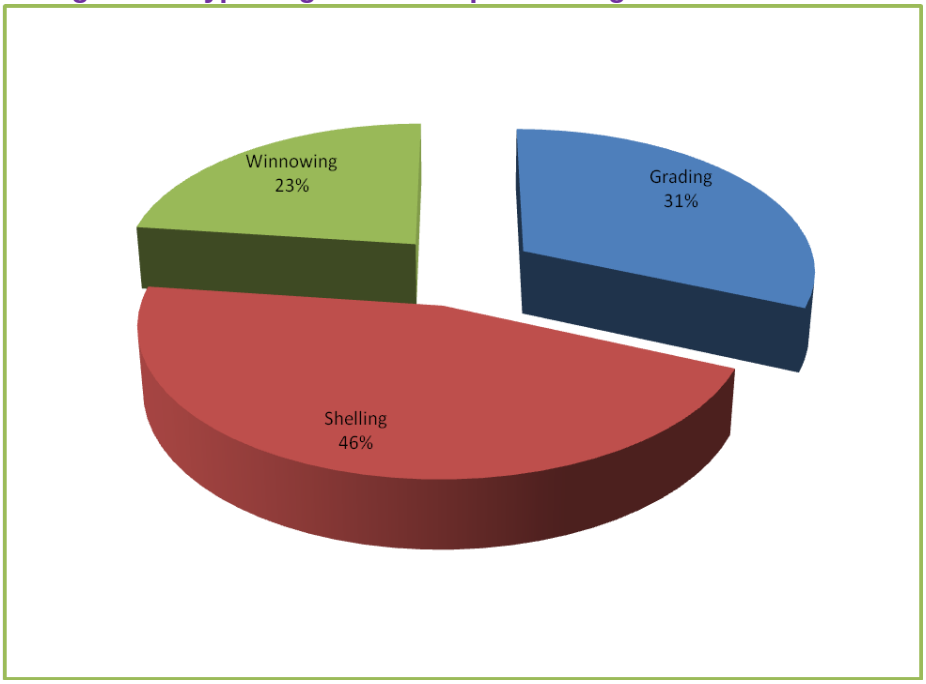
Crop	N	Total Average Cost of Inputs in Tshs	Total Average Annual Earnings from Sales of a Crop in Tshs	Gross Profit Margin Ratio
Groundnuts*	270	43,554.00	190,915.75	77.19
Maize*	400	55, 618.54	141,073.93	60.57
Sorghum	112	25, 214.67	35,390.00	28.75
Millet	47	16,234.40	23,430.00	30.71
Cassava*	263	5600.00	11,086.47	49.49
Sweet Potatoes*	147	6,760.27	12,528.75	46.04
Fruits	69	18,672.10	34,972.50	46.61
Vegetables*	179	20,321.00	60,316.29	66.31
Tobacco*	300	547,238.46	1,015,314.51	46.10
Beans*	245	15,876.87	122,500.50	87.04
Sunflower	92	9,235.00	16,402.51	43.70
Rice*	136	20, 219.30	116,862.50	82.70
Sugarcane	74	2,087.00	4,765.00	56.20

Source: Computation from survey data, 2010; * Major crop

4.4 Groundnuts processing and value addition mechanisms

Only 35 (13%) groundnuts farmers out of 270 reported to have been processing their farm products. About 46% of respondents mentioned shelling as the main method they used to process and therefore to add value to the produce. Others (32%) reported grading as main method of groundnuts value-addition. Twenty three percent (23%) of the respondents used winnowing as method of groundnuts-processing. Figure 5 presents the findings. Unlike grading and winnowing, shelling require less concentration and supervision and therefore all household members, including children could help in the exercise. Nautiyal, (2002) maintains that shelling or decortications is a major method of groundnuts value addition. According to Akobundu (1998), farmers feel a need for value-adding in order to increase their revenue from sale of their output. Being that the official marketing channels only accept unshelled groundnuts, farmers seeking value addition must sell on the open markets, thereby further reducing the volume that moves through official channels.

Figure 5: Type of groundnuts processing for value addition



Source: Survey data, 2010

With regards to the factors limiting groundnuts processing, the study indicates that 15% of respondents reported inadequate knowledge to operate shelling-machines as the reason for unprocessed groundnuts, 31% of respondents reported limited technology as a problem, whereas 11 % said that customers preferred unprocessed groundnuts. Furthermore, 29% reported shortage of capital to purchase necessary equipment as a limiting factor. Fifteen percent of respondents reported that the selling price for the processed products did not cover cost of production, and therefore, it did not provide incentives to process the groundnuts. In addition, number of counts exceed the sample size because of multiple response effect, that is, a respondent had an opportunity to pick more than one response. For more details see Box 1.

