FACTORS INFLUENCING HOUSEHOLD FOOD SECURITY IN THE TEA ZONE OF KIRINYAGA COUNTY, KENYA

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A Thesis Submitted to the Graduate School in Partial Fulfilment of the Requirements for the Master of Science Degree in Community Studies and Extension of Egerton University

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DECLARATION AND RECOMMENDATION

Declaration

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

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Recommendation

This thesis has been submitted with our approval as University supervisors

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DEDICATION

To my entire family, my husband Mr. Kamau for moral and financial support, my children for their patience and understanding for spending long hours away from them while working on this project. My House help, who has been taking care of my family while I have been very busy working on this project. May God almighty bless you all abundantly.

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ABSTRACT

Individuals are deemed to be food secure if they have access to dietary balanced feeding preferences. Globally, there are at least 805 million with limited access to food. In some countries at least 75% of infants have no access to food. In Africa there is a positive growth of chronically hungry households. Poverty and food shortage have been attributed to it. In Kenya, there is a question on whether continuous land subdivision may guarantee food security. In Kirinyaga County, smallholders' tea farming has gained prominence where majority has converted into tea mono-cropping, a trend that may injure household food security. The purpose of the study was to investigate the influence of land size, tea mono-cropping and access to credit by smallholder tea farmers on household food security in the tea zone of Kirinyaga County, Kenya. The study adopted a descriptive design with the target population as the smallholder tea farmers. The accessible population consisted of 42,318 registered smallholder farmers. The sample size was 110 respondents selected through multistage sampling. Data collection was done using structured questionnaires. Validity was evaluated through seeking of opinion from supervisors from department of Applied Community Development Studies Department and experts in Ministry of Agriculture. A Pilot study was done in Gacharage tea factory in Muranga County. The factory was selected to minimize the chances of prior access of the research instrument by the target respondents. Reliability was estimated through use of Cronbach Alpha coefficients. The Cronbach's alpha coefficients for credit access, land size, tea mono-cropping was 0.7362, 0.8169 and 0.7463 respectively. Prior to data collection research permit was sought from National Commission of Science and Technology and department of agriculture in Kirinyaga County. Data was collected using self-administered questionnaires, after which SPSS Version 24 was used for analysis. Descriptive statistics such as mean, standard deviation, frequency and percentages and inferential statistics such as Chi square were used for data analysis. Land size, tea mono-cropping and access to credit had statistically significant influence on household food security ($p = 0.004$; $p=0.000$ and $p=0.002$) respectively. The study concluded that land size and access to credit were important factors in household food security. The study recommended that there is need for development of measures aimed at enhancing food security.

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LIST OF ABBREVIATIONS AND ACRONYMS

CIDP:	County Integrated Development Plan
DFID:	Department for International Development of the Government of United Kingdom
FAO:	Food and Agriculture Organization
HFS:	Household Food Security
HHSI:	Household Hunger Scale Index
HSC:	Head of State Commendation
KALRO:	Kenya Agricultural and Livestock Research Organization
KTDA:	Kenya Tea Development Agency
MDG:	Millennium Development Goals
MoA:	Ministry of Agriculture
NACOSTI:	National Commission of Science, Technology and Innovation
NGOs:	Non-Governmental Organizations
SPSS:	Statistical Package for Social Sciences
TRI:	Tea Research Institute
UN:	United Nations
UNDP:	United Nations Development Programme
USA:	United States of America
USAID:	United States Agency for International Development
WFP:	World Food Programme

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Food security is defined as a situation that exists when all people at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (Food and Agricultural Organization [FAO], 2003). This definition implies four salient features of food security: availability, stability, access and utilization. Food availability refers to the sufficient physical quantities of food of appropriate quality that is locally produced, stored, processed, distributed and exchanged or imported including food aid.

