SELECTED FACTORS INFLUENCING SMALLHOLDER RURAL HOUSEHOLDS' PARTICIPATION IN NON-AGRICULTURAL INCOME GENERATING ACTIVITIES AND THEIR IMPLICATIONS FOR FOOD SECURITY IN WEBUYE DIVISION OF BUNGOMA DISTRICT, KENYA

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DECLARATION

This thesis is my original work and has not been previously published or presented for the award of a degree in any other university.

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RECOMMENDATION

This thesis has been submitted with our approval as university supervisors.

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DEDICATION

To all parents who value the importance of education to their children.

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ABSTRACT

Farmers use their livelihood as a means of food security and income generation, and income levels are closely correlated with performance of the agricultural sector. However, these farmers are constrained by land size which is decreasing, lack of credit, inadequate use of appropriate technologies due to high costs of inputs, lack of appropriate marketing channels for the produce among other factors. These threaten food security and income generation of households since agricultural production is adversely affected by the constraints. Studies indicate however, that non-agricultural income generating activities could improve the situation when the agricultural sector is deteriorating. The purpose of this study was therefore to determine how selected factors (farm size, age; gender; education level of the household head, access to credit, access to market information and use of appropriate technologies) influenced smallholder rural households' participation in non-agricultural income generating activities and the implications this had for food security in Webuye Division of Bungoma District. The target population consisted of small scale rural households in Webuye Division. Simple random sampling was used to select a sample of 110 households proportionate to the locations of the division. Data were collected using a structured questionnaire. The questionnaire was pilot tested in Kanduyi Division and obtained an alpha coefficient of 0.77 with 20 households. Data analysis was done using statistical tests in which inferential and descriptive statistics were used. The Statistical Package for Social Sciences (SPSS) was used for analysis. Stated hypotheses were tested using Chi-square and factor analysis. All tests were computed at α=0.05. The findings showed that most households were food insecure (72.73%). Levels of participation in non-agricultural income generating activities and food security status of households did not show a statistically significant relationship. Age and gender of the household head were significantly related to the level of participation in non-agricultural income generating activities while gender and level of education of the household head were significantly related to the food security status of the households. Age of the household head was the most important factor influencing the food security status of a household while access to credit was the least influencing. Policy formulation and implementation regarding food security of smallholder rural households should therefore take into consideration farmer characteristics like age and gender and institutional factors like access to credit and market information for any success in curbing food insecurity to be realized.

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ACRONYMS AND ABBREVIATIONS

DFID	Department for International Development (UK)
ERSWEC	Economic Recovery Strategy for Wealth and Employment Creation
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GOK	Government of Kenya
IFAD	International Fund for Agricultural Development
IIED	International Institute of Environment and Development
KShs	Kenya Shillings
MoA	Ministry of Agriculture
NAIGAs	Non-Agricultural Income Generating Activities
NGO	Non Governmental Organization
SPSS	Scientific Package for Social Sciences
UNDP	United Nations Development Programme
USDA	United States Department of Agriculture

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

About 80% of Kenya's population lives in the rural areas. This population largely derives its livelihood from agriculture (Government of Kenya, 2006). Over 70% of Kenyan farmers are small scale, majority of which practice subsistence agriculture. However, the sector's contribution to the GDP has progressively declined from 37% in 1970s to about 25% at the end of 2000 (GOK, 2002a). The decline has been attributed to the decreasing farm sizes, inadequate use of technologies, unreliable rainfall, poor marketing infrastructure, limited access to credit and high cost of inputs (GOK, 2002a). Despite the decline, the government in its Economic Recovery Strategy for Wealth and Employment Creation (ERSWEC) has still identified agriculture as an important tool to realize its objective of creating employment and to reduce poverty (GOK, 2004).

According to the International Institute of Environment (2002), however, non-agricultural income generating activities have been widespread and have often compensated for the decline in agricultural performance. This has involved significant transformation in farm households where the family as a unit of production and consumption has been replaced by more individualized priorities and behaviours (World Bank, 2001). At household level, gender and generation differences in access to and control over resources can also be an important reason for some groups to diversify their income generating activities (IFAD, 2001). But for the sake of farm production and consequently food security, these trends have to be considered because the undertaking of the non-agricultural income generating activities differs within households and agro climatic zones.

In rural development and land consolidation (FAO, 2000), upgrading conditions in rural areas requires sustained programmes and projects that lead to development of farms, villages and small towns. If there will be participation and diversification in income generating non-farm activities, will these programmes and projects (which are mostly farm based) be sustained and increase production, and the eventual food availability? FAO (2000) suggests that an integrated approach to rural development should include improving social conditions by promoting employment opportunities and providing increased access to social services. This

in essence encourages migration from the rural to nearby urban areas where such services and opportunities are centralized (Lerise et al., 2001). A situation that still becomes eminent is that rural households are homogenous, relatively stable units of production and consumption with agriculture as the main source of livelihood.

Ensuring food security remains the greatest challenge facing the world community. The challenge is most critical in low income, food deficit countries (Peacock, 2004). It is projected that of the 86 low income and food deficient countries, 43 are in Africa. Food needs vary greatly from region to region and among countries within regions of the world. This means that approaches to food security have to be directed to the respective situation. According to Tschirley and Weber (1994), population growth, poverty and agricultural production capabilities in Africa for instance, are the most critical factors when considering food security. The most frequent cause of chronic hunger is poverty (World Bank, 2001). In many countries, there are examples of hungry people in food surplus areas - people who lack adequate income or assets to produce or purchase enough food for themselves and their families. Ironically, food insecurity is the most severe in rural Africa where farming and herding are still the main means of livelihood. Ninety percent of Africans living in poverty are rural dwellers (FAO, 2003).

In Bungoma district, the main staple food is maize. Maize production averages 1.7 million bags per year (GOK, 2002b). With an estimated consumption rate of 132kgs per person per year and a population of about 700,000 persons according to GOK (2002b), the annual consumption is approximately 1.03 million bags. This shows some surplus but in most cases, there are ever increasing reports of food insecurity. This can be explained on one hand by the limited access to land faced by many rural households in developing countries (Lanjouw & Lanjouw, 1995), either because of shortages or because of control by older men. However, low incomes from family farming are a more important reason as are emerging opportunities in non-farm employment, wage agricultural labour - and often both - while at the same time, closely related to it, farming becomes increasingly mechanized and controlled by better capitalized operators (FAO, 2001). This poses a risk to the small scale farmers in terms of earning enough out of the non-farm activities to access food. The situation further worsens or may be improved because young men offer transport services on bicycles popularly known as *boda boda*. Other activities include brick making, grocery shops, eatery kiosks, and bicycle

repair among others. The dilemma is whether they can be sufficient enough to reinvest the incomes into meaningful production and therefore be able to bring food to the table.

More so, older women still shoulder much of the agricultural work as well as domestic chores but farming no longer provides employment opportunities or incentives to young people who in addition no longer provide unpaid family labour. As a result almost 30% of households rely on waged labour for family farming and other household chores (Toumlin & Julian, 2000). The trend now is that numbers of landowners are being forced to withdraw from agriculture because of age and illness (Ellis, 1998). Many of their heirs have no interest in agriculture and tend to be divorced from village life. According FAO (2001), many farmers are trying to survive with no clear vision of how to advance their agricultural productivity and this is detrimental to farming and eventual food security in the district. The study therefore examined the factors influencing smallholder rural households to participate in non-farm activities and the probable implications these factors may have on food security status.

1.2 Statement of the Problem

Despite the intensification of agricultural production being recommended as a means of ensuring that farmers have adequate food supplies and incomes, food security is a major concern in Webuye Division. Farmers in this division are negatively affected by land shortages, limited access to credit, lack of access to market information and inadequate use of appropriate technologies. This situation has forced the farmers to turn to non-agricultural income generating activities as a means of diversifying their livelihood income sources. It is therefore not clear whether the small scale farmers are obtaining food security by participating in these non-agricultural income generating activities.

1.3 Purpose of the Study

The research was designed to determine how selected factors (farm size, age of household head, gender of household head, education level of the household head, access to credit, access to market information and use of appropriate technologies) influenced smallholder rural households' participation in non-agricultural income generating activities and the implications these factors had on food security.

1.4 Objectives

i. To determine the food security status of small scale farmers in Webuye Division.

ii. To establish the prevalence of non-agricultural income generating activities in Webuye Division.

iii. To determine the level of participation of small scale farmers in non-agricultural income generating activities in Webuye Division.

iv. To determine the relationship between the level of participation of small scale farmers in non-agricultural income generating activities and food security status in Webuye Division.

v. To determine the relationship between selected factors and small scale farmers' participation in non-agricultural income generating activities in Webuye Division.

vi. To determine the influence of selected factors on food security in Webuye Division.

1.5 Hypotheses

Ho1. There is no statistically significant relationship between the level of participation of small scale farmers in non-agricultural income generating activities and food security status.

Ho2. There is no statistically significant relationship between selected factors and small scale farmers' participation in non-agricultural income generating activities.

Ho3. There is no statistically significant relationship between selected factors and food security status of small scale farmers

1.6 Significance of the Study

Ensuring adequate food supplies for small scale farmers that are constantly faced by the ever increasing problems of land shortages, limited access to credit, unreliable markets and low farm product prices is the greatest challenge facing Kenya's agricultural sector. Because participation in non-agricultural income generating activities may not necessarily help to curb production problems and neither will high production guarantee food security, the results of the study will sensitize government, donors and development agencies on the importance of non-agricultural income generating activities' role in increasing food security and facilitating rural development with a view to furthering the harmonious growth of both farm and non-agricultural income generating activities among small scale farmers. If this information is known, it can be used in making critical farming decisions that would enable small scale farmers to:

a. Choose appropriate non-agricultural income generating activities that enhance attainability of sufficient food supplies through improved incomes.
b. Adopt technologies that require minimum inputs without compromising production despite the negative effects of the selected factors above.
c. Seek appropriate advice on which investments they can make from the produce of the current harvest so that they can still have a base of capital come the next production season.

This study might close the existing information gap by improving the understanding on the implications of non-agricultural income generating activities in ensuring food security among small scale farmers.

1.7 Scope of the Study

The study was confined to small holder rural household heads with land size below ten acres. The households apart from practicing agriculture also participated in non-agricultural income generating activities as a source of their livelihood. The activities were agro processing, trading, artisan, extractive and services. The selected factors focused on the farmer's characteristics (farm size, age of the household head, gender of the household head and education level of the household head), institutional factors (access to credit and access to market information) and technological factors (use of appropriate technologies).

1.8 Limitation of the Study

There were problems of getting the household heads for their responses. Therefore the most responsible member of the household was contacted. This did not fully avail the required information particularly because of the socio-cultural standings. It is only the household head that is responsible for all the activities of the household. To control for this, secondary data were used to supplement the information not adequately given. Thus variation may have occurred in information because secondary data were of an earlier period.

1.9 Assumption of the Study

Non-agricultural income generating activities supplemented small scale farmers' production activities that ensured food security of their households.

1.10 Definitions of Terms

This section provides the operational meaning of some of the words and phrases used in this study.

Boda boda: Bicycle public transport famous in Western Kenya because of poor roads that have discouraged transport by public service vehicles.

Diversification: The ability and capacity of the households to sustain other income generating activities alongside or even totally independent from farm activities.

Food insecurity: According to Reutlinger & Pellekan (1986), it is the inability of a household or nation to meet target consumption levels in the face of fluctuating production, prices and incomes. Food insecurity may be chronic or transitory. In chronic food insecurity, there is continuous inadequate diet and nutrition caused by the household's inability to acquire food. It therefore afflicts households that persistently lack the ability to either buy food or produce their own. On the other hand, transitory food insecurity results from a temporary decline in household access to food due mainly to instability in food prices, production, household income or a combination of these factors.

Food insecure with moderate hunger: It is a food insecurity status where a household has a minimal or reduced food intake.

Food insecure with severe hunger: This is a food insecurity status whereby all members of the household (adults and children) have reduced food intake.

Food insecure without hunger: A food insecurity status where food intake is reduced for adults but not in children in a household.

Food security: When all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive healthy life access by all people at all times to enough food for an active healthy life (FAO, 2003)

Off-farm activities: Activities pursued by the household that away from the household's own farm and its resources.

Participation: The active physical involvement or attendance of small scale farmers in non-agricultural income generating activities because of considering how worthwhile they believe the activities are in enhancing food security.

Pull factors: These are better returns accruing from non-farm activities as compared to the farm sector such that the households are enticed to pursue them as opposed to those that are farm oriented.

Push factors: These are the conditions that are adverse to the households when they try to involve themselves in farm-oriented activities such that they are often driven from the farm to the non-agricultural income generating activities.

Non-agricultural income generating activities: All off-farm activities outside agriculture and allied activities in secondary and tertiary sectors carried out in the rural areas or for the benefit of small scale farmers.

Small scale farmer: Farmer living in the rural areas with an average farm size of 0.1 – 4.99 hectares (below 10 acres) and practices agriculture mainly for food production as a source of livelihood.

Use of appropriate technology: The incorporation into the farmer's production system and use of practices like use of fertilizer, certified seeds, crop rotation in order to have better yield. In this study, this was considered as either being a constraint or not according the farmers perception.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter provides broad implications that non-agricultural income generating activities may have for agricultural policy and institutional coordination with a view to improving the food security status among small scale farmers. This is achievable by considering participation into these activities in line with the selected factors that affect the small scale farmers. The chapter concludes with a presentation of a summary of findings from earlier studies to depict the gaps that this study is likely to fill.

2.2 Agricultural Situation in Webuye Division

Agriculture is the main income earner and over 80% of the population depends on the sector for employment (GOK, 2004; GOK, 2006). Crop production is the most important economic activity in Webuye Division because of the prevailing climatic conditions and rich soils that are responsive to fertilizer use and labour availability (GOK, 2002b). The division has two cropping seasons; long and short rains seasons. The main crops grown in long rains include maize, beans, sorghum and millet. During the short rains, sweet potatoes, groundnuts, sunflower are grown. The major cash crops grown are sugarcane and coffee. There is not much diversity in food preferences. The main staple food is maize. This is alternated mostly by sweet potatoes especially in the months of January to June. Beans are also consumed but as a mixture with maize and this has no specific time in the year. There is a little of sorghum and millet and these are consumed mostly in form of porridge. Cassava is grown although to a low extent because of the cassava mosaic virus.

The division has a cattle population of 32,050 with 80% being local zebus. Other livestock include goats, poultry, pigs, rabbits and bee-keeping (GOK, 2002b). The challenge however, remains in upgrading the local herds for improved production. Apart from farming, the people engage themselves in non-agricultural income generating activities. The most common ones are trading, artisan and waged employment especially in Webuye's Pan African Paper Mills. Others seek jobs in Nzoia Sugar Factory that is in the neighbouring Kanduyi Division.

2.3 The Non-Agricultural Income Generating Activities

The non-farm sector forms part of the family uplift component that offers a range of economic interventions associated with land, livestock and non-agricultural income generating activities (Lanjouw & Lanjouw, 2001). The role of non-agricultural income generating activities is not to be neglected in enhancing farming and food security status. This is because in the past, the global strategies to solve food problems have mainly aimed at increasing agricultural production at both the household and national levels and ensuring that a portion of the produced food was stored to last through the next harvest (Brown & Kane, 1994). However, these strategies have not been successful in alleviating food problems especially in third world countries mostly because of declining land sizes, stagnated farming technology, poor infrastructure, the demand for cash money and the ever expanding population. Non-agricultural income generating activities form a safety valve for small scale farm families that are negatively affected by the above constraints (Lanjouw & Lanjouw, 1995; Craig & Gordon, 2004).

A case study from Burkina Faso before and after the 1984 drought illustrates the typical importance of non-agricultural income generating activities (Barrett & Reardon, 2000). Households with greater income diversification were able to buy food and withstand the effects of the drought and tended to have higher overall incomes than those who were not able to supplement their farm incomes with non-agricultural income generating activities. More over, these activities generate income that is often a major source of savings for farm households in poor areas that are often used for food purchase in difficult times (Reardon, 2000).

2.4 Classification of Non-Agricultural Income Generating Activities

Most non-agricultural income generating activities are divided across commerce, manufacturing and services linked to a household's livelihood (Craig & Gordon, 2004). The activities include trade or processing of agricultural products that take place on the farm such as micro processing activities. However, Barrett et al. (2001) suggest a three way classification of the non-agricultural income generating activities. This classification is based on the sectoral, functional and spatial components distinguished as primary, secondary and tertiary sector activities. The primary sector activities include mining and extractive activities; the secondary sector activities include manufacturing activities while the tertiary

sector activities include services. This is regardless of where the activity takes place, at what scale, or with what technology.

2.5 Factors Influencing Participation in Non-Agricultural Income Generating Activities

Decisions made by the small scale farmers concerning the form and extent of their participation in non-agricultural income generating activities generally depend on two factors (Reardon et al., 2001). One concerns the incentives offered such as relative profitability and risk of farm and rural non- agricultural income generating activities. The other factor is the household's capacity determined by education, income and assets and access to credit in order to undertake such activities.

Households are motivated to undertake such activities by either 'pull' or 'push' factors (Toumlin & Julian, 2002). The 'pull' factors include incentives such as better returns in non-farm sector relative to farm sector. The 'push' factors in particular include:

i. Inadequate output resulting either from temporary events like drought or long term problems like land constraints
ii. Absence or incomplete crop insurance and consumption credit markets.
iii. Risks of farming which include households to manage income and consumption uncertainties by diversifying and undertaking activities with returns that have low or negative correlation with those of farming.