Box 1: Factors limiting groundnuts processing in Urambo district

Category label	Code	Count	Pct of Responses	Pct of Cases
Lack of knowledge to operate the machine	1	120	15.2	39.0
Lack of technology/machines	2	244	30.9	79.2
Customer prefers unprocessed products	3	85	10.8	27.6
Lack of capital to purchase machines	4	221	28.0	71.8
Price for processed products is not attractive	5	119	15.1	38.6
		789	100.0	256.3

4.5 Socio-economic factors influencing groundnuts production in the study area

Regarding issues of multicollinearity Hollar (2010) suggests small tolerance values of less than 0.100 or VIF of greater than 10 for the variable under investigation should not be entered into the regression model. All variables under investigation had tolerance values greater than 0.100 and a VIF of less than 10 tolerance values ranged from 0.806 to 0.984 and VIF values ranged from 1.016 to 1.241.

Results show that, sex of a farmer did not affect groundnuts yield. These results were tested at $p < 0.05$ and produced a non-statistically significant results, that is, β=.094, t-value = 1.834, p-value = .067. However, the positive β coefficient suggest a positive relationship between sex of a farmer and groundnuts yield. This is due to the fact that groundnuts growing in the surveyed area is considered a women activity. Nautiyal (2002) reports that most of the post-harvest activities such as: picking; drying; threshing and shelling are traditionally performed by women.

Effect of age on yield was tested at $p < 0.05$ and produced β = .010, t-value =.182, p-value =.855. These results were not statistically significant. Besides, the positive β coefficient suggest a positive relationship between age of a farmer and the quantity of groundnuts harvested. This might be true as age is considered a proxy-determinant for experience. This is because, mature farmers have accumulated more experience and knowledge about crop farming hence, they stand a high chance to avoid mistakes that could lead to low yield.

The study also tested ($p< 0.05$) whether education level of a farmer had any effect on groundnuts yield a particular farmer harvested. Findings show a non-statistically significant result with β = .030, t-value =.554 and p-value =.580. The positive β coefficient suggests a positive correlation between education level of farmer and groundnuts yield. This means farmer's education is not a good predictor of the groundnuts yield. Findings relate to Appleton and Balihuta (1996) who found that in the two surveys they conducted education was not found to be significant in either.

The farmers' household size positively correlates with yield. However, these resuts were not statistically significant at $p< 0.05$ with β = .035, t-value = .686 and p-value = .493. The weak statistical correlation between household size and yield shows that household size is a weak predictor of yield harvested. However, the coefficient (β) is positive, which signifies a positive correlation between household size and quantity of groundnuts harvested. Although not statistically significant, the result support the study hypothesis because in smallholder farming the household is a major source of

labour, and the more the labour the large the land cultivated and the more the harvest, other factors remaing the same.

The effect of previous year's price on groundnuts yield was tested at p<0.05 and produced a highly statistically significant results of β = .190, t-value = 3.933 and p-value = .000. These results indicate the positive correlation between price of previous year and the quantity of groundnuts harvested. That is, the higher price of the previous year induced farmers to produce more the following year. These results supports the hypothesis related to price and was somewhat expected. However, these study-findings depict what economic principles suggest, that is, the higher the price of the product the more the supply of that product. This is naturally true because when the price of a product increases; sellers perceive more profits, and thus increase production. But, in turn, the perceived increase in price also turns to affect quantity demanded.

Effect of credit availability on yield of groundnuts was also tested at p<0.05 and produced a non- statistically significant results β = -.036, t-value =-.741, p-value = .459. Besides, the coefficient (β) is negative indicating that access to credit negatively correlates with the quantity of groundnuts harvested. Desipte the non-statistically significant result, access to credit is very important for smallholder farmers to alleviate capital constraints by enabling them acquire inputs in production improvement that they would otherwise not afford. Diagne and Zeller (2001) observe that access to credit also reduces the opportunity costs of capital-intensive assets in relation to family labour, thus encouraging labour-saving technologies and raising labour productivity.

There were no statistically significant correlation between market access and groundnuts yield. This correlation was tested at p < 0.05, β=.057, t-value = 1.145 and p-value =.253, which indicate that yields was not influenced by the availability of markets or buyers. This result might be true because groundnuts farmers, like any other business-people, are interested in maximizing profit. A person cannot necessarily maximize profit just because buyers are many, but largely where the selling-price is considered to make a breakeven for costs and at least provide a marginal profit. It means it has to be above the production costs including transportation. One way of improving access to markets is to increase proximity of farmers to marketing points.

The study also tested (p<0.05) whether land size cultivated had any effect on quantity of groundnuts harvested. The analysis produced a highly statistically significant findings β=.190, t-value = 3.746 and p-value =.000. Moreover, the coefficient is positive which suggests a positive association between cultivated land

size and quantity of groundnuts harvested. Which means land cultivated is mostly associated with production per unit area other factors kept constant. These findings supports the study hypothesis and imply that cultivated land size is a good predictor of quantity of harvested groundnuts.