Food availability is also concerned with ease with which sufficient food can be obtained or the overall ability of the agricultural system to meet food demand. Adequacy of food availability is assessed through comparison of availability with the estimated consumption requirement for each food item (FAO, 2011). Food stability is the aspect of a population, household or individual having access to adequate food at all times. That means they are not at risk of losing access to food, temporarily or permanently as a consequence of sudden shocks such as an economic or climatic crisis, or cyclical events such as seasonal food insecurity (FAO, 2008).

Food access comprises availability to individuals, adequate incomes or other resources to purchase and /or exchange to obtain enough amounts of appropriate foods needed to maintain consumption of an adequate nutrition level. Food access is determined by its affordability or the financial capacity to buy food. Food utilization encompasses having the knowledge and means to transform plant and animal materials into nutritious food, as well having adequate water and sanitation to ensure that food prepared and consumed is hygienically sound. Food utilization determines the extent to which a given household or community can be considered as food secure or insecure (FAO, 2008).

Food is recognized as a basic human right and inadequate food consumption has serious implications for general body health and well-being, growth, development and cognitive ability. This implies that food insecurity which in this case refers to a condition in which a population does not have access to sufficient, safe and nutritious food over a given period to meet dietary

needs and preferences (FAO, 2006), is a threat to overall human well-being, as well as efforts geared toward poverty reduction and economic growth (Kirimi et al., 2013). A guarantee of household food security requires adequate home production of food and/or adequate economic and physical access to food. Economic access is the adequate purchasing power of the household, while physical access refers to the proximity to markets or other distribution channels through which food may be acquired (Lagat et al., 2010).

Global hunger, which is a consequence of food insecurity, continues to decline although 805 million people in the world today still do not have enough food to lead a healthy active life (World Food Programme [WFP], 2014). Achieving food security in its totality continues to be a challenge not only for the developing nations, but also for the developed world. In developed nations such as the United States of America, the problem is alleviated by providing targeted food security interventions, including food aid in the form of direct food relief, food stamps, or indirectly through subsidized food production (Sabila, 2014). In Tajikistan, food insecurity is attributed to the low purchasing power, arising from high levels of unemployment (FAO, 2014). In some regions of Guatemala, an estimated 75 percent of the children from infants to the ages of 6 and 7 are chronically malnourished due to food scarcity. This has been attributed to income inequality, with indigenous communities at a particular disadvantage (WFP, 2014).

In Sub-Saharan Africa, the number of undernourished people and chronically hungry has been increasing from 169 million in 1992 to 246 million in 2018 (WFP, 2019). Poverty and food shortage are the main catalysts of food insecurity in Sub-Saharan Africa, where about 48.5% of the people live in poverty. This constrains the ability of farming households to invest in productive assets and agricultural technologies, resulting in insufficient agricultural productivity (World Bank, 2013). In addition, food crop production is not increasing at a rate necessary to meet population growth, which currently averages at 2.4% annually across Africa. This food scarcity continues to drive up food prices resulting in food insecurity (Folaranmi, 2012). Besides this, erratic weather patterns often accompanied by prolonged drought are a major cause of widespread food insecurity. Despite this realization, only 5% of the cropped land is irrigated in the region compared to 14% in Latin America and 37% in Asia (Ringler et al., 2010).

In Kenya, food security has remained a challenge. For example, between 2004 and 2008 about 33% of Kenya's population experienced chronic food insecurity (Kumba, 2015). Food

security continued to deteriorate and by 2012, about 10 million people were food insecure (WFP, 2014). Inadequate food availability has been singled out as one of the most important causes of food insecurity and is attributed partly to insufficient domestic production. This has been due to low agricultural productivity and high poverty rate (over 50% of the population living below the poverty line) which limits access to food because households have no sufficient means to pay for the required food (Glopolis, 2013).

In Kirinyaga County the yields for both cash and food crops are generally low. This may be attributed to the use of low-quality seeds, low adoption of modern agricultural techniques, rising costs of farm inputs and effects of climate change. Most farmers in the county are small scale farmers due to the fact that over the years, there has been great sub-division of land to uneconomical portions. Most of the upper parts of the county are currently divided into small portions of land leading to lower agricultural productivity (Kirimi, 2016).