On the basis of these 'push' factors; the study examined the following selected factors that influence small scale farmers to participate in non-agricultural income generating activities; farm sizes, gender, age, level of education, access to credit, access to market information and use of appropriate technologies. These were discussed in the following groups; farmer characteristics, institutional and technological factors.

2.5.1 Farmer Characteristics

These are factors that differentiate the various categories of small scale farmers apart from the land they own. They include; farm size, age, gender and level of education of household head. All these therefore will dictate the households' participation in non-agricultural income generating activities and consequently the food security status.

(i). Farm size

Providing secure access to land for the rural poor represents one of the key factors in achieving food security and sustainable agricultural development (Barraclough, 1996).

Nearly three quarters of the world's poor and hungry live in rural areas in the developing world. Not surprisingly poverty and hunger are concentrated among those who are landless or farm plots are too small to provide for their needs (World Bank, 2001). Studies have confirmed that reduction in or loss of access to land leads directly to reduced income and access to food.

For the poor and hungry in rural areas, access to land resources tends to be both inadequate and insecure. Impoverished smallholders face the constant threat that they may be forced to sell their land and other assets to buy food. FAO (2002) further suggests that food insecurity often drives the poor farmers to make decisions that may jeopardize their ability to retain control of their land. Farmers who are struggling to feed their families are frequently forced to choose between short term survival and long term economic and environmental sustainability for instance, between buying food or fertilizer or between growing subsistence foods or profitable commercial crops.

Without land that could be used as collateral, smallholders often cannot obtain credit they need to improve their land. They may also not be confident to benefit from their efforts since they may lose rights to the land. Failure to invest in improved soil and water management results in land degradation and soil loss threatening both livelihoods of millions of people and future food security (FAO, 2002).

(ii). Gender of household head

Participation in non-agricultural income generating activities is mediated by social rules and regulations which often have a strong gender bias (Reardon, 2000). Women household heads are generally excluded from the patronage system controlling access to non-agricultural income generating activities. They may therefore be forced into marginal activities like being employed as house girls in order to earn a living (Seppala, 1996). This on the contrary will reflect how such households will access food because in most cases, women are the ones who usually take the responsibility of feeding the families even though their incomes are meager (FAO, 2002). Studies have documented the fact that women tend to allocate a larger share of their resources for food and other basic needs of their children and family (Kennedy & Peters, 1992; Lloyd & Gage-Brandon, 1993; Quisumbing et al., 1995; Kydd, 2002.).

On the other hand, young women do not have the same opportunity as young men to find employment in sectors that require physical strength. These sectors are for example

construction and transport (Tacoli, 2001). Despite the constraints, women's independent participation in non-agricultural income generating activities has increased partly because of; growing opportunities, personal desire for independence and because even the most traditionalist household village elders now find that financial support from women is not only acceptable but desirable (Jambiya, 1998; Diyamett et al., 2001; Okali et al., 2001). The breakdown between men and women is therefore that women invest more resources for caring for themselves and their children by providing the basic necessities of food and clothing. Men tend to invest in human capital (health, education, household services) but also invest in adult goods that include leisure activities and luxury items (Levin et al., 1999).

(iii). Age of household head

Access to main assets linked to farming often depends on an individual's position especially under customary land tenure (IIED, 1999). Older men have control over the limited assets and resources for farming (IFAD, 2001). More so, increased financial dependence on household heads linked to unpaid labour on the family's farm is resented by the younger generation. These as heirs to the farms have no interest in agriculture and tend to be divorced from village life (Ellis, 1998; Jambiya, 1998; Mong'ng'o, 1998). Young people are thus forced to participate in non-agricultural income generating activities. According to Okali et al. (2001), young men because of pressure, migrate to urban areas to avoid being described as 'weak' or 'lazy' in their own village.

Because of this withdrawal of young people, households are thus forced to rely on waged labour for family and other household chores (Toumlin et al., 2000). Landowners on the other hand are being forced to withdraw from agriculture because of age and illness. In addition, the farmers are trying to survive without a clear vision of advancing in agricultural productivity and this is a setback to farming and food security (Ellis, 1998; FAO, 2001).

(iv). Level of education of household head

Food security status will vary among households depending on the level of education of the members (Craig, & Gordon, 2004). The level of education influences households to make superior decisions in terms of non-agricultural income generating activities. In most cases the activities are of higher returns as compared to those made by households with lower levels of education. According to Reardon et al. (2001), higher level of education makes members of households to be risk takers and therefore willing to try their hands on varied activities other than agriculture alone. Households with low levels of education tend to be reservists of

traditional practices they have practiced over a long time and therefore venturing into non-agricultural income generating activities will take some time (World Bank, 2001).

2.5.2 Institutional Factors

These are those factors that emanate from bodies that assist farmers pursue agriculture. Most farmers may not be in a position to operate on their own and therefore they seek assistance in such circumstances to remain in the light of food production. These, however, have rules and regulations that the farmers have to adhere to in order to be assisted and therefore depending on these farmers may opt to participate in non-agricultural income generating activities or not. Two factors will be studied and these are; access to credit and access to market information.

(i). Access to credit

Smallholders as indicated above are always faced with problems of obtaining credit to improve their land because of lack of security that in most cases is placed on land (Islam, 1997). On the other hand the access to food is determined by the ability to buy or acquire food, control production resources or exchange other goods and services for food (Mushtaq, 2004). With limited credit to offset some of the financial requirements for the smallholders there is a risk of food insecurity among these households. It is therefore necessary for these households to participate in non-agricultural income generating activities to acquire income for such purposes of production on farm (Smith et al., 2001).

Whilst there is growing experience with micro-credit schemes, the majority of rural people do not have access to any such scheme. According to Gordon (2000), funds available from friends and family for meeting unforeseen needs are important but often inadequate since household expenditure follows a similar seasonal pattern in rural areas with everyone's need arising at the same time. The problem is more immense where food supplies are running low and the next crop is not yet ready for harvest.

(ii). Access to market information

Agricultural markets to small scale farmers are characterized by the following constraints among others (Reardon et al., 2000); long chains of transaction between the farm gate and the consumer, poor access to appropriate and timely market information, small volumes of highly varied and un-graded quality products and poorly structured and insufficient markets.

The lack of market information represents a significant impediment to market access especially for smallholder producers. It substantially increases transaction costs and reduces market efficiency (Mwale, 1998). For any one crop, the marketing chain consists of multiple middlemen each taking a margin at every stage of this chain and eventually it is the smallholder farmer who bears the brunt of low income.

2.5.3 Technological Factors (Use of Appropriate Technologies)

Farmers are always accosted to improve their production by using technologies developed for their consumption by research institutions. The study therefore collectively considered the use of technologies to mean issues concerning use of fertilizer, use of certified seeds and practices such as crop rotation among others.

According to Barrett et al. (2001), incentives and capacity for undertaking non-agricultural income generating activities may also diverge. For instance, poor farmers may have very strong incentives to participate in non-agricultural income generating activities while lacking the capacity to do so because of various constraints that include; household wealth, agro climatic zone and developmental policies and programmes. These are further affected by the low returns farmers get from selling their produce (Okali et al., 2001). With low returns compared to high prices incurred on inputs, the farmers are likely to stop producing or may go for cheap inputs for instance uncertified seeds, lack of use of fertilizer, and to a large extent they may be forced to refrain from seeking new technologies developed by private research institutes for adoption. The end result is that production will be low and mainly for subsistence therefore increasing the chances of food insecurity (Jambiya, 1998). It is at this point that majority of them will be forced out of active on-farm production to venture into non-agricultural income generating activities that may help them curb the danger of food insecurity (FAO, 2001). The low prices of locally produced products are also attributed to importation of commodities that are sold cheaply. This implies that locally produced farm products lack market because of the competition in pricing.

2.6 The Role of Non-Agricultural Income Generating Activities on Farming

The non-agricultural income generating activities can impact both positively and negatively on the farm sector and therefore affect the food security status of a given region or household. Positively, non-agricultural income generating activities affect the availability of cash to make the farm capital investments and farm input purchase needed to adopt appropriate technologies (Douglass, 1998). Thus non-agricultural income generating activities by farm

households are potentially important for long term food security because they can increase the use of farm inputs and hence farm productivity and the ability of farmers to intensify production. Access to non-farm income is crucial for purchasing farm inputs. This can create a dynamic effect as cash from the non-farm sector is reinvested in farm equipment thus creating capital that can substitute for labour and reduces labour demand.

According to FAO (2000), participation in the rural non-agricultural income generating activities can lower overall income risk for farm households, increasing the incentive to adopt risky but more profitable farm technologies and to commercialize agriculture. Access to non-farm income may enable a farmer to increase the area under cultivation, use more purchased input and diversify farming into cash crops that raise farm incomes hence have more accessibility to food.

On the contrary however, non-agricultural income generating constraints can block farm sector development by raising processing and distribution costs thereby undermining farm profits. At the same time, non-agricultural income generating activities can compete for a farmer's resources and eventually affect the factor bias of farm technology. If non-farm returns are better than those of farm labour marketing jobs, or non-farm labour use, then depending on the integration of the labour market, they will increase the farm wage thereby reducing farm labour demand and increasing the capital intensity of farming and or leading to a shift to less labour intensive crops. Especially where cropping is most risky, non-agricultural income generating activities can compete for labour and cash for crop technology improvements in the cropping season and for investments in land improvements in the dry season (Hodgson, 2000). On the basis of this therefore, food production will be at stake.

2.7 Concept of Food Security

The most common definition of "food security" is "access by all people at all times to enough and appropriate food to provide the energy and nutrients needed to maintain an active and healthy life". If food security involves access at all times to enough and appropriate foods, then "food insecurity" reflects uncertain access to enough and appropriate foods. According to Barrett (2002), food security is thus an inherently *ex ante* status with respect to nutrition and health. There are a number of closely related, *ex post* concepts, that is, concepts related to realized outcomes. "Hunger" is a physiological sensation associated with insufficient food

intake, closely related to the concept of "food insufficiency", meaning that an individual or household sometimes or often goes without food (American Dietetic Association, 1990).

The concept of food security is most precise at the individual level because its foundation is the individual-specific nutrient requirements for maintaining an active and healthy life. For this reason, nutritionists tend to approach food security issues from the individual level. While hunger and food insufficiency imply food insecurity, the converse does not hold. Significant shortfalls in the consumption of macronutrients (calories, protein, fats) subsequently become manifest in "undernutrition" or "protein energy malnutrition" (PEM). These too are potential but not necessary consequences of food insecurity (Campbell, 1991). "Malnutrition" is an outcome with a complex relationship to hunger, because it is influenced by many other variables as well, for instance; health status, energy expenditure in work, caregiver education levels, community infrastructure, micronutrient intake (Scrimshaw et al., 1968; Behrman & Deolalikar 1988; Strauss & Thomas 1995).

2.8 Food Security Measurement

Documented evidence shows that there is no single indicator that best measures household food security, however, a common indicator is the calorie adequacy (Payne, 1990; Habicht & Pelletier, 1990; Maxwell & Frankenberger, 1992; Haddad et al., 1994; Chung et al., 1997). This measures food sufficiency in terms of quantity but does not address the quality of the diet in terms of protein and micronutrient deficiencies nor does it address issues of vulnerability or sustainability of access (Levin et al., 1999). The traditional approach for measuring household food security using dietary intakes has been to select an optimal caloric intake based on a recommended daily allowance (RDA) for the equivalent of a moderately active adult and compare it to observed caloric intake per adult equivalent. Therefore, to identify food deficient households, a cut off point is used to identify households that experience energy shortfalls. But Beaton (1983); Dugdale & Payne (1987); Edmundson & Sukhatme (1990) cite two problems associated with selecting the cut off point for this analysis:

i. Setting the correct cut off in the absence of full information for estimating the energy requirements of the sample.
ii. Whether caloric requirements make sense given fluctuations in inter- and intra-personal dietary requirements and individual's ability to adjust to inadequate energy intakes.

It was not possible in this study to quantify energy requirements because data was not collected on weights and time allocation for household members. The study therefore adopted the USDA food security measurement scale (USDA, 2000). The food security measure provides independent, more specific information on the dimension of well-being than can be inferred from caloric adequacy. Specifically, the USDA food security measurement scale asks about the following kinds of household conditions, events, behaviours, and subjective reactions:

i. Anxiety that the household food budget or food supply may be insufficient to meet basic needs;
ii. The experience of running out of food, without money to obtain more;
iii. Perceptions by the respondent that the food eaten by household members was inadequate in quality or quantity;
iv. Adjustments to normal food use, substituting fewer and cheaper foods than usual;
v. Instances of reduced food intake by adults in the household, or consequences of reduced intake such as the physical sensation of hunger and
vi. Instances of reduced food intake or consequences of reduced intake, for children in the household.

From the household conditions, four statuses of food security were defined for the purpose of this study:

i. Food secure: Households show no or minimal evidence of food insecurity.
ii. Food insecure without hunger: Food insecurity is evident in household members' concerns about adequacy of the household food supply and in adjustments to household food management, including reduced quality of food and increased unusual coping patterns. Little or no reduction in members' food intake is reported.
iii. Food insecure with moderate hunger: Food intake for adults in the household has been reduced to an extent that implies that adults have repeatedly experienced the physical sensation of hunger. In most (but not all) food-insecure households with children, such reductions are not observed at this stage for children.
iv. Food insecure with severe hunger: At this level, all households with children have reduced the children's food intake to an extent indicating that the children have experienced hunger. For some other households with children, this already has occurred at an earlier stage of severity. Adults in households with and without children have repeatedly experienced more extensive reductions in food intake.

The questions are as given in Appendix A, Part II and were modified to suit the local conditions in Webuye Division. The responses were to be scored on the scale in Appendix C.

2.9 The Theoretical Framework

The study was based on the Utility theory. This is a theory where emphasis is on the attempt to make preferences from a set of choices for ones own satisfaction (Bell et. al, 1998). Utility theory can be used in both decision making under risk (where the probabilities are explicitly given) and in decision making under uncertainty (where the probabilities are not explicitly given) (Keeney & Raiffa, 1993). According to Bell et al. (1998), there are three traditions in utility theory. One attempts to describe people's utility functions and is called the descriptive approach. Another attempts to use utility in the construction of a rational model of decision making and is called the normative approach. The third attempts to bridge the descriptive and normative approaches by considering the limitations people have with the normative goal they would like to reach; this is called the prescriptive approach.

2.10 The Conceptual Framework

The conceptual framework in Figure 1 depicts how the variables in the study interact. On the basis of the utility theory, the small scale farmer is the decision maker as a result of uncertainty associated with agricultural production which influences food security of a household. The utility function in this situation is the food security status. This will vary from household to household depending on the decisions made by the various farmers. The small scale farmer is on the other hand characterized by various situations as indicated by the selected factors. The farmer has a chance to participate in non-agricultural income generating activities. This is dependent on whether food security status of choice is being achieved or not. If the small scale farmer decides not to participate in non-agricultural income generating activities then farming will be the option. Therefore the extraneous variables will affect this choice because they directly influence agricultural production. The rational decision according to the study will be whether or not to participate in non-agricultural income generating activities. This will depend on the food security status that describes the household either as food secure or insecure and the decision also will be influenced by the selected factors eminent in a household.