The study was also set to establish (at $p< 0.05$) whether or not costs of inputs a particular farmer incurred had any effect on quantity of harvested groundnuts. The results were not statistically significant at β = -.003, t-value = -.067and p-value =.946. The negative coeffient suggest a negative correlation between cost of inputs and quantity of harvested groundnuts. This is because, cost of inputs may affect farm size, assuming that farmers will cultivate a farm size which they can manage with little inputs they have this in turn may reduce the harvested quantity. These findings, support the study hypothesis about costs of inputs. A summary of final regression results for socio– economic factors influencing groundnuts production in the study area are presented in Table 5.

Table 5: Socio-economic factors influencing groundnuts production in Urambo district

Variable	Unstandardized Coeficients		Standardized Coefficients	t-value	p-value	95.0% Confidence Interval for β		Collinearity Statistics	
	β	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
(Constant)	.340	2.122		.160	.873	-3.832	4.512		
Sex of a farmer	1.626	.886	.094	1.834	.067	-.117	3.368	.876	1. 141
Age of a farmer	.006	.031	.010	.182	.855	-.056	.067	.834	1. 199
Education(years)	.085	.154	.030	.554	.580	-.217	.388	.806	1. 241
Household size	.141	.206	.035	.686	.493	-.264	.546	.901	1. 110
Previous year price (Tshs/kg)	.000	.000	.190	3.933	.000	.000	.000	.984	1. 016
Credit in Tshs	-5.700E-007	.000	-.036	-.741	.459	.000	.000	.963	1. 039
Market access	1.123	.981	.057	1.145	.253	-.805	3.051	.942	1. 061
Cultivated land size in acres	.364	.097	.190	3.746	.000	.173	.555	.900	1. 111
Costs of inputs in Tsh	-8.826E-005	.001	-.003	-.067	.946	-.003	.002	.979	1. 022

Dependent Variable: Yield in Kg/Acre

5.0 SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

5.1 Summary

Groundnuts is worldwide important annual legume. It is mainly grown for oilseed, food, and animal feed. Groundnuts is the 13th most important food crop of the world. It is the world's 4th most important source of edible oil and 3rd most important source of vegetable protein. Despite its worldwide importance, its production fluctuates highly. This study surveyed the socio-economic factors that affect the level of groundnuts production in Urambo district, Tabora region. Ostensibly, it was set to identify limiting factors that amount to declining production of the crop overtime. Major findings indicate that:

- purchasing was the most preferred method of land acquisition by smallholder farmers in the study area as compared to others such as inheritance;
- very few women own land as compared to men;
- most smallholder farmers cultivate small pieces of land that they can manage athough huge piece of land is available;
- groundnuts in Urambo is produced mostly for household consumption;
- groundnuts in the study area is sold at low prices compared to tobacco and rice;
- very few groundnuts farmers do process their produces; major factors mentioned include limited technology, customers' preference for unprocessed groundnuts, shortage of capital to purchase necessary equipment and low selling price which does not cover cost of production;
- sex of the farmer, cultivated land size and price of the previous season, significantly limit groundnuts production in the area;
- groundnuts is the third most profitable crop after beans and rice which were ranked first and second respectively in terms of gross profit margin; however, farmers reported limited extension services and availability of inputs as problems limiting production of the crop;
- most farmers in Urambo district did not complete seven years of primary schooling.

5.2 Conclusions

In view of the above major findings it can be concluded that, most smallholder farmers in the district acquired land through purchasing. Since groundnuts production is deemed as women's business, household heads – especially men do not give this crop deserved weight for its production. This has mostly contributed to lower production. On the other hand, the study found gender disparity in land-ownership. It was observed that, more than three-quarters of males owned land, as compared to less than a fifth of female counterparts.

Of significant note is that, land scarcity is not an issue in the study area, as most smallholder farmers cultivate less than what they already have season after season resulting into huge idle land. The study also concludes that, groundnuts in Urambo is mostly small scale produced crop for household consumption. A small quantity is for commercial purposes, regardless of the shorter distance between farmers' homes and the market place. Generally, groundnuts in the study area is sold at a low price compared to tobacco and rice. This discourages farmers from producing more groundnuts.

Groundnuts in the studied area is processed on small scale. Most of the smallholder farmers reported shelling as the main method they use to process their groundnuts. Others reported grading as main method of groundnuts processing and value-addition. Respondents reported inadequacy of knowledge to operate the decorticating-machines as the reason for unprocessing groundnuts. Other limiting factors mentioned include limited technology, customers' preference on unprocessed groundnuts, shortage of capital to purchase necessary equipment and low selling price which does not cover cost of production.