Tea is a major cash crop in Kenya and is predominantly produced by smallholder, resource-poor farmers, who seem to be caught in the vicious cycle of low investment, low productivity and low incomes. These farmers also face various exogenous risks emanating from the biophysical and socio-economic environments in which they operate. These risks, coupled with farm specific resource endowments and constraints affect the level and variability of household incomes and subsequently access to household food requirements (Lagat et al., 2010).

Tea farming in Kenya, which is predominantly smallholder, is considered one of the success stories in Africa. Smallholder land under tea production has persistently increased since Kenya got independence in 1963 from 21,448 ha to 141, 316 ha by 2010 (Kumba, 2015). Tea farming is similarly considered to be the leading income earner in Kirinyaga County. Policies on commercialization of cash crops like tea and provision of credit assume that, realization of increased household incomes, through cultivation of tea, would guarantee improved food security and subsequent reduction of poverty at the household level (Kirimi, 2016).

Agriculture is the main economic activity in Kirinyaga County, and 87% of the county's population depends on it, with tea being the leading major income earner. Additionally, over 75% of land in the tea zone is under tea, leaving very little land for food crop production. According to a report by Kirimi (2016) 70% of the income from the tea is used to purchase food. Since small quantities of food crops are grown in the area, food security is not guaranteed in

households which result to food imports from other non-tea growing areas of the county and neighbouring counties.

The average land holding per household is less than one hectare, and this is reducing further due to fragmentation as the population increases. According to a survey conducted in Kirunda sub-location in Kirinyaga County, Tea-coffee zone on cropping pattern and land use pattern, 27% of the land was under tea while 47% of the land was on coffee while only 36% was on food crops. This in essence contributed significantly to household food insecurity in the region. The study drew its respondents among households in Kirinyaga county that practiced tea farming (Kirimi, 2016).

1.2 Statement of the Problem

Smallholder farmers in the tea Zone of Kirinyaga County have converted most of their land into tea production, while food crop production has been on the decline. Nevertheless, the extent to which this trend has affected food security is not clear. Few studies have been conducted to establish the factors influencing household food security especially in tea Zone of Kirinyaga County. Due to land subdivision in households' areas allocated to food crops has consistently decreased. The quality and quantity of tea harvested is not guaranteed due to inability to raise required working capital which is contingent on access to credit. This study assessed how land size, tea mono-cropping and access to credit in tea farming influence household food security in the tea zone of Kirinyaga County.

1.3 Purpose of the Study

The purpose of the study was to examine factors influencing household food security in the tea zone of Kirinyaga County, Kenya.

1.4 Objectives of the Study

The specific objectives of the study were:

i. To establish the influence of land size on household food security in the tea zone of Kirinyaga County
ii. To determine the influence of tea mono-cropping on household food security in the tea zone of Kirinyaga County

iii. To investigate the influence of access to credit by smallholder tea farmers on household food security in the tea zone of Kirinyaga County

1.5 Research Hypotheses

The following hypotheses were tested in the study:

Ho_1: There is no statistically significant influence of land size on household food security in the tea zone of Kirinyaga County.

Ho_2. There is no statistically significant influence of tea mono-cropping on household food security in the tea zone of Kirinyaga County.

Ho_3. There is no statistically significant influence of access to credit by smallholder tea farmers on household food security in the tea zone of Kirinyaga County.

1.6 Significance of the Study

The findings of this study may create awareness to the Government of Kenya and the County Government of Kirinyaga on the need for food security at household level in tea zone of Kirinyaga County. The Kenya Tea Development Agency (KTDA) may use the research findings to come up with prudent policies on credit acquisition for the tea farmers to ensure proper use of the tea income to guarantee food security. The Tea Research Institute (TRI) may use the findings of the study to develop tea varieties that are high yielding per unit area hence farmers can have higher incomes that may ensure household food security. In addition, the findings may help the department of Agriculture in Kirinyaga County