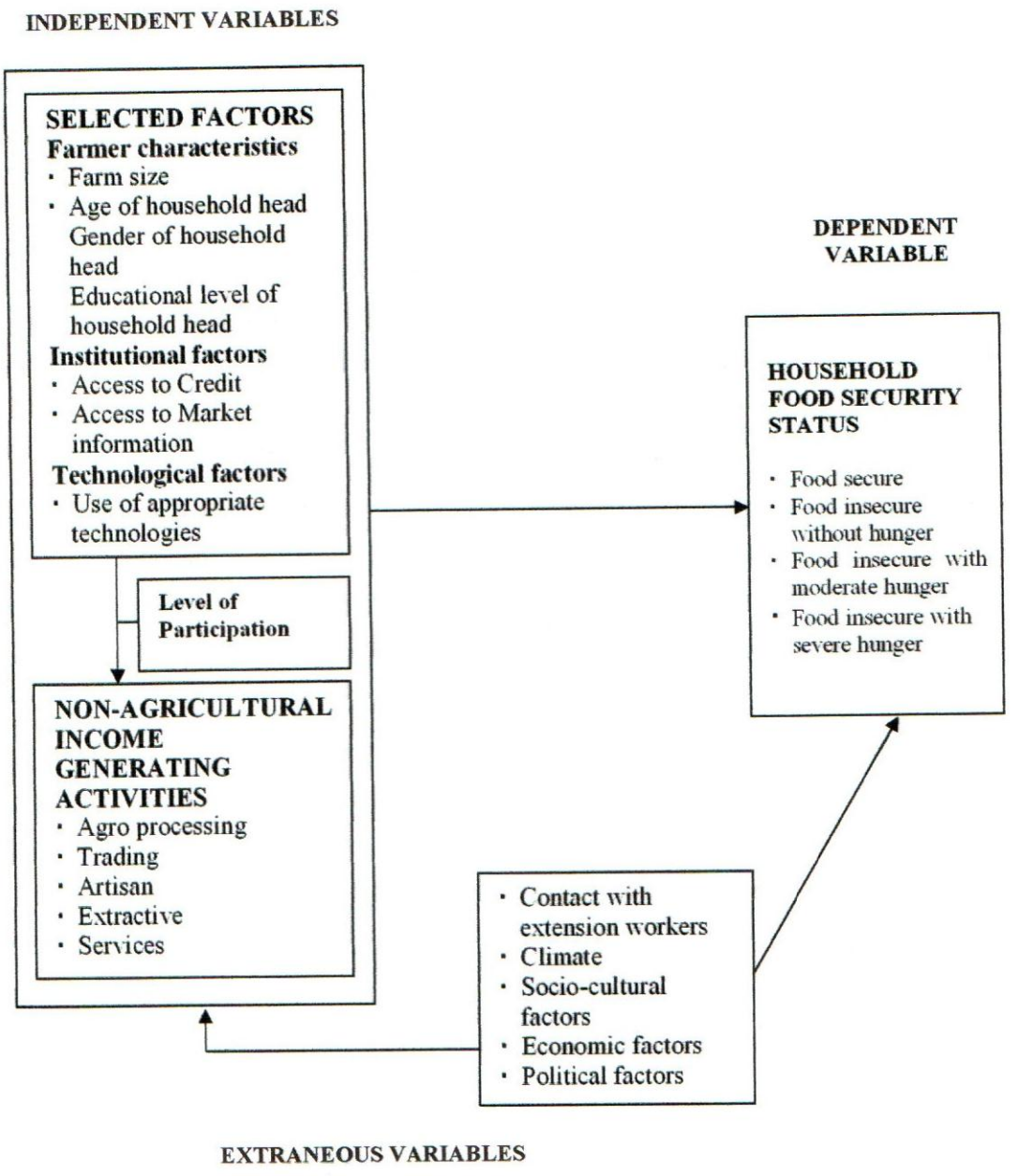


Figure 1. Conceptual framework on the interaction between independent variables (selected factors and level of participation in non-agricultural income generating activities) and the dependent variable (household food security status)

2.11 Summary

Participation in non-agricultural income generating activities is thought to provide small scale farmers with a range of economic interventions amidst the constraints that face them. These activities are thought to enhance food security status of households unlike strategies aimed at increasing agricultural production. Households are forced to participate in non-agricultural income generating activities either by incentives offered in the non-farm sector or because of the limitations that farmers are faced with. It is purported that the smaller the farm size, the higher the level of participation in the non-agricultural income generating activities.

Levels of participation will vary depending on various factors. For instance, households headed by men will have a higher level of participation as opposed to those headed by women. The higher the level of education of the household head also means high level of participation in these activities. Generally all the variables (farmer characteristics, institutional and technological factors) have a positive correlation with the level of participation in non-agricultural income generating activities. Consequently the food security status of households is supposed to improve as a result of their participation in non-agricultural income generating activities.

The participation, the type of non-agricultural income generating activities is dependent on the farmer's disposition of which decision he or she is to make to curb the constraints that face his or her household. This therefore implies that priorities of households will vary and consequently the food security status each will have. It is therefore not clearly stated at what level of participation by households will enhance food security for these farmers. It was important for this study to determine this aspect to close the gap existing in knowledge on the participation of households in non-agricultural income generating activities and food security status of small scale farmers amidst factors that surround them.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides the methodology used to attain the objectives of the study. It presents the research design, location of the study, the population of the study, sampling, instrumentation, validity and reliability of the instrument, data collection and analysis.

3.2 Research Design

The study adapted a cross-sectional survey that utilized an ex-post facto approach. A cross-sectional survey studies the relationship between different variables at a point in time. For instance in this study, the relationship between level of participation of small scale farmers in non-agricultural income generating activities and food security was looked at without considering the difference in time the households had spent in the activities and the food security status that had prevailed over that period. Unlike time series, cross-sectional survey relates to how variables affect each other at the same time (Trochim, 2006). The ex-post approach was adapted because the study was conducted in an already existing situation (Kerlinger, 2000) where rural farm households had already engaged themselves in non-agricultural income generating activities and these had dictated their food security status.

3.3 Location of the Study

The study area was Webuye Division which is one of the ten divisions forming Bungoma District in Western Province of Kenya. The division was established in 1983 and was later divided into two to create Ndivisi in 1997. It borders Ndivisi Division to the east, Lugari District to the south, Kimilili to the north and Chwele, Nalondo (Central) and Kanduyi to the west. It covers an area of 269.1km^2 which is about 13% of the total area of the district. It has 4 administrative locations namely Sitikho, Bokoli, Misikhu and Webuye. The total number of sub locations is 13 (GOK, 2002b).

The division was selected because of its fair representation of an agricultural zone in Kenya where farmers are predominantly small scale. There was also diversification of non-agricultural income generating activities the smallholder farmers participate in so that they could meet their daily demands of food and income. The division was also selected because it represents both rural and periurban settings which might have differences in livelihoods and

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consequently the households' participation in non-farm activities in order to be food secure. Therefore, the findings would easily be predicted for other parts of the country with a similar setting.

3.4 Population

The target population consisted of all small scale farmers who had diversified activities apart from on-farm ones. A total of 23,454 households were targeted. The households were selected as the basis for the study because they act as units of both production and consumption of agricultural and non-agricultural services and produce. Household heads were interviewed. In case the household head was absent, then the most responsible member was interviewed. This was a member who at one time had been entrusted with the responsibility of overseeing the household's activities for a period spanning two years or more. This period was essential for the householder member to have experienced changes that might have occurred because of the seasonality of agricultural production. Key informants to supplement the information were also interviewed both from the Ministry of Agriculture and opinion leaders. A total of 10 respondents were adequate to give the information from an expert and or a leader's perspective.

3.5 Sampling Procedures and Sample Size

The sampling frame was a list of households (23,454) from the Bungoma District Development Offices for the respective division. The sample size was obtained using the coefficient of variation (Nassiuma, 2000). This is because for most surveys or experiments, a coefficient variation of at most 30% is usually acceptable. The study took a coefficient variation of 21% and a standard error of 0.02. The formular given by Nassiuma (2000) is:

$$n = \frac{NC^2}{C^2 + (N-1)\,e^2}$$

Where n = sample

N = population

C = covariance

e = standard error

The number of households for example for Webuye Division was;

$$n = \frac{23{,}454 \times (21\%)^2}{(21\%)^2 + (23{,}454 - 1)\,(0.02)^2} = 110 \text{ households}$$

The 110 households were appropriate for the study because the minimum recommended sample size in a survey is 100 (Borg & Gall, 1983). The extra 10 households were to

compensate for attrition, respondent refusal to participate and other similar circumstances. Simple random sampling was then used to draw the required respondents according to the proportionate households in each location of the division. Thus the sample size for the selected division is as shown in Table 1. The key informants were on the other hand obtained from the division's office records and this was done at random.

Table 1. Sample Size for Webuye Division

Location	Households	Proportion percent	Sample size
Bokoli	4,447	18.96	21
Misikhu	5,812	24.78	27
Sitikho	4,278	18.24	20
Webuye	8,917	38.02	42
Total	**23454**	**100.00**	**110**

Source: District Development Office, Bungoma

3.6 Instrumentation

Data was collected using a structured questionnaire. This was developed with the advice from the university supervisors. The items on the questionnaire were developed on the basis of the objectives of the study. Appendix A consisted of Part (I) which was to give general information regarding the respondents' identification. Part (II) was to determine the food security status of households in the study. The items on food security were adapted for use from the USDA food security measurement scale. These were however modified with advice to suit the local situation of households in Webuye Division. These items sought the respondents' answer to depict anxiety or not on food budget whose indicators are; less money to purchase food, eating less food as desired, substituting quality food with cheaper ones and reduced intakes by adults and to a severe extent in children also. This information was scored on the scale provided in order to depict the food security status of a household.

Part (III) was divided into (a) and (b) to seek information regarding the level of participation of households in non-agricultural income generating activities and the feelings of the respondents (on a five scores Likert scale) on the selected factors influence on food security status of households respectively. The level of participation of households in non-agricultural income generating activities was to be determined by the number of hours households spent

on the activities, the number of activities a household participated in and who in the household participated in the activities. The scores on the Likert scale were to determine which households thought were constrained by access to credit and market information and use of appropriate technologies. Appendix B consisted of an interview schedule for extension officers from the Ministry of Agriculture and opinion leaders. This was to determine the implications of non-agricultural income generating activities on food security. The information was to supplement that which the household heads gave from the expert and or a leader's perspective.

3.6.1 Validity of the Instrument

After the questionnaire was developed, validation was done by subjecting it to individual experts from Agricultural Extension in the Faculty of Education and Human Resource of Egerton University to asses the content, construct, criterion and face validity. Validity is the accuracy, soundness, or effectiveness with, which an instrument measures what it is intended to measure (Wiersma, 1995). Content and construct validity was to ensure that the content and format of the instrument was consistent with the definition of the variables and the sample of the subjects to be measured. To avoid biased responses from the respondents, face validity was done. Comments from the experts were incorporated into the instrument before being used in the field.

3.6.2 Reliability of the Instrument

A pilot testing was done using 20 households in Kanduyi Division of Bungoma District which had similar characteristics like the study location. Pilot testing of the instrument was to ensure that there were no deficiencies and ambiguities in the final instrument. After the pilot testing, the reliability of the instrument was estimated using the Cronbach's coefficient test. Reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials. According to Fraenkel and Wallen (2000), a reliability of 0.70 or higher is preferable for research purposes. In the case of the instrument used in this study, a reliability of 0.77 was obtained and this was high enough to warrant the research.

3.7 Data Collection

The researcher obtained an introductory letter from the university's graduate school before carrying out the study. This facilitated the acquisition of a research permit from the Ministry of Education authorizing the carrying out of the research among the smallholder farmers in Webuye Division of Bungoma District. Secondary data were then collected and this involved

reviews of annual reports from the Ministry of Agriculture and the development plan of the district and the division. These data were then coupled with key informant interviews with Ministry of Agriculture staff and local leaders in the area. These provided general information on households' general agricultural practices in the area. The information was compiled into a report and on its basis survey areas were selected. A survey was then conducted to collect the required data. It involved visiting each of the household in the sample and administering the questionnaires. These questionnaires were in English but questions were presented to the respondents in Luhya and in Kiswahili for the non-Luhya speaking respondents. This was necessary to enhance objectivity. Personal contact with interviewees was also ensured to give and or facilitate acquisition of more accurate responses. Data were collected between December 2005 and February 2006.

3.8 Data Analysis

Descriptive and inferential statistic procedures were used in data analysis. Descriptive statistics included frequency and modal distributions, means, standard deviations and percentages. These were used to describe the food security status and the non-farm activities farmers participated in to attain food security status. The inferential statistics involved the use of Chi-square and factor analysis. Participation in non-agricultural income activities yielded categorical data as very low, low, moderate, high and very high. Therefore this guaranteed the use of Chi-square. The technique was selected because was possible to test for the goodness of fit, test the significance of association between two attributes and it also enabled the testing of homogeneity or the significance of population variance. Factor analysis was also chosen because of the varied number of the independent variables (Morrison, 1990; Fabrigar et al., 1999). The variables in the study have a systematic interdependence thus the technique seeks to resolve (a large set of measured) variables in terms of relatively few categories known as factors upon which inferences can be made. The hypotheses were tested at $\alpha = 0.05$. The Statistical Package for Social Science (SPSS) was used to compute the data collected. Table 2 gives a summary of how the null hypotheses were tested.

Table 2. Summary of Data Analysis

Hypothesis	Independent variable	Dependent variable	Statistical test
Ho1 There is no statistically significant relationship between the level of participation of small scale farmers in non-agricultural income generating activities and food security status.	**Levels of participation in non-agricultural income generating activities** • Very low • Low • Moderate • High • Very high	**Food security status** • Food secure • Food insecure without hunger • Food insecure with moderate hunger • Food insecure with severe hunger	Chi-square
Ho2 There is no statistically significant relationship between selected factors and small scale farmers' participation in non-agricultural income generating activities.	**Selected factors** • Farm size • Age of household head • Gender of household head • Education level of household head • Access to credit • Access to market information • Use of appropriate technologies	**Levels of participation in non-agricultural income generating activities** • Very low • Low • Moderate • High • Very high	Chi-square
Ho3 There is no statistically significant relationship between selected factors and food security status of small scale farmers	**Selected factors** • Farm size • Age of household head • Gender of household head • Education level of household head • Access to credit • Access to market information • Use of appropriate technologies	**Food security status** • Food secure • Food insecure without hunger • Food insecure with moderate hunger • Food insecure with severe hunger	Chi-square Factor analysis

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter provides the results of data analyses and discussion with reference to research objectives and hypotheses as stated in chapter one. The aspects analyzed and discussed include: food security status of the households, prevalence of non-agricultural income generating activities, levels of participation of households in non-agricultural income generating activities and factors that influence households to participate in non-agricultural income generating activities. Statistical tests were done using SPSS for windows version 11.5 at α=0.05. The descriptive analyses are presented in sections 4.2.1-3 in accordance to the objectives (i), (ii) and (iii). Tests of hypotheses are presented in section 4.3.

4.2 Descriptive Analyses

(i). Food Security Status of Small Scale Farmers in Webuye Division

Household heads were asked to give an account of food status for their families. Table 3 shows the proportion of households in each category of the food security status.

Table 3. Food Security Status of Households in Webuye Division

	Food security status of households				
Location	Food secure	Food insecure without hunger	Food insecure with moderate hunger	Food insecure with severe hunger	**Total**
Sitikho	13	5	2	-	**20**
Bokoli	10	5	5	1	**21**
Misikhu	3	7	15	4	**29**
Webuye	4	9	24	3	**40**
Total	**30**	**26**	**46**	**8**	**110**
% Frequency	**27.27**	**23.64**	**41.82**	**7.27**	**100**

Source: Survey data, Webuye Division, 2005-2006

In this study, the dependent variable was food security status of households. This was indicated by either a household being food secure, food insecure without hunger, food insecure with moderate hunger and food insecure with severe hunger. The last three indicators depict the level of severity of food insecurity situation in terms of hunger experienced in a household. The results therefore indicate that majority of the households (72.73%) in Webuye Division are food insecure as compared to those that are food secure

(27.27%). The proportion of the poor in the division is given as 47.67% (GOK, 2002b) and this outcome was therefore expected. According to GOK (2000), 52% of the population in the division cannot afford a balanced meal daily. This is evident by the large proportion of the population that is food insecure. From the study, households were mostly threatened by food insecurity in the months of February to July. This corresponded to the households that were food insecure with moderate hunger (41.82%). This usually occurred before households could get the next harvest of the staple food which in Webuye Division is maize. Others were worse hit in that once the harvesting of maize was done, the food in store ran out before the year ended (harvesting of maize is normally in September) and consequently the 7.27% households with food insecurity with severe hunger.

Most farmers practice the first level of management and mostly intercrop maize and beans (MoA, 2004). The recommended cost of production under this level of management in Webuye Division is KShs.10,365 per acre. Farmers in the study were asked the cost of agricultural production per acre and this translated to an average of KShs.5,400 come the planting season. This was half the required amount for good produce to be realized and consequently the high rate of food insecurity observed in the division. This is in agreement with Tschirley and Weber (1994) who contend that poverty and agricultural production capabilities are the most critical factors when considering food security. With 47.67% households being poor, investment in agricultural production could not be optimal and consequently the food insecurity reported in Webuye Division.

The locations show a great variation in the food security status. Sitikho and Bokoli have the highest number of households that are food secure (65% and 47.62% respectively) as compared to Misikhu and Webuye who have 10.34% and 10% respectively. This can be attributed to the fact that most households in Misikhu and Webuye had majority of the households with farm sizes below 2.5 acres (55.17% and 57.5% respectively) as compared to Sitikho and Bokoli who had 45% and 42.86% respectively. To about half (51.8%) of the households in the study, the farm size influenced agricultural productivity and therefore food security. Therefore, households in Misikhu and Webuye were expected to be more food insecure as compared to those in Sitikho and Bokoli. The locations also differ in terms of cash crops grown, for instance, Sitikho and Bokoli have intense sugarcane while Misikhu and Webuye have some coffee. Comparing the incomes earned on the basis of locations,

sugarcane had higher returns as opposed to coffee and thus income disparities in the locations which influenced food security differently.

The major finding towards the difference in the food security status is gender composition of the locations. Most households in Misikhu (64.83%) and Webuye (32.5%) had the highest number of female heads as opposed to those in Sitikho (5%) and Bokoli (14.83%). This was owed to the fact that men in these households had migrated to towns for employment. These households in Misikhu and Webuye locations were in turn more food insecure (89.66% and 90% respectively) as compared to Sitikho and Bokoli locations (35% and 55% respectively). The implication is that female headed households were more food insecure than those headed by males in Webuye Division.

(ii). Non-Agricultural Income Generating Activities in Webuye division

In Webuye Division, households already involved themselves in activities such as *boda boda* transport, brick making, grocery shops, eatery kiosks, and bicycle repair among others. With the classification cited, five categories of the non-agricultural income generating activities were prominent. These were suited for the study area because of the resources that were exhibited by the households. The households were asked to describe the non-agricultural income generating activities they participated in and the outcome is as shown in Table 4.

Table 4. Non-Agricultural Income Generating Activities by Type at Household Level

NAIGAS	Location					
	Sitikho	Bokoli	Misikhu	Webuye	Total	%
Agro processing						
Beer brewing	-	1	-	1	2	1.52
Posho milling	2	1	-	2	5	3.79
Sub-total	**2**	**2**	**0**	**3**	**7**	**5.31**
Trading						
Kiosk/canteen/retail shop	9	8	2	14	33	25.0
Livestock	1	-	2	1	4	3.03
Cereals	6	-	3	1	10	7.56
Grocery	-	5	15	10	30	22.73
Second hand clothes selling			3	-	3	2.27
Sub-total	**16**	**13**	**25**	**26**	**80**	**60.59**
Artisan						
Carpentry	2	2	-	1	5	3.79
Tailoring/Knitting	-	-	-	1	1	0.76
Brick making	-	-	3	4	7	5.31
Rope making	-	-	1	1	2	1.52
Masonry	-	-	-	1	1	0.76
Sub-total	**2**	**2**	**4**	**8**	**16**	**12.12**
Extractive						
Sand removal	-	-	1	1	2	1.52
Timber sawing	-	2	1	1	4	3.03
Bee-keeping	-	1	-	-	1	0.76
Sub-total	**0**	**3**	**2**	**2**	**7**	**5.31**
Services						
Boda boda	-	-	1	-	1	0.76
Herbalist	-	-	-	2	2	1.52
Hotel	2	2	1	-	5	3.79
Rental rooms	-	3	-	-	3	2.27
Photography	-	1	-	-	1	0.76
Salon /Barber	-	-	-	2	2	1.52
Bicycle/Radio/Shoe repair	1	2	-	1	4	3.03
Contract farm labour		1	-	3	4	3.03
Sub-total	**3**	**9**	**2**	**8**	**22**	**16.67**
Total	**23**	**29**	**33**	**47**	**132**	**100**

Survey data, Webuye Division, 2005-2006

Classification adapted from Wegulo (1997).

All the locations in the division showed a considerable number of non-agricultural income generating activities. Webuye location reported the highest 47 (35.6%) number of non-agricultural income generating activities. This was followed by Misikhu location 33 (25%); Bokoli location 29 (22%) and lastly Sitikho 23 (17.4%). The trading activities were more prevalent (60.59%) as compared to other activities; services (16.67%), artisan (12.12%), agro

processing and extractive (5.31% each). Under the trading non-agricultural income generating activities, households with kiosk, canteen, retail shop were the leading 33 (25%). These were followed by those with grocery activities 30 (22.73%). Webuye location again recorded the highest kiosk, canteen, retail shop non-agricultural income generating activities while Misikhu location reported the highest number of grocery activities.

Other categories show a greater decline in the number of the non-agricultural income generating activities. The difference can be explained on one hand that the trading activities required less skill and probably low capital to run. According to Wegulo (1997), this explains the nature of the economy that is characteristic of most developing countries as being agrarian. The households rely on trade in agricultural products in a bid to generate income to reduce food insecurity and poverty (MoA, 2005) as is the case with most households in Misikhu location which rely on grocery activities.

On the crucial issues that propagate the diversification of income generating activities for farm households, human capital cannot be neglected. This is acquired through formal and informal education. It is divulged that formal education increases the farmer's ability to understand and respond to information concerning decision making for appropriate choice of investment in non-agricultural income generating activities (Feder & Slade, 1984). In the Webuye Division, majority of the household heads as discussed earlier have primary and secondary education. Trading non-agricultural income generating activities require basic knowledge to compute for profits made. This is provided by education which most households heads had and therefore participation in these category of activities was high. Artisan and extractive based activities require skill. This lacked in most respondents and thus the considerable low number of such activities. In relation to the category of services non-agricultural income generating activities, the capital required to start them is considerably high. Since most of these households are resource poor (GOK, 200b; Reardon et al., 2001; MoA, 2005), the number of such activities was low.

Wegulo (1997) contends that many households have invested labour and capital in farm related non-agricultural income generating activities for instance the trading of grocery (vegetable, banana, cassava, sweet potatoes, fruits). This in part can be explained by the fact that non-agricultural income generating activities come in to avert risky situations that face agricultural production (IIED, 2002). Therefore farmers want to be near the farms as they

participate in non-agricultural income generating activities and at the same time participate in agricultural production. Majority of the farmers in the study had the activities carried out on the farm. The fact that the domestic market is small and fragmented and lacks an effective marketing information system and infrastructure cannot be ignored in leading to the farmers to be extensively on their farms (MoA, 2005).

(iii). Level of Participation of Small Scale Farmers in Non Agricultural Income Generating Activities

The level of participation in non-agricultural income generating activities could not be directly determined. To achieve this objective, it was necessary to develop a scale on the basis of time spent by households in non-agricultural income generating activities, number of non-agricultural income activities a household participated in and who in the household participated in the non-agricultural activities. But firstly, the following are the results emanating from the three indicators considered for the development of the index to give the level of participation by households.

a) Time spent by households in non-agricultural income generating activities

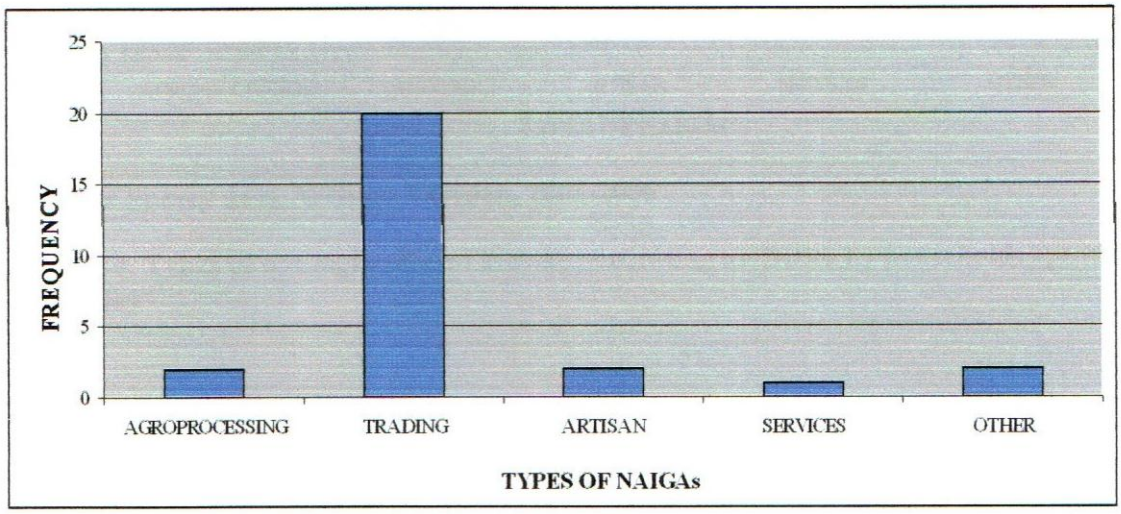
The respondents were asked the total number of hours they spent in non-agricultural income generating activities in a day. The hours given by the respondents were further categorized into proportions of the day as; 1-3 hours (1/4 day), 4-6 hours (1/2 day), 7-9 hours (3/4 day), 10-12 hours (full day) and >12 hours (>full day) as shown in Table 5.

Table 5. Amount of Time Spent on NAIGAs

	Time in hours spent on non-agricultural income generating activities					
Location	**¼ Day**	**½ Day**	**¾ Day**	**Full day**	**>Full day**	**Total**
Sitikho	-	1	4	13	2	**20**
Bokoli	3	3	1	10	4	**21**
Misikhu	12	10	4	2	1	**29**
Webuye	5	13	5	12	5	**40**
Total	**20**	**27**	**14**	**37**	**12**	**110**
% Frequency	**18.18**	**24.55**	**12.73**	**33.63**	**10.91**	**100**

Source: Survey data, Webuye Division, 2005-2006

Out of the total households in the study, 37 (33.63%) exhibited participation in non-agricultural income generating activities for a full day while households spending half a day on non-agricultural income generating activities were 27 (24.55%). Taking into account these two groups in terms of non-agricultural income generating activities they undertook, the trading activities were prominently carried out. This is shown in Figures 2 and 4.



Source: Survey data, Webuye Division, 2005-2006

Figure 2. Types of non-agricultural income generating activities by households spending half a day

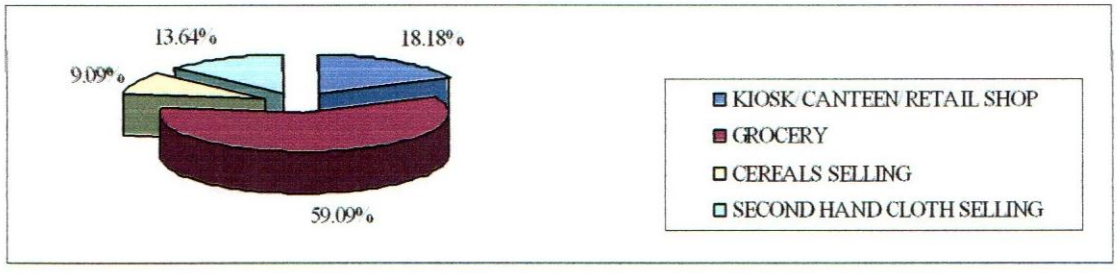
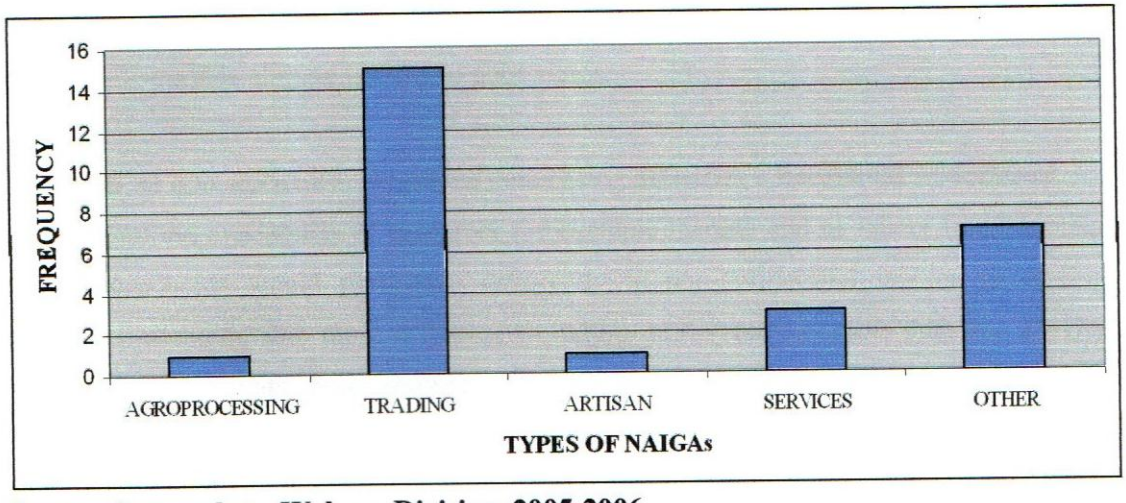


Figure 3. Non-agricultural income generating activities under the trading category by households spending a half day



Source: Survey data, Webuye Division, 2005-2006

Figure 4. Types of non-agricultural income generating activities by households spending a full day

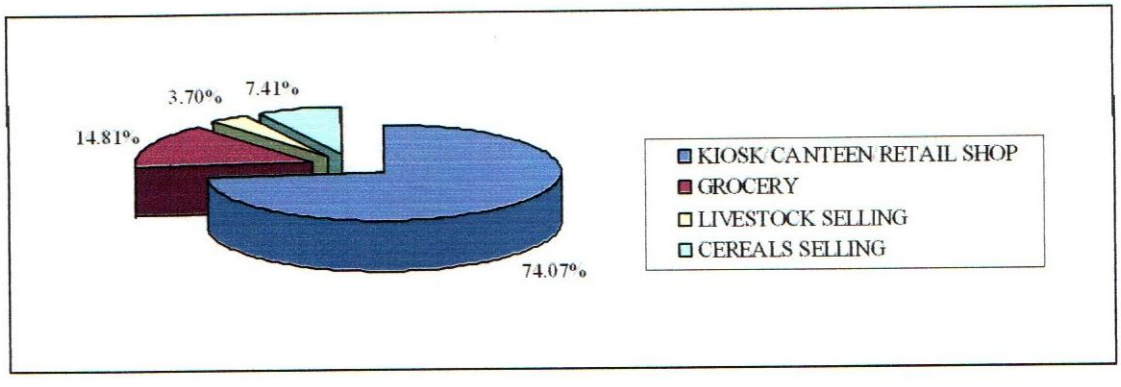


Figure 5. Non-agricultural income generating activities under the trading category by households spending a full day

In Figures 3 and 5, the households that spend half a day on non-agricultural income generating activities participated (59.09%) in grocery trading as opposed to those spending a full day on the same (14.81%). Those with full day participation were mostly occupied by the kiosk, canteen, retail shop activities (74.07%) as compared to those spending half a day on non-agricultural income generating activities (18.18%). Considering that agriculture is the major source of livelihood, this outcome was expected. Though it might be perceived that a household was occupied throughout the day in a kiosk, canteen or a retail shop, this was within the vicinity of the farm and therefore a service was only provided when a customer appeared. In essence this depicts that households will be involved in non-agricultural income

generating activities to avert difficulties that are associated with agricultural production for instance unfavourable climate leading to poor yields.

b) Number of non-agricultural income generating activities a household undertakes

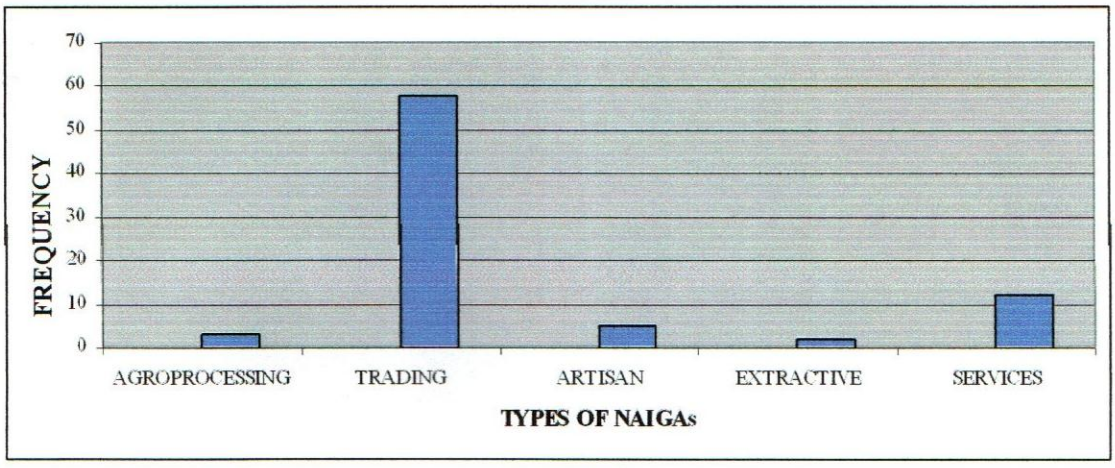
Depending on the availability of resources for example income and or labour (among other factors), households would participate differently in non-agricultural income generating activities. Households with more resources would opt to diversify in more than one activity as opposed to those with lesser resources (Reardon et al., 2001). Households in this study were reported to have one or more than one non-agricultural income generating activity hence the following results in Table 6.

Table 6. Number of NAIGAs Participated in by Households

Location	Number of non-agricultural income generating activities		Total
	One	More than one	
Sitikho	15	5	**20**
Bokoli	14	7	**21**
Misikhu	24	5	**29**
Webuye	32	8	**40**
Total	**85**	**25**	**110**
% Frequency	**77.27**	**22.73**	**100**

Source: Survey data, Webuye Division, 2005-2006

The indication given here is that most of the households 85 (77.27%) undertook only one non-agricultural income activity while the remaining number of households 25 (22.73%) had more than one activity to undertake. This is in agreement with the status of the households in the study area because most of them are resource poor and hence can only afford to invest in one activity (GOK, 2002b). The most dominant activity undertaken by majority of the households with one non-agricultural income generating activity was trading (Figures 6 and 7).



Source: Survey data, Webuye Division, 2005-2006

Figure 6. Distribution of non-agricultural income generating activities undertaken by households with one activity

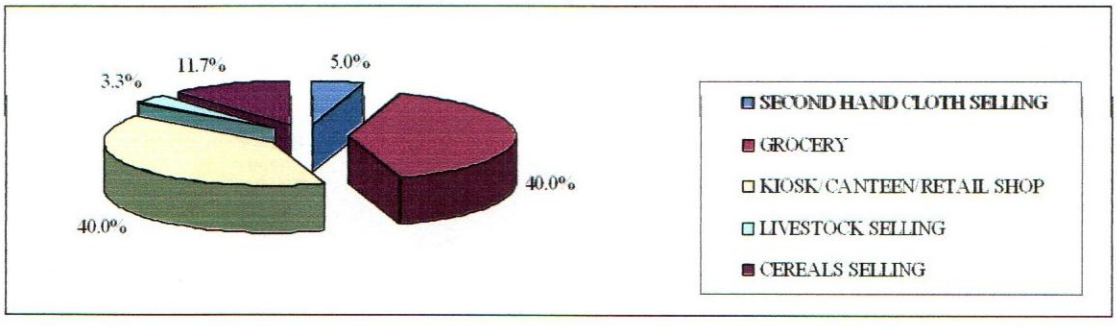
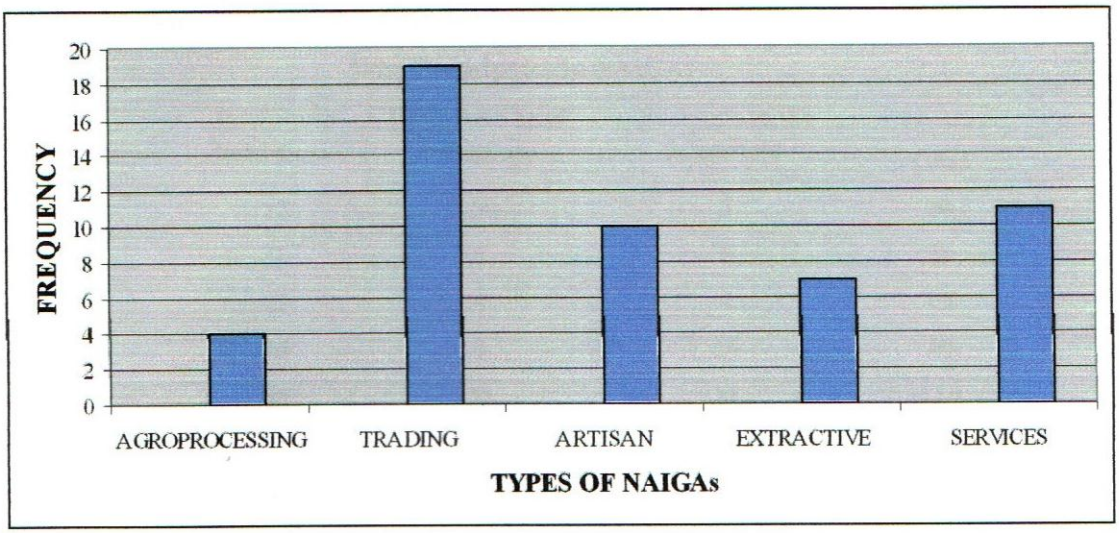


Figure 7. Trading activities undertaken by households with one non-agricultural income generating activity

It is manifest that households with one non-agricultural income generating activity undertook 40.0% in the grocery and the kiosk, canteen, retail shop activities as compared to other activities under the trading category (Figure 9). On the other hand, trading activities were also highly preferred by households with more than one non-agricultural income generating activity (Figure 8).



Source: Survey data, Webuye Division, 2005-2006

Figure 8. Distribution of non-agricultural income generating activities by households with more than one activity

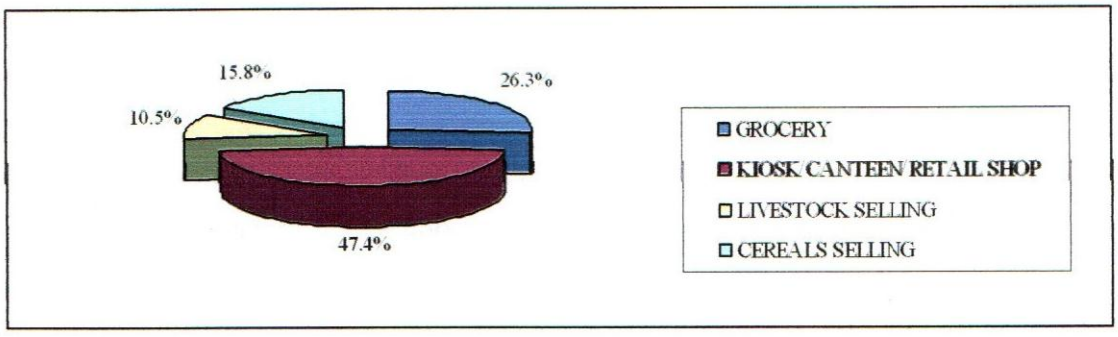


Figure 9. Trading activities by households with more than one non-agricultural income generating activity

As indicated in Figure 9, the kiosk, canteen, retail shop activities were highly undertaken by this group of respondents in conjunction with others.

c) Individuals in the household participating in non-agricultural income generating activities

Level of participation of households may vary significantly in terms of who takes part in the non-agricultural income generating activities coupled with time and number of the activities of a household. Households where the household head is the only one involved in non-agricultural income generating activities may have a low level of participation as compared to the case where the spouse of the household head and children are involved (Table 7).

Table 7. Individuals in the Households Participating in NAIGAs

	Who Participates In NAIGAs			
Location	Household head alone	Household head and spouse	Everyone in the household	**Total**
Sitikho	12	3	5	**20**
Bokoli	9	6	6	**21**
Misikhu	21	4	4	**29**
Webuye	15	9	16	**40**
Total	**57**	**22**	**31**	**110**
% Frequency	**51.82**	**20**	**28.18**	**100**

Source: Survey data, Webuye Division, 2005-2006

The nature and type of non-agricultural income generating activities households participated in differed greatly and so was the case with those who participated in the activities. Household heads were on the lead of participation 57 (51.82%) as compared to the rest of the categories of who participated in the activities; 22 (20%) for household heads and the spouse; and 31 (28.18%) for everyone in the household. This is agreeable considering the fact that some non-agricultural income generating activities require specific skills that can be possessed by a few members of the households. On specific occasions when the household head was absent or involved in a concurrent family activity, the spouse or children ran the non-agricultural income generating activity. From the consideration of total time spent on non-agricultural income generating activities, the number of activities a household participates in and who participates in non-agricultural income generating activities, the indicators were given scores as indicated in Table 8.

Table 8. Scores for the Scale of Level of Participation in NAIGAs

Level of participation indicators		
Time in NAIGAs	**Number of NAIGAs**	**Who participate in NAIGAs**
¼ Day **1***	One **1***	Household head alone **1***
½ Day **2***	More than one **2***	Household head and spouse **2***
¾ Day **3***		Everyone in the household **3***
Full Day **4***		
>Full Day **5***		

Note: The * indicates the score for responses under each indicator.

From these scores, an index was developed by getting the sum of scores exhibited by the respondent. For instance the lowest score was obtained by a sum of 1 + 1 +1 = 3 while the highest score was obtained by summing up 5 + 2+ 3 = 10. With this basis, a scale ranging from 3 to 10 was arrived at to cater for the respondents' scores. The midpoint of this scale was 6.5 and this denoted moderate level of participation in non-agricultural income generating activities. Considering the scores below and above the midpoint, five levels of participation in non-agricultural income generating activities were defined in this study (Figure 10). These were; very low for a score range from 3 to 4.75; low for a score range from 4.75 to 6.5; moderate for a score of 6.5; high for a score range from 6.5 to 8.25 and finally very high for a score range from 8.25 to 10. For a household with a very low participation implied that it spent ¼, undertook one non agricultural income generating activity and only the household head was involved. On the other hand, a household with a very high participation spent more than a full day, undertook more than one non-agricultural income generating activity and everyone in the household was involved.

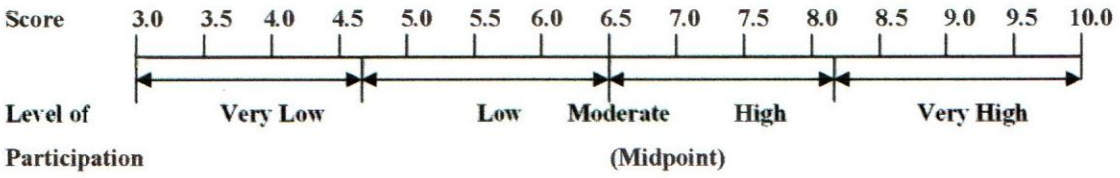


Figure 10. Scale depicting levels of participation of households in non-agricultural income generating activities

From the scale in Figure 10, households showed the results as illustrated in Table 9.

Table 9. Levels of Participation of Households in NAIGAs

Location	Levels of participation of households in non-agricultural income generating activities					Total
	Very low	Low	Moderate	High	Very high	
Sitikho	-	11	1	3	5	**20**
Bokoli	3	7	1	3	7	**21**
Misikhu	4	21	-	1	3	**29**
Webuye	7	20	5	-	8	**40**
Total	**14**	**59**	**7**	**7**	**23**	**110**
% Frequency	**12.73**	**53.64**	**6.36**	**6.36**	**20.91**	**100**

Source: Survey data, Webuye Division, 2005-2006

Slightly over half of the households 59 (53.64%) had a low level of participation in non-agricultural income generating activities. However, it is worth to note that those that very highly participated in non-agricultural income generating activities 23 (20.91%) were more than those that were considered to be of very low participation 14 (12.73%). A finding to note here is that households with very low participation had a 21.4% participation in agro processing activities; 7.1% in both extractive and services activities. Those with low participation were mostly involved in trading activities (98.3%). For households with moderate participation, 85.7% were doing artisan activities while 14.3% did extractive activities.

Households that had a high level of participation were majorly concerned with services activities (100%) and lastly those with a very high level of participation undertook 8.7% of trading activities, 4.3% of services activities and 87.0% for a combination of the various categories of the non-agricultural income generating activities. An implication from the findings is that the category of a non-agricultural income generating activity dictated the level of participation of the household. This is because of the difference in the time and labour required from the household members to run such an activity.

4.3 Tests of Hypotheses

Tests of hypotheses were carried out to establish whether there was any relationship between independent variables (farm size; age of household head, gender of household head and

education level of household head; access to credit and access market information and use of appropriate technologies) and the dependent variable (food security status). The hypotheses in the study were translated from objectives (iv) to (vi).

Hypothesis one: There is no statistically significant relationship between the level of participation of small scale farmers in non-agricultural income generating activities and food security status.

This hypothesis was tested using the Chi-square. The levels of participation were compared to the food security statuses of the households to determine if a relationship existed between the two within the households (Table 10). The levels of participation as described earlier were: very low, low, moderate, high and very high.

Table 10. Cross Tabulation and Chi-square for Relationship between level of Participation in NAIGAS and Food Security Status of Households

	Food security status of households				
Level of participation	Food secure	Food insecure without hunger	Food insecure with moderate hunger	Food insecure with severe hunger	**Total**
Very low	2 (6.67%)	5 (19.23%)	6 (13.04%)	1 (12.5%)	**14 (12.73%)**
Low	15 (50.0%)	13 (50.0%)	27 (58.70%)	4 (50%)	**59 (53.64%)**
Moderate	3 (10.0%)	3 (11.54%)	1 (2.17%)	0	**7 (6.36%)**
High	2 (6.67%)	1 (3.85%)	3 (6.52%)	1 (12.5%)	**7 (6.36%)**
Very high	8 (26.66%)	4 (15.38%)	9 (19.57%)	2 (25%)	**23 (20.91%)**
Total	**30 (100%)**	**26 (100%)**	**46 (100%)**	**8 (100%)**	**110 (100%)**

Source: Survey data, Webuye Division, 2005-2006

Chi-square = 6.338, df = 12, P value = 0.837 (Critical alpha = 0.05)

The test as indicated in Table 10 shows that there is no evidence of a statistically significant relationship between the level of participation of small scale farmers in non-agricultural income generating activities and food security status. Therefore the null hypothesis is not rejected because χ^2 value of 6.338 is not significant at α=0.05 (P>0.05). Though with a perceived low participation in non-agricultural income generating activities, these households are more food secure (50%) as compared to those that have a higher level of participation in the same; moderate (10%), high (6.67%) and very high (26.67%). However, it is significantly noted that very low levels of participation consequently are less food secure (6.67%). Basing on the level of participation in terms of time spent by households in non-agricultural income generating activities, number of non-agricultural income activities a household participated in

and who participated in the activities, it implies that households of low level of participation will concentrate more in agricultural production. This is because a few hours are set aside for the non-agricultural income generating activity, the activity is one and only one household member is engaged in the activity at a time (therefore much labour is channeled towards agricultural production).

On the contrary, very low participation is relatively detrimental to food security. These households tend to be reservists and generally practice traditional agricultural production characterized by constraints ranging from farmer characteristics to adverse external factors. In comparison to high and very high levels of participation, these households participate in more than one agricultural activity and almost every member in the household is involved at the same time. This means that labour availability for agricultural production is divided, there is much time spent on the activities and generally much financial investment is directed towards the non-agricultural income generating activities. In return agricultural production is lowered and hence food insecurity.

Hypothesis two: There is no statistically significant relationship between selected factors and small scale farmers' participation in non-agricultural income generating activities

The selected factors that is; farm size; age, gender and education level of household head; access to credit and market information and use of appropriate technologies were thought to influence the households to participate differently in non-agricultural income generating activities. This hypothesis was tested using Chi-square on the basis that the type of data was nominal. The cross tabulation for each selected factor versus level of participation in non-agricultural income generating activities are given in Tables 11-17.

Table 11. The Relationship between Farm Size and the Level of Participation of Households in NAIGAs

Farm size categories	Level of participation in non-agricultural income generating activities					Total
	Very low	Low	Moderate	High	Very high	
0.1-2.5	6 (42.9%)	33 (55.9%)	3 (42.9%)	2 (28.6%)	15 (65.2%)	**59 (53.6%)**
2.6-5.0	6 (42.9%)	19 (32.2%)	4 (57.1%)	3 (42.9%)	4 (17.45%)	**36 (32.7%)**
5.1-7.5	0	3 (5.1%)	0	1 (14.3%)	3 (13.0%)	**7 (6.4%)**
7.6-10	2 (14.3%)	4 (6.8%)	0	1 (14.3%)	1 (4.3%)	**8 (7.3%)**
Total	**14 (100%)**	**59 (100%)**	**7 (100%)**	**7 (100%)**	**23 (100%)**	**110 (100%)**

Source: Survey data, Webuye Division, 2005-2006

Chi-square = 11.51, df = 12, P value = 0.486 (Critical alpha = 0.05)

The Chi-square test output (Table 11) shows that there is no statistical significant relationship between farm size and households' level of participation in non-agricultural income generating activities in Webuye Division. The null hypothesis is therefore not rejected since the Chi-square test value of 11.51 is not significant at α=0.05. Thus although (53.6%) households had small farm size (0.1-2.5 acres), those with larger farm sizes above this range did not necessarily have a higher level of participation in non-agricultural income generating activities.

Farm size according to Mauceri (2004) is a per capita measure of the amount of land held by a household and is also an indicator of wealth. Therefore a smaller farm size translates into low wealth. This should influence the households to participate more in non-agricultural income generating activities. On the other hand, according to Reardon et al. (2001); Toumlin and Julian (2002), increased size of land portrays increased wealth and hence a household will have the opportunity to diversify into other income generating activities and so the level of participation is expected to be higher.

Table 12. The Relationship between Age of Household Head and the Level of Participation of Households in NAIGAs

Age categories	Level of participation in non-agricultural income generating activities					Total
	Very low	Low	Moderate	High	Very high	
21-30	2 (14.3%)	7 (11.9%)	1 (14.3%)	2 (28.6%)	4 (17.4%)	**16 (14.5%)**
31-40	0	27 (45.8%)	3 (42.9%)	2 (28.6%)	10 (43.5%)	**42 (38.2%)**
41-50	5 (35.7%)	10 (16.9%)	3 (42.9%)	1 (14.3%)	3 (13.0%)	**22 (20.0%)**
51-60	5 (35.7%)	10 (16.9%)	0	0	5 (21.7%)	**20 (18.2%)**
61-70	2 (14.3%)	5 (8.5%)	0	2 (28.6%)	1 (4.3)	**10 (9.1%)**
Total	**14 (100%)**	**59 (100%)**	**7 (100%)**	**7 (100%)**	**23 (100%)**	**110 (100%)**

Source: Survey data, Webuye Division, 2005-2006

Chi-square = 32.625, df = 20, P value = 0.037 (Critical alpha = 0.05)

There is a significant (P<0.05) relationship (χ^2= 32.625) between age of household head and level of participation in non-agricultural income generating activities (Table 12). Households with heads of the age between 31-40 years were the majority (38.2%). This age category is considered youthful and it is still establishing itself according to FAO (2000). It is associated with many needs from household members like education, food, healthcare, shelter among others. It therefore becomes eminent that their level of participation in non-agricultural

income generating activities will be high. On the other hand, older farmers tend to be risk averters and have a decreased long term investment in non-agricultural income generating activities. Young people are willing to try other activities other than farming. They are typically less risk-averse. A significant relationship is thus established and the null hypothesis rejected.

Table 13. The Relationship between Gender of Household Head and the Level of Participation of Households in NAIGAs

Gender of household head	Level of participation in non-agricultural income generating activities					Total
	Very low	Low	Moderate	High	Very high	
Male	7 (50.0%)	36 (61.0%)	7 (100.0%)	6 (85.7%)	19 (82.6%)	**75 (68.2%)**
Female	7 (50.0%)	23 (39.0%)	0	1 (14.3%)	4 (17.4%)	**35 (31.8%)**
Total	**14(100%)**	**59 (100%)**	**7 (100%)**	**7 (100%)**	**23 (100%)**	**110 (100%)**

Source: Survey data, Webuye Division, 2005-2006

Chi-square = 9.995, df = 4, P value = 0.041 (Critical alpha = 0.05)

There is a significant ($P<0.05$) relationship ($\chi^2 = 9.995$) between gender of the household head and level of participation in non-agricultural income generating activities (Table 13). Male headed households had a higher level of participation in non-agricultural income generating activities as compared to the female headed households at all levels of participation. Therefore the null hypothesis was rejected. As cited before in the literature, women in the division are subordinate to men and this outcome was expected. An observation from Tanzania by Tovo (1991) shows that in most cases, women are left solely in charge of the home, farm and family while men are away. In this case, women will have little time spent on non-agricultural income generating activities and consequently a low level of participation.

Another constraint that affects the low level of female headed households' participation is the fact that most decisions to diversify income generating activities are made by men. Men will choose non-agricultural income generating activities of higher returns as opposed to women. This is evident in this study whereby women are the majority (51.72%) undertaking the trading of vegetable, banana, cassava, sweet potatoes, fruits while men (84.09%) go for artisinal, extractive and services activities. When the level of participation in terms of time is

considered, then women related activities will take a shorter time as opposed to those of their male counterparts and so the different levels of participation on gender basis.

Table 14. The Relationship between Educational Level of Household Head and the Level of Participation of Households in NAIGAs

Education level of household head	Level of participation in non-agricultural income generating activities					Total
	Very low	Low	Moderate	High	Very high	
Primary	7 (50.0%)	20 (33.9%)	0	2 (28.6%)	10 (43.5%)	**37 (35.5%)**
Secondary	2 (14.3%)	31 (52.5%)	5 (71.4%)	2 (28.6%)	7 (30.4%)	**47 (42.7%)**
Tertiary	5 (35.7%)	8 (13.6%)	2 (28.6%)	3 (42.9%)	6 (26.1%)	**24 (21.8%)**
Total	**14 (100%)**	**59 (100%)**	**7 (100%)**	**7 (100%)**	**23 (100%)**	**110 (100%)**

Source: Survey data, Webuye Division, 2005-2006

Chi-square = 28.118, df = 12, P value = 0.070 (Critical alpha = 0.05)

From the Chi-square test, there is no statistically significant relationship ($P>0.05$ at $\chi^2 = 28.118$) between education level of household head and level of participation in non-agricultural income generating activities (Table 14). The null hypothesis that there is no statistically significant relationship between the education level of household head and level of participation in non-agricultural income generating activities is thus not rejected. With higher level of education, farmers are more risk takers; possess information and venture into non-agricultural income generating activities at a higher level (Reardon et al., 2001). This however, was not the case with the households in Webuye Division although the difference in relationships is relative (indicated by the small margin of P value of 0.070 with that of $\alpha=0.05$).

Table 15. The Relationship between Access to Credit and the Level of Participation of Households in NAIGAs

Access to credit is a constraint	Level of participation in non-agricultural income generating activities					Total
	Very low	Low	Moderate	High	Very high	
Yes	7 (50.0%)	35 (59.3%)	4 (57.1%)	6 (85.7%)	12 (52.2%)	**64 (58.2%)**
No	7 (50.0%)	24 (40.7%)	3 (42.9%)	1 (14.3%)	11 (47.8%)	**46 (41.8%)**
Total	**14 (100%)**	**59 (100%)**	**7 (100%)**	**7 (100%)**	**23 (100%)**	**110 (100%)**

Source: Survey data, Webuye Division, 2005-2006

Chi-square = 2.942, df = 4, P value = 0.568 (Critical alpha = 0.05)

The results indicate that access to credit was constraining more than half (58.2%) of the households in Webuye Division. It was therefore expected that these households would have higher levels of participation in non-agricultural income generating activities. The test shows that there was a significant relationship (χ^2 value of 2.942 is not significant at α=0.05) between access to credit and the level of participation in non-agricultural income generating activities. The null hypothesis is therefore rejected. Most small scale farmers lack the finances to advance their agricultural production. This in essence is one of the factors observed by Islam (1997) and Mushtaq (2004) as leading to farmers to abandon agricultural production. Therefore having access to credit leads to farmers to purchase farm inputs to enhance agricultural production (Gordon, 2000). When agricultural production is turned to then the level of participation will be lowered because more time, labour and the number of non-agricultural income generating activities will be reduced. This is as depicted by those households that were not constrained by access to credit as indicated across every level of participation in Table 15.

Table 16. The Relationship between Access to Market Information and the Level of Participation of Households in NAIGAs

	Level of participation in non-agricultural income generating activities					
Access to market information is a constraint	**Very low**	**Low**	**Moderate**	**High**	**Very high**	**Total**
Yes	9 (64.3%)	24 (40.7%)	2 (28.6%)	5 (71.4%)	9 (39.1%)	**49 (44.5%)**
No	5 (35.7%)	35 (59.3%)	5 (71.4%)	2 (28.6%)	14 (60.9%)	**61 (55.5%)**
Total	**14 (100%)**	**59 (100%)**	**7 (100%)**	**7 (100%)**	**23 (100%)**	**110 (100%)**

Source: Survey data, Webuye Division, 2005-2006

Chi-square = 5.610, df = 4, P value = 0.230 (Critical alpha = 0.05)

The test as indicated in Table 16 shows that χ^2 value of 5.610 was not significant at α=0.05 (P>0.05). The null hypothesis here that there is no statistically significant relationship between lack of access to market information and the level of participation in non-agricultural income generating activities was therefore rejected. With access to market information, farmers are highly placed to make better production decisions and therefore have good returns from the sale of their produce. The good returns as a result will be invested in other income generating activities (UNDP, 2000) and consequently the level of

participation will be influenced positively. From the study, 55.5% of the households were not constrained by access to market information. Therefore their level of participation in the activities was expected to be higher as opposed to those that were constrained.

Table 17. The Relationship between Use of Appropriate Technologies and the Level of Participation of Households in NAIGAs

	Level of participation in non-agricultural income generating activities					
Use of appropriate technologies is a constraint	**Very low**	**Low**	**Moderate**	**High**	**Very high**	**Total**
Yes	8 (57.1%)	28 (47.5%)	2 (28.6%)	5 (71.4%)	9 (39.1%)	**52 (47.3%)**
No	6 (42.9%)	31 (52.5%)	5 (71.4%)	2 (28.6%)	14 (60.9%)	**58 (52.7%)**
Total	**14 (100%)**	**59 (100%)**	**7 (100%)**	**7 (100%)**	**23 (100%)**	**110 (100%)**

Source: Survey data, Webuye Division, 2005-2006

Chi-square = 3.781, df = 4, P value = 0.437 (Critical alpha = 0.05)

The null hypothesis for this selected factor (use of appropriate technologies) was that there was no statistically significant relationship between use of appropriate technologies and level of participation in non-agricultural income generating activities (Table 17). The Chi-square value of 3.781 is not significant at α=0.05 (P>0.05). This implies that there is a significant statistical relationship between households using appropriate technologies and the level of participation in non-agricultural income generating activities. The null hypothesis was thus rejected. The results show that 52.7% of the households were not constrained by use of appropriate technologies as opposed to 47.3% that were constrained. With improved technologies for instance use of certified seed, proper fertilizer application among other technologies it is expected that yields will increase. These high yields foster good returns to the farmers and therefore income can be further invested in more non-agricultural income generating activities and hence there was a higher level of participation in non-agricultural income generating activities.

Hypothesis three: There is no statistically significant relationship between selected factors and food security status of small scale farmers

This hypothesis was also tested using Chi-square to establish the relationship between the independent variable (selected factors) and the dependent variable (food security status). Tables 18-24 give the results for this hypothesis.

Table 18. The Relationship between Farm size and Food Security Status of Households

	Food security status of households				
Farm size categories	Food secure	Food insecure without hunger	Food insecure with moderate hunger	Food insecure with severe hunger	**Total**
0.1-2.5	11 (36.7%)	16 (61.5%)	26 (56.5%)	6 (75.0%)	**59 (53.6%)**
2.6-5.0	15 (50.0%)	8 (30.8%)	11 (23.9%)	2 (25.0%)	**36 (32.7%)**
5.1-7.5	1 (3.3%)	2 (7.7%)	4 (8.7%)	0	**7 (6.4%)**
7.6-10	3 (10.0%)	0	5 (10.9%)	0	**8 (7.3%)**
Total	**30 (100%)**	**26 (100%)**	**46 (100%)**	**8 (100%)**	**110 (100%)**

Source: Survey data, Webuye Division, 2005-2006

Chi-square = 11.674, df = 9, P value = 0.232 (Critical alpha = 0.05)

The Chi-Square test in Table 18 indicates that there is no statistical significant relationship between farm size and food security status of households ($\chi^2 = 11.674$ was not significant at α=0.05). Food security can be obtained through production of adequate food and or through purchase of the quantities of food to provide the required nutrients needs for everyone in the household to maintain an active life. As already cited, most households in Webuye Division are first level managers of their farms. The input for production of the required food quantities is not enough and so not enough food is produced. This low production renders the households food insecure despite the farm size. Resources for the purchase of food can be generated from the households' participation in non-agricultural income generating activities. However, when farm size was related to the households' level of participation in non-agricultural income generating activities, 53.6% of the households had low participation (hypothesis two). Thus this level of participation would not necessarily guarantee food security to the households. The null hypothesis that there was no statistically significant relationship between farm size and food security as a result was not rejected.

Table 19. The Relationship between Age of Household Head and Food Security Status of Households

Age categories	Food security status of households				Total
	Food secure	Food insecure without hunger	Food insecure with moderate hunger	Food insecure with severe hunger	
21-30	3 (10.0%)	6 (23.1%)	6 (13.0%)	1 (12.5%)	**16 (14.5%)**
31-40	13 (43.3%)	9 (34.6%)	18 (39.1%)	2 (25.0%)	**42 (38.2%)**
41-50	6 (20.0%)	6 (23.1%)	9 (19.6%)	1 (12.5%)	**22 (20.0%)**
51-60	4 (13.3%)	4 (15.4%)	9 (19.6%)	3 (37.5%)	**20 (18.2%)**
61-70	4 (13.3%)	1 (3.8%)	4 (8.6%)	1 (12.5%)	**10 (9.1%)**
Total	**30 (100%)**	**26 (100%)**	**46 (100%)**	**8 (100%)**	**110 (100%)**

Source: Survey data, Webuye Division, 2005-2006

Chi-square = 8.094, df = 15, P value = 0.920 (Critical alpha = 0.05)

Age wise, households with older heads are perceived to be in possession of most of the resources for agricultural production and therefore should be food secure (IFAD, 2001). The study involved respondents with the youngest age of 22 years while the oldest age being 70 years. The ages of household heads were categorized into the following groups; 21-30 (14.5%), 31- 40 (38.2%), 41-50 (20.0%), 51-60 (18.2%), 61-70 (9.1%). The range of 31-40 years had the highest respondents (38.2%). On the analysis of food security status, the most food secure households were headed by those in the category of 61-70 years of age (considering the incidences of food insecurity among the age categories). This was in agreement with the findings according to IFAD (2001) that older people will have an advantage over resources for agricultural production ranging from owning land to being in a position to acquire finances through credit firms because of having land title deeds that act as guarantees for the assistance (FAO, 2002).

An improvement of this according to Adesina and Zinnah (1993) is that older farmers tend to be experienced in production technologies and hence are more stable in their production as compared to younger farmers. The latter group is likely to experiment with new technologies that may seem risky or complicated and therefore jeopardize their production making them food insecure. As a support to this point is the fact that the participation level of older household heads in the study was lower as compared to the other age categories. This implies that more time, labour and inputs were spent on agricultural production as opposed to non-agricultural income generating activities and consequently more food was produced for the households with older heads. The null hypothesis hereunder that there was no statistically

significant relationship between age of household head and food security status was rejected owing to the fact that the Chi-square value of 8.094 was not significant at α=0.05 (P>0.05) (Table 19).

Table 20. The Relationship between Gender of Household Head and Food Security Status of Households

	Food security status of households				
Gender of household head	Food secure	Food insecure without hunger	Food insecure with moderate hunger	Food insecure with severe hunger	**Total**
Male	27 (90.0%)	15 (57.7%)	27 (58.7%)	6 (75.0%)	**75 (68.2%)**
Female	3 (10.0%)	11 (42.3%)	19 (41.3%)	2 (25.0%)	**35 (31.8%)**
Total	**30 (100%)**	**26 (100%)**	**46 (100%)**	**8 (100%)**	**110 (100%)**

Source: Survey data, Webuye Division, 2005-2006

Chi-square = 9.981, df = 3, P value = 0.019 (Critical alpha = 0.05)

There is a significant (P<0.05) relationship (χ^2 = 9.981) between gender of household head and food security status as shown in Table 20. Majority of male headed households were food secure than the female headed households. A significant relationship is thus established and the null hypothesis that there is no statistically significant relationship between gender of household head and food security status is rejected. This is in contradiction with views of Kennedy and Peters (1992); Lloyd and Gage-Brandon (1993); Quisumbing et al. (1995) who presuppose that women headed households will be food secure as compared to their male counterparts. The explanation for this difference is the fact that women in the division are subordinate to men. This is evident through the non-agricultural income generating activities males and females undertook (the participation of women (51.72%) in the trading of grocery and men (84.09%) in artisinal, extractive and services activities). The non-agricultural income generating activities for the males are posed to have higher returns compared to those of females and hence the difference in food security status. According to MoA (2005), even though women may have access to family resources, they have little control over them in terms of key decision making and this in turn influences their food production.

Table 21. The Relationship between Educational Level of Household Head and Food Security Status of Households

Education level of household head	Food security status of households				Total
	Food secure	Food insecure without hunger	Food insecure with moderate hunger	Food insecure with severe hunger	
Primary	7 (23.3%)	7 (26.9%)	20 (43.5%)	5 (62.5%)	**39 (35.5%)**
Secondary	12 (40.0%)	13 (50.0%)	19 (41.3%)	3 (37.5%)	**47 (42.7%)**
Tertiary	11 (36.7%)	6 (23.1%)	7 (15.2%)	0	**24 (21.8%)**
Total	**30 (100%)**	**26 (100%)**	**46 (100%)**	**8 (100%)**	**110 (100%)**

Source: Survey data, Webuye Division, 2005-2006

Chi-square = 12.067, df = 9, P value = 0.008 (Critical alpha = 0.05)

The Chi-square value of 12.067 is significant at α=0.05 (P<0.05) as indicated in Table 21. This implies that there is a statistical significant relationship between the level of education of the household head and food security status. The null hypothesis in this case was consequently rejected. Education is thought to improve decision making skills of farmers in the adoption of new technologies (Chaves & Riley, 2001; Strauss et al., 1991; Feder et al., 1985). The reverse is therefore true that low level of education would be a set back to improved farm production. Level of education ranged from; no education, primary, secondary to tertiary education. Most of the households (42.7%) attained secondary education followed by primary education level (35.5%) and lastly tertiary (21.8%). Low level of education is characterized by conventional farming and in the case of Webuye Division, this was true in the level of management most farmers practiced (first level of management) (MoA, 2004). The incidences of food insecurity were therefore vast among the households with primary level of education heads. Households whose heads attained tertiary education had less incidences of food insecurity as compared to the lower levels.

Table 22. The Relationship between Access to Credit and Food Security Status of Households

	Food security status of households				
Access to credit is a constraint	Food secure	Food insecure without hunger	Food insecure with moderate hunger	Food insecure with severe hunger	**Total**
Yes	18 (60.0%)	13 (50.0%)	26 (56.5%)	7 (87.5%)	**64 (58.2%)**
No	12 (40.0%)	13 (50.0%)	20 (43.5%)	1 (12.5%)	**46 (41.8%)**
Total	**30 (100%)**	**26 (100%)**	**46 (100%)**	**8 (100%)**	**110 (100%)**

Source: Survey data, Webuye Division, 2005-2006

Chi-square = 3.634, df = 3, P value = 0.304 (Critical alpha = 0.05)

The null hypothesis was that there was no statistically significant relationship between access to credit and food security status of the households. The test signifies that (P>0.05) with χ^2 = 9.981 is not significant. The null hypothesis is therefore rejected. The incidences of food insecurity implicated by the food insecurity without hunger: with moderate hunger and severe hunger are more prevalent in the households without access to credit than those that were not constrained by credit. This meant that credit accessibility was important to enhance food security status of the households. Lack of credit is a constraint to both diversification into non-agricultural income generating activities and agricultural production. Most of the households became threatened by incidences of food insecurity owing to the poor structure of micro financial institutions especially in the rural (MoA, 2005) of which Webuye Division is not an exception. This is evidenced by the percentage (58.2%) of those households that did not access credit (Table 22). The institutions reach only a small proportion of smallholder farmers and provide very short term credit and their effective lending rates are very high.

Table 23. The Relationship between Access to Market Information and Food Security Status of Households

	Food security status of households				
Access to market information is a constraint	Food secure	Food insecure without hunger	Food insecure with moderate hunger	Food insecure with severe hunger	**Total**
Yes	18 (60.0%)	8 (30.8%)	20 (43.5%)	3 (37.5%)	**49 (44.5%**
No	12 (40.0%)	18 (69.2%)	26 (56.5%)	5 (62.5%)	**61 (55.5%)**
Total	**30 (100%)**	**26 (100%)**	**46 (100%)**	**8 (100%)**	**110 (100%)**

Source: Survey data, Webuye Division, 2005-2006

Chi-square = 5.080, df = 3, P value = 0.166 (Critical alpha = 0.05)

The null hypothesis for this variable was that; there was no statistically significant relationship between access to market information and food security status of households. From the Chi-square test in Table 23, $\chi^2 = 5.080$ is not significant at $\alpha=0.05$ ($P<0.05$). Households that were not constrained by access to market information were less food secure than those that were constrained by access to market information. But consequently, cases of food insecurity were more in the former group of households than the latter. With access to market information, households were likely to participate more in non-agricultural income generating activities as discussed in hypothesis two for the same variable.

The expected outcome of this would have been that the households would be more food secure. But according to DFID (2000), non-agricultural income generating activities may provide incomes that are too low for basic needs and conditions inadequate for basic human needs among them food. From the study, the trading non-agricultural income generating activities were the most prevalent (60.59%). Of these, households with kiosk, canteen, retail shop were (25%) and those with grocery activities were 22.73%. These were the activities that provided most income to households. The sustenance of these activities towards food security is low (especially the agricultural products) bearing in mind the nature of agricultural markets to small scale farmers which are characterized by long chains of transaction between the farm gate and the consumer, poor access to appropriate and timely market information, small volumes of highly varied and un-graded quality products and poorly structured and insufficient markets (Reardon et. al., 2000).

Table 24. The Relationship between Use of Appropriate Technologies and Food Security Status of Households

	Food security status of households				
Use of appropriate technologies is a constraint	Food secure	Food insecure without hunger	Food insecure with moderate hunger	Food insecure with severe hunger	**Total**
Yes	10 (33.3%)	14 (53.8%)	23 (50.0%)	5 (62.5%)	**52 (47.3%)**
No	20 (66.7%)	12 (46.2%)	23 (50.0%)	3 (37.5%)	**58 (52.7%)**
Total	**30 (100%)**	**26 (100%)**	**46 (100%)**	**8 (100%)**	**110 (100%)**

Source: Survey data, Webuye Division, 2005-2006

Chi-square = 3.671, df = 3, P value = 0.299 (Critical alpha = 0.05)

The null hypothesis underlying this variable was that; there was no statistically significant relationship between the use of appropriate technologies and food security status of households. The test indicates that the Chi-square value of 3.671 was not significant at α=0.05 therefore the null hypothesis was rejected (Table 24). A statistical significant relationship between use of appropriate technologies and food security status existed. About half of the households (52.7%) were not constrained by use of appropriate technologies for their agricultural production. Basing on the importance of using appropriate technologies, the expected outcome was therefore that these households would be more food secure than those that did not use the same for agricultural production.

Factor analysis

Factor analysis was used to identify underlying variables, or factors, that were essential to explain the pattern of correlations within a set of observed variables towards the dependent variable in the study. This was because factor analysis is often used in data reduction to identify a small number of factors that explain most of the variance observed in a much larger number of manifest variables (Fabrigar et al., 1999). This study had a considerable number of independent variables acting towards the dependent variable.

The results in Table 25 indicate that the first four principle components formed the extracted solution. The extracted sums of squared loadings show that the extracted components explained approximately 71.54% of the variability in the original seven variables in the study. Since factor analysis is a data reduction technique (grouping of variables), the data in this study was reduced in complexity with 28.46% loss of information.

Table 25. Explanation of Total Variance

	Initial Eigenvalues		Extraction Sums of Squared Loadings	Rotation Sums of Squared Loadings		Initial Eigenvalues		Extraction Sums of Squared Loadings	Rotation Sums of Squared Loadings		Initial Eigenvalues	
Component	Total	% of Variance	Cumulative %	Component	Total	% of Variance	Cumulative %	Total	Total	Component	Total	% of Variance
1	1.60	22.81	22.81	1.60	22.81	22.81	1.59	22.75	22.75			
2	1.24	17.64	40.45	1.24	17.64	40.45	1.21	17.26	40.01			
3	1.13	16.11	56.56	1.13	16.11	56.56	1.12	16.03	56.04			
4	1.05	14.98	71.54	1.05	14.98	71.54	1.09	15.50	71.54			
5	0.845	12.03	83.56									
6	0.72	10.32	93.88									
7	0.43	6.12	100.00									

Source: Survey data, Webuye Division, 2005-2006
Extraction Method: Principal Component Analysis
Note: Components 1-7 represent the independent variables

The rotated matrix in Table 26 helped to determine what the components 1-7 represented.

Table 26. Rotated Component Matrix

Variable	Component			
	1	2	3	4
Farm size	0.74	0.17	-0.21	0.28
Age of household head	0.83	-0.02	-0.02	-0.22
Gender of household head	0.05	0.65	0.33	0.39
Level of education of household head	-0.53	0.28	-0.61	0.03
Access to credit	-0.03	-0.07	-0.07	0.86
Access to market information	-0.26	0.14	0.77	-0.06
Use of appropriate technologies	-0.02	-0.81	0.10	0.23

Source: Survey data, Webuye Division, 2005-2006
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. A Rotation converged in 9 iterations.

The first component was most highly correlated with Farm size and Age of household head. Age of household head was a better representative, however, because it was less correlated with the other three components. The second component was most highly correlated with Gender of household head. The third component was most highly correlated with Access to market information. The fourth component was most highly correlated with Access to credit. For each case and each component, the component score was computed by multiplying the case's original variable values by the component's score coefficients. The resulting four component score variables were representative of, and can be used in place of the seven original variables with a 28.46% loss of information. From the analysis, age and gender of household head and access to market information and credit are not linearly correlated with each other and therefore are a representative of all seven original variables in determining the food security status of the households in Webuye Division.

The implication for this analysis is that the age of the household head was the most determining factor for the level of participation in non-agricultural income generating activities and consequently the food security status of his/her household. Households with a younger age category (below 41-50 years) had a higher level of participation in non-agricultural income generating activities as opposed to the age categories above this. But on the other hand, the lower the age category the more food insecure the households became. As discussed earlier, older people have access to resources for production and are more settled

compared to younger ones who are risk takers and want to try other activities other than farming. Since agriculture is the main source of livelihood, it was imperative that older household heads had an advantage in agricultural production and were able to meet the food needs of their households as opposed to younger household heads who undertook other activities for their livelihood that were uncertain and therefore affected their attainment of food needs.

With gender of the household head, traditions and practices undermined the role of women in agricultural production. This is evident from the study because of the food security statuses that differed with those of the males. Most female headed households were food insecure compared to the households headed by males. This proves the cited literature that women in the division were subordinate to men and this affected their decision making which in turn affected their agricultural production. Therefore gender from the disposition of this study was the second most influencing factor for food security status of the households.

Access to market information was the third most influencing factor on the food security status of the household. With access to markets, households are better placed to get good returns from their produce. This is because middle men who would have taken the advantage of the farmers by getting the profits are avoided. This is what accrues from the study and consequently the food security status that was a characteristic of households that had access to market information in the study.

Access to credit is a major constraint to most farmers in the rural setting since the credit institutions reach only a small proportion of the farmers and provide short term credit. Interests for these lendings are usually very high. Due to high cost of inputs most farmers are unable to produce sufficient food for their households. In case of Webuye Division, due to the characteristic of the micro financial institutions most farmers were first level managers of their farms. This implied that they were only able to afford half the required inputs for production per acre of their farms. The results were that the produce was not adequate enough to sustain the households and so the high rates of food insecurity in the households that did not access credit.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter outlines a brief summary, gives conclusions and recommendations resulting from the study. It indicates the theoretical value of the study in terms of filling a gap in knowledge and adding new knowledge in agricultural extension in Kenya. It also gives suggestions for further research to be conducted to discover more in terms of other variables that influence food security status of households.

5.2 Summary of major findings

This study was propelled by the fact that food security was a major concern in Webuye Division. Owing to this problem many farmers had turned to non-agricultural income generating activities as a means of diversifying their livelihood income sources. It was not clear whether the small scale farmers were obtaining food security by participating in these non-agricultural income generating activities. The study had several key objectives to answer this problem. It evaluated how selected factors; farm size, gender; age; level of education of the household head, access to credit, access to market information and use of appropriate technologies influenced smallholder rural households' participation in non-agricultural income generating activities and the implications these factors had on food security. The attempt to answer the problem was based on survey responses from 110 small scale farmers in Webuye Division.

Looking at food security status, a large proportion of the population (72.73%) in the study were food insecure as compared to 27.27% who were food secure. Food insecurity increased with the increase in farm size. Women headed households in the study were 46.67% and only 8.6% of these were food secure compared to men headed households (53.33%) where they recorded 36% of food secure households. In the study, (42.7%) of the household heads attained secondary education followed by those with primary education level (33.6%), tertiary education level (21.8%) and lastly no education (1.8%). Households whose heads attained tertiary education were 45.83% food secure followed by those with secondary education (28.57%) then primary education (18.92%). The study involved respondents with ages ranging from 22 years to 70 years. A fairly good proportion food secure households

(42.86%) were headed by those in the category of 61-70 years of age and those with the least food secure households (18.75%) were in the category of 21-30 years.

On the prevalence of non-agricultural income generating activities the division shows a considerable number of them. The trading activities were more prevalent (60.59%) as compared to other activities like services (16.67%), artisan (12.12%), agro processing and extractive (5.31%) each. Under the trading non-agricultural income generating activities, households with kiosk, canteen, and retail shop were 33 (25%). These were followed by vegetable, banana, cassava, sweet potatoes, fruits activities 30 (22.73%). Trading cereals followed at a frequency of 10 (7.56%) then livestock 4 (3.03%) and lastly second hand cloth selling 3 (2.27%). Other categories showed a greater decline in the number of the activities.

The level of participation in non-agricultural income generating activities according to the time, number of non-agricultural income generating activities and who participated in the activities by households was low. More than half of the households 59 (53.64%) had a low level of participation in non-agricultural income generating activities. Those that very highly participated in non-agricultural income generating activities were 23 (20.91%) followed by those with very low participation 14 (12.73%). The moderate and high levels had a tie of 7 (6.36%) households. Still on the level of participation, the null hypothesis, "There is no statistically significant difference between the level of participation of small scale farmers in non-agricultural income generating activities and food security status" was rejected because χ^2 value of 6.338 was not significant at $\alpha=0.05$ ($P>0.05$). Households with a low participation in non-agricultural income generating activities were more food secure (50%) as compared to those that had a higher level of participation in the same; moderate (10%), high (6.67%) and very high (26.67%).

Farm size, education level of the household head, access to credit and market information and use of appropriate technologies had a statistically significant relationship with the level of participation in non-agricultural income generating activities. Only age and gender of the household head had a statistically significant relationship with the level of participation. Farm size, age of the household head, access to credit and market information and use of appropriate technologies did not show a statistically significant relationship with the food security status of the households. Gender and level of education of the household head posted

a statistically significant relationship with the food security status of the household. Age and gender of the household head, access to market information and credit were the most influential variables on the food security status of the households in Webuye Division.

5.3 Conclusion

The role of agriculture in the economy and the livelihoods of the rural households is generally acknowledged. On the other hand, the non-agricultural income generating activities have been identified as key to compensating for the decline in agricultural performance. However, despite the efforts being made by households to attain food security through agricultural production and participation in non-agricultural income generating activities, majority of them still remained food insecure. What emanates from the study is that age and gender of the household head, access to market information and credit influenced the food security status of households. Without consideration of these factors in Webuye Division, strategies and programmes aimed at up scaling the food security status of households may prove futile.

The linkage between agricultural production and non-agricultural income generating activities in cognisance of farmer characteristics, institutional and technological factors still has little attention in the view of improving livelihoods and food security of the households in Webuye Division. This is evident by the households' varying levels of participation in non-agricultural income generating activities and the consequent food security statuses they attained. Households may have undertaken the various non-agricultural income generating activities without passable expertise and resources to realize quality returns to enhance their livelihoods and food security.

Food security and participation of smallholder rural households in non-agricultural income generating activities are therefore multifaceted concepts which cannot be treated in isolation from other indexes that surround the farmer. Therefore efforts geared towards achieving food security and on the other hand diversifying into non-agricultural income generating activities should also address other areas of human and infrastructure development.

5.5 Recommendations

The following are recommendations from the results of this study:

i. There should be sensitization of rural households on their understanding of food security because most of them still remain food insecure despite the efforts being done

to come out of this situation. This should be enhanced by the government and NGOs that have programs situated in most rural areas. The households should in turn be in a better position to make appropriate decisions concerning their attainment of food security in the face of constraints that make part of their agricultural production activities.

ii. Policies towards the development and governance of agricultural production technologies should consider farmer characteristics like age and gender and institutional factors like access to credit and market information because these are key to influencing the food security status of the smallholder rural households. This is attainable through stakeholder forums in the initial stages of policy development and the eventual implementation of such agricultural programs. These households form the basic units of both production and consumption that emanate from the technologies developed.

iii. Attention should be given towards the promotion of the linkage between agricultural production and non-agricultural income generating activities for instance through institutions put in place in rural areas like the micro finance providers by considering the dilemma of the rural households so that facilities such as credit can be availed to most farmers at repayable rates that are affordable to them. This might help the households to acquire capital sufficient to invest in non-agricultural income generating activities that are of higher returns and thus improve their livelihoods in terms of attaining quality and enough food.

5.6 Suggestions for Further Research

i. A similar study is recommended in the same area or a different one but incorporating the discriminant function (Discriminant Analysis-DA) to investigate differences between groups and to discard variables, which are little related to group distinction. This is because of the complexity of food security and non-agricultural income generating activities in view of the factors that influence them.

ii. The magnitude and direction of the relationships arrived at in the study could be determined to establish the degree at which the independent variables influence the dependent variable.

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APPENDIX A: HOUSEHOLDS' QUESTIONNAIRE

PART I: Respondent's Identification

It is a pleasure to notify you that you have been included in this study on "Selected factors influencing smallholder rural households' participation in non-farm activities and their implications for food security in Webuye Division, Bungoma District".

Your responses will be treated as confidential and for research purposes only.

Farmer's/interviewee's names……

Gender 1. Male [ ] 2. Female [ ]

Age……

Total number of years in formal education……

Total number of years in informal education……

Marital status 1. Single [ ] 2. Married [ ] 3. Widow [ ] 4. Widower [ ]

Size of household (family size)……

Other dependants (if any)……

1. What is the size of your farm? …… (Acres).
2. When did you acquire the farm? ……
3. Whom was it acquired from? ……
4. What crops and/or animals do you raise on your farm? (Indicate as below)

Crops	Animals (indicate number)
i. _____	i _____
ii. _____	ii _____
iii. _____	iii _____
iv. _____	iv _____
v. _____	v _____

Others _____

5. Do you utilize all your farmland Yes [ ] No [ ]
6. (If yes in question 5) What portion do you utilize? …… (Acres)
7. (If no in question 5) Why don't you utilize all the land?

_____

_____

_____

_____

_____

_____

PART II: Food Security Status of Households

Respond to the questions below as directed by the respective instructions.

1. Which types of food do you consume as a family? (Tick against each type).

   i. Maize
   ii. Beans
   iii. Cassava
   iv. Sweet potatoes
   v. Sorghum
   vi. Bananas
   vii. Millet

   Others_____

2. What foods do you consume at the times indicated?

   Breakfast_____
   Lunch_____
   Supper_____

3. What is the average expenditure on food at these times in a day?

   Breakfast_____
   Lunch_____
   Supper_____

4. How much of the foods (IN Q1) would you consider to be enough for your family in a year?

Type of food	**Amount (Bags)**
i. Maize	
ii. Beans	
iii. Cassava	
iv. Sweet potatoes	
v. Sorghum	
vi. Bananas	
vii. Millet	
Others	

From the responses above, did you as a household experience the following situations because of the reasons given? The letters imply; DK-Don't Know; NT-Not True; ST-Sometimes True; OT-Often True

SITUATION	DK	NT	ST	OT
I was worried food would run out before I could afford more				
The food that I bought didn't last and I didn't have money to get more				
I couldn't afford to eat balanced meals.				
I relied on only a few kinds of low-cost food to feed the children because I was running out of food in store.				
I couldn't feed my children a balanced meal because I couldn't afford that				
My children were not eating enough because I couldn't afford enough food				

1. In the last 12 months, since last (name of current month), did you ever cut the size of your meals or skip meals because there wasn't enough food?

   [ ] YES [ ] NO

2. (IF YES IN Q1). How often did this happen?

[ ] Almost every month

[ ] Some months but not every month

[ ] In only 1 or 2 months

3. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough food?

   [ ] YES [ ] NO

4. In the last 12 months, were you hungry but didn't eat because you couldn't afford enough food?

   [ ] YES [ ] NO

5. In the last 12 months did you ever not eat for a whole day because there wasn't enough food?

   [ ] YES [ ] NO

6. (IF YES IN Q5) How often did this happen?

   [ ] Almost every month

[ ] Some months but not every month

[ ] In only 1 or 2 months

7. In the last 12 months, since (current month) of last year, did you ever cut the size of your child's meals because there wasn't enough food in store?

[ ] YES [ ] NO

8. In the last 12 months did your children ever skip meals because there wasn't enough food?

[ ] YES [ ] NO

(IF YES IN Q8) What meals did they skip?

[ ] Breakfast [ ] Lunch [ ] Supper

9. How often did this happen?

[ ] Almost every month

[ ] Some months but not every month

[ ] In only 1 or 2 months

10. In the last 12 months, was your child ever hungry but you couldn't afford more food?

[ ] YES [ ] NO

11. In the last 12 months, did your child ever not eat for a whole day because there wasn't enough food?

[ ] YES [ ] NO

PART III: Participation in Non-Agricultural Income Generating Activities

a. Level of participation of households in non-agricultural income generating activities

Respond to the following items as per their instructions

1. Which non-agricultural income generating activities do you participate in as a household?

2. How much time have you allocated to these activities in a day?

ACTIVITY	TIME (Hours in a day)

Does this vary from season to season? [ ] YES [ ] NO
If YES, how?

4. Approximately, how much income do you generate from the activities in a day?

ACTIVITY	INCOME (KShs)

5. How much of the income do you spend to on food?
KShs_____

6. What is the cost of the following agricultural activities for you as a farmer?

Activity	**Cost (KShs.)**
Land preparation	
Buying planting materials	
Planting	
Weeding	
Top dressing	
Harvesting and transportation	
Storage	
Total	

7. Where in the agricultural activities do you invest income from non-agricultural income activities and approximately how much?

Activity	**Invest income (tick √)**	**Amount invested (KShs)**
Land preparation		
Buying planting materials		
Planting		
Weeding		
Top dressing		
Harvesting and transportation		
Storage		
Total		

8. Approximately how much income do you generate from agriculture?
   KShs_____

9. Who in your household participates in non-agricultural income generating activities?
   [ ] The household head alone
   [ ] The household head and wife/husband
   [ ] Children alone
   [ ] Everyone in the household

10. Have you realized any change in food production because of your participation in non-agricultural income generating activities? [ ] Yes [ ] No

11. (IF YES IN Q10), what has contributed to the increased the production?

12. (IF NO IN Q10), what has contributed to the low production?

_____

_____

_____

_____

_____

_____

_____

_____

13. How would you rate your household's participation in non-agricultural income generating activities?
    [ ] Very low
    [ ] Low
    [ ] Moderate
    [ ] High
    [ ] Very high

14. If production on your farm improved to give enough food for the family, would you continue with your non-agricultural income generating activity? [ ] Yes [ ] No

15. What other benefits do you derive from your participation in non-agricultural income generating activities?

b. Perception on constraining factors to households

Tick appropriately in the table the letters that describe your feelings about the following items. The letters represent the following responses:

SD=Strongly Disagree D=Disagree U=Uncertain A=Agree SA=Strongly Agree

Item	SD	D	U	A	SA
Small farm size does not encourage participation in non-farm activities					
Small farm size enhances food production hence ensures food security					
Income from non-agricultural income generating does not supplement food production despite the land size					
Small farm size is not critical in determining the type of non-agricultural income generating activity					
Farm size will always determine the food security status of the household					
Credit accessibility does not facilitate participation in non-agricultural income generating activities					
Accessibility to credit means more food production hence food security					
Accessibility to credit will enhance acquisition of farm inputs thus averting participation in non-farm activities for food security					
Credit accessibility is not critical in determining the type of non-agricultural income generating activity					
Credit accessibility will not always determine the food security status of the household					
Access to market information for farm produce does not influence participation in non-agricultural income generating activities					
Access to market information for farm produce encourages more food production hence food security is attained					
Access to market information for farm produce will enhance acquisition of inputs thus averting participation in non-agricultural income generating activities for food security					
Access to market information for farm produce is critical in determining the type of non-agricultural income generating activity					
Access to market information for farm produce will always determine the food security status of the household					
Use of appropriate technologies does not encourage participation in non-agricultural income generating activities					
Use of appropriate technologies encourages more food production hence food security is attained					
Use of appropriate technologies enhances the acquisition of farm inputs thus averting participation in non-farm activities for food security					
Use of appropriate technologies is not critical in determining the type of non-agricultural income generating activity					
Use of appropriate technologies will always determine the food security status of the household					

Thank you for your responses

APPENDIX B: INTERVIEW SCHEDULE FOR KEY INFORMANTS

You are asked to participate in this study on how small scale farmers participate in non-agricultural income generating activities and how this enhances their food security in your capacity as an expert and or as a leader in agricultural production. Your responses will be treated as a basis to help farmers make decisions on their food production.

1. What is your opinion on non-agricultural income generating activities?

2. What is your view on the extent of participation of farmers in non-agricultural income generating activities on food security?

3. Rank the following to indicate the factor that most influences small scale farmers to participate in non-agricultural income generating activities? Use numbers 1-6, where 1 will indicate the least influencing and 6 the most influencing factor.

[ ] Farm size
[ ] Age
[ ] Gender
[ ] Lack of access to credit
[ ] Lack of market information for farm produce
[ ] Inadequate use of appropriate technologies

4. Which non-agricultural income generating activity is widely practiced by majority of the farmers in your area?

5. Why do farmers prefer it to the rest?

6. What has been the impact of non-agricultural income generating activities on food security status of farmers?

Thank you for your responses

APPENDIX C: SCALE FOR MEASURING THE FOOD SECURITY STATUS OF HOUSEHOLDS

Number of 'YES' responses		Food security status category
Household with child	**Household with no child**	
0 1 2	0 1 2	Food secure
3 4 5 6 7	3 4 5	Food insecure without hunger
8 9 10 11 12	6 7 8	Food insecure with hunger moderate
13 14 15 16 17 18	9 10	Food insecure with hunger severe

Source: USDA-Guide to Measuring Household Food Security-2000

APPENDIX D: GRADUATE SCHOOL LETTER OF APPROVAL FOR THE STUDY

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OFFICE OF THE DIRECTOR GRADUATE SCHOOL

Ref: EM12/1034/03

Date..... 21st December, 2005

Mr. Charles Mamati Lusweti,
Department of Agric. Educ. & Ext..
Egerton University.
P. O. Box 536,
NJORO.

Dear Mr. Lusweti,

RE: CORRECTED PROPOSAL

This is to acknowledge receipt of three copies of your corrected proposal, entitled "Selected Factors Influencing Smallholder Rural Households' in Non-Farm Activities and Their Implications for Food Security in Webuye Division, Bungoma District".

You are now at liberty to commence your fieldwork.

Thank you.

Yours sincerely,

Joel K.K. Biwott,
for: DIRECTOR, BOARD OF POSTGRADUATE STUDIES

c.c. Supervisors

JKKB/qma

Please address all communications to the Director, Graduate School

APPENDIX E: MINISTRY OF EDUCATION RESEARCH AUTHORIZATION LETTER

MINISTRY OF EDUCATION, SCIENCE & TECHNOLOGY

Telegrams: "EDUCATION", Nairobi

Fax No.
Telephone: 318581
When replying please quote

JOGOO HOUSE
HARAMBEE AVENUE
P. O. Box 30040
NAIROBI
KENYA

Ref. No. MOEST 13/001/35C 45/2

REPUBLIC OF KENYA

Date 26th January 2006

Charles Mamati Lusweti
Egerton University
P O box 536
NJORO

Dear Sir

RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "Selected Factor Influencing Small Holder Rural Households in Non-farm Activities and their Implications for Food Security" in Webuye Division, Bungoma District, I am pleased to inform you that you have been authorized to carry out research in Bungoma District for a period ending 31st December 2006.

You are advised to report to the District Commissioner and the District Education Officer, Bungoma District before commencing your study.

On completion of your research project, you are advised to deposit two copies of your research findings to this office.

Yours faithfully

M.O. Odieki
For: PERMANENT SECRETARY

c.c. The District Commissioner
Bungoma
The District Education Officer
Bungoma

APPENDIX F: RESEARCH PERMIT

CONDITIONS

1. You must report to the District Commissioner and the District Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit.
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two (2) four(4) bound copies of your final report for Kenyans and non-Kenyans respectively.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.

GPK 6055—3m—10/2003

REPUBLIC OF KENYA

RESEARCH CLEARANCE PERMIT

(CONDITIONS—*see* back page)

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THIS IS TO CERTIFY THAT:

Prof./Dr./Mr./Mrs./Miss CHARLES MAMATI LUSWETI

of (Address) EGERTON UNIVERSITY P O BOX 536 NJORO

has been permitted to conduct research in

Location, BUNGOMA District, WESTERN Province,

on the topic SELECTED FACTORS INFLUENCING SMALL HOLDER RURAL HOUSEHOLDS IN NON-FARM ACTIVITIES AND THEIR IMPLICATIONS FOR FOOD.

for a period ending 31st Dec, 2006

SECURITY IN WEBUYE DIVISION, BUNGOMA DIST

Applicant's Signature

PAGE 3

Research Permit No. NCOST/13/001/36645

Date of issue 25-01-2006

Fee received SHS. 500



For PERMANENT SECRETARY
MINISTRY OF EDUCATION SCIENCE AND TECHNOLOGY

Permanent Secretary
Ministry of Education
Science and Technology

APPENDIX G: BUNGOMA DISTRICT COMMISSIONER'S AUTHORIZATION LETTER

REPUBLIC OF KENYA

OFFICE OF THE PRESIDENT

Telegrams: DISTRICT BUNGOMA
Telephone: 055-30340
FAX: 055-30216
when replying please Quote

REF NO ADM 15/22/209

DISTRICT COMMISSIONER
BUNGOMA DISTRICT
P.O. Box 550
50200 - BUNGOMA

Date: 26th January 2006

All District Officers
BUNGOMA

RE: RESEARCH AUTHORIZATION
CHARLES MAMATI LUSWETI

Reference is made to a letter from the Permanent Secretary, Ministry of Education Ref. No. MOEST 13/001/35C 45/2 dated 26th January, 2006 on the above stated subject.

I would like to inform you that this Masters Student has been allowed and authorized to carry out research on *"Selected factors Influencing Small Holder Rural Households in Non-Farm Activities and their Implications for Food Security"* in Webuye Division, Bungoma District. He will complete his research on 31st December, 2006.

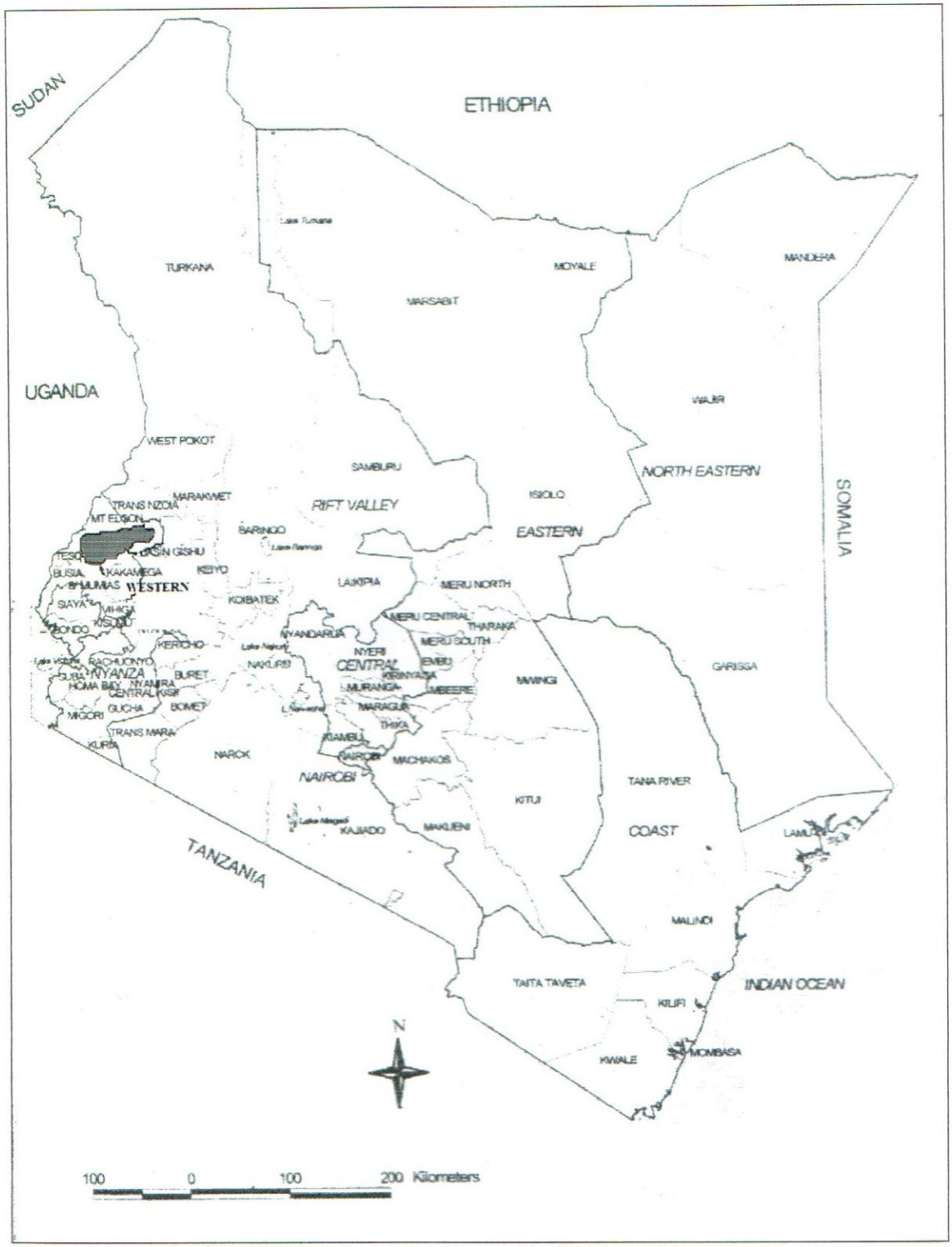
You are asked to accord him all the necessary assistance that he may require to complete the research.

(GM. OMBONGI)
FOR: DISTRICT COMMISSIONER
BUNGOMA

Cc

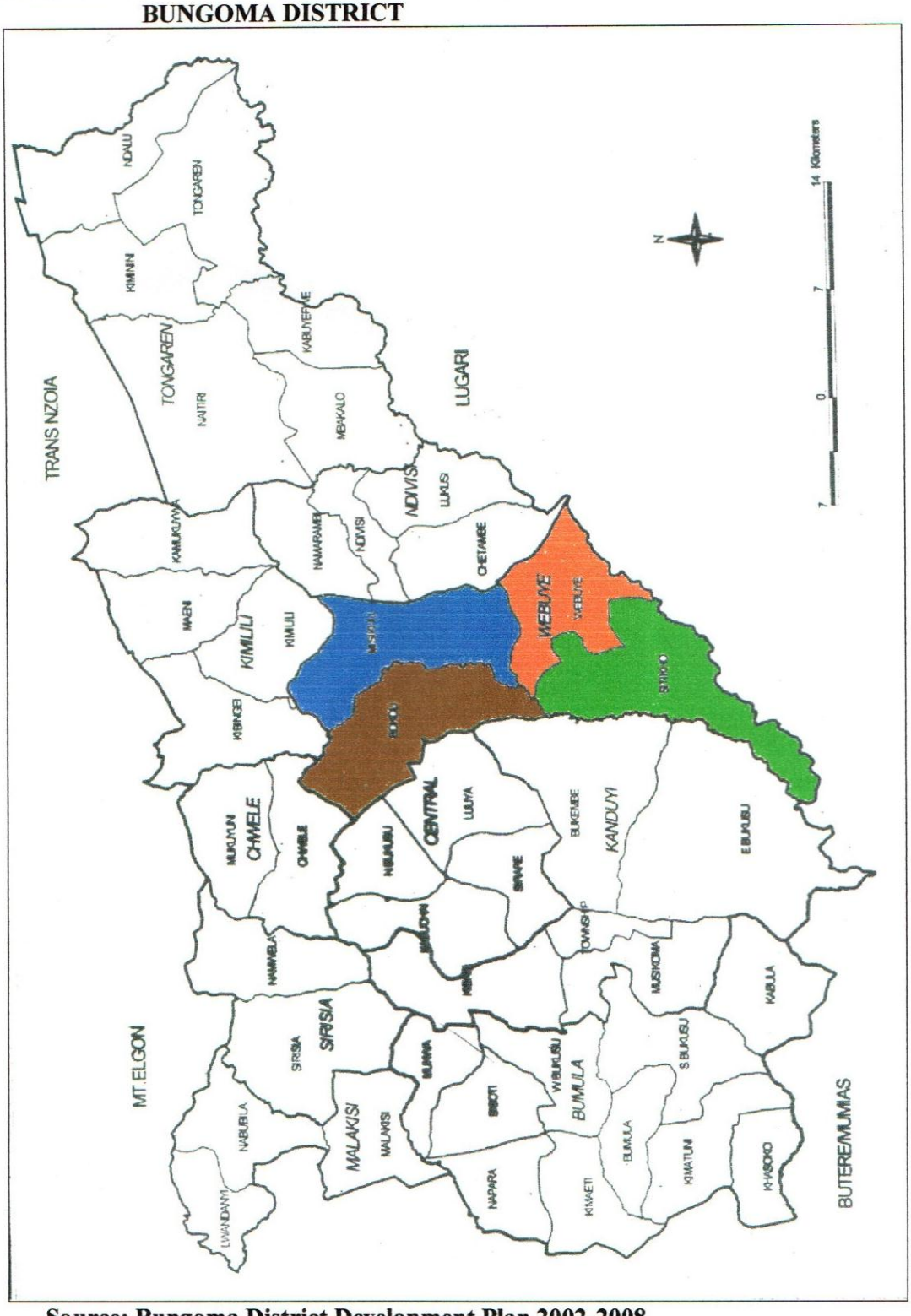
The District Education Officer
BUNGOMA - Refer to your copy of the above mentioned letter for further action.

APPENDIX H: LOCATION OF BUNGOMA DISTRICT IN KENYA



Source: Bungoma District Development Plan 2002-2008

APPENDIX I: LOCATION OF WEBUYE DIVISION AND ITS LOCATIONS IN BUNGOMA DISTRICT



Source: Bungoma District Development Plan 2002-2008

EGERTON UNIVERSITY LIBRARY