Concerning profitability, groundnuts is the third most profitable crop after beans and rice which were ranked first and second respectively. Groundnuts has lower inputs costs so farmers are urged to increase the area under cultivation if they want to get increased profit. Nervertheless, provision of extension services to farmers connotes the involvement of the government in agricultural production. Extension services in the study area do not reach majority of groundnuts farmers. Several factors might cause this: i) lack of transportation; ii) poor incentives; iii) lack of specialized extension officers for different crops; and iv) shortage of extension officers. Resolving these obstacles will enable farmers to access extension services.

5.3 Policy Implications

Poverty alleviation is the top most policy agenda in Tanzania today. The government recognizes that in order 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. In its development vision Tanzania aspires, among other things, to be a country with high quality livelihood and a competitive economy capable of producing sustainable growth and shared benefits. The NSGRP which is currently in its second phase has made some noticeable achievements on improving macro-economic indicators. However, this has been limited by the slow growth in agriculture which does not support the fast growth in other sectors such as service sector and communication. It was in light of this slow growth in agriculture that the government established another strategy known as “Kilimo Kwanza” (Agriculture First). Its grand profile is clearly stipulated in the ‘Kilimo-Kwanza’ resolution by the Tanzania Agricultural Council (TAC). It is based on ten actionable pillars. This strategic approach, is basically intended to transform agriculture for the purpose of benefiting the majority of Tanzanians. The major thrust behind, is to transform agriculture; so as to become the major and effective contributor on social welfare vis a vis other poverty reduction strategies. But, Kilimo Kwanza seem to start with wrong footing, it has not addressed smallholder farming seriously. The strategy mainly emphasises on the supply of modern tilling machines such as power tillers and tractors without making sure that these implements reach the targeted farmers and the government never tested the machines in various farming systems. In order to boost groundnuts production in Tanzania, this study recommends the following policy responses:

(a) The government through extension department must ensure that smallholder groundnuts farmers have access to high yielding groundnuts seed varieties, agro chemicals, improved farm inputs, storage and marketing facilities to small holder farmers.

(b) It is recommended that local government authorities should establish gender sensitization campaigns to farmers including smallholder groundnuts farmers. This will encourage farmers especially men to value groundnuts as they value other crops such as tobacco and rice that contribute directly to households livelihood through provision of food and income.

(c) The government should encourage formation of farmer managed co-operatives among smallholder groundnuts growers. These may be in a form of a co-operative banks, Agricultural Marketing Co-operatives (AMCos) or

Savings and Credit Co-operative Societies (SACCOS). Co-operatives will assist in production; collection; storage; marketing and processing of produce. Furthermore, SACCOS as another form of co-operative organizations will assist in provision of soft loans with affordable interest rates to smallholder farmers.

(d) Since groundnuts is among highly profitable crops, smallholder farmers should be encouraged to go into large scale groundnuts farming by increasing land under cultivation.

(e) It is advised that farm gate prices should be discouraged by establishing selling points which will also offer value addition and storage facilities. This might attract higher price.

(f) Research organizations are urged to conduct studies to establish reasons as to why the majority of people in Urambo district do not complete seven years of primary schooling.

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APPENDIX

Sample size determination

A: Based on a sample size formula by Fisher et al. (1991) as described hereunder:

When population is greater than 10,000

Sample size n of a population P is given by: n = $\frac{Z^2 Pq}{d^2}$

Where,
Z = Standard normal deviation set at 1.96 (or 2.0) corresponding to 95 confidence level
P= Percentage of target population estimated to have a particular characteristics if not known use 50%
q= 1.0-P
d=Degree of accuracy desired set at 0.05 or 0.02

Given:
P= Percentage of (groundnuts and non groundnuts farmers) (not known), we use 50%.
Z= 2.0
q=1.0-0.5
d=0.05

The sample size for the study is given by: $\frac{2^2 x 0.05 x 0.05}{0.05^2}$ = 400 Farmers

B: Proportionate sampling

Using a formula: $n = \frac{p_1}{p_2} xN$

Where,
N = Total sample 400
n = Expected sub-sample
P1 = Estimated population of the village

P2 = Total households of all 14 sampled villages (1,592 H/Holds)

We get the following sub-samples:

S/No.	Village	Households	Sample	Percentage
1	Kalemela B	180	47	12
2	Muungano	120	30	7
3	Mabundulu	68	17	4
4	Songambele	168	42	10
5	Uhuru	72	18	6
6	Usisya Kati	80	20	5
7	Usoke	52	13	3
8	Usongelani	116	29	7
9	Itegamatwi	80	20	5
10	Sipungu	76	19	5
11	Vumilia	108	27	7
12	Katunguru	124	31	7
13	Kalemela A	128	32	8
14	Jionee mwenyewe	220	55	14
	Total	**1592**	**400**	**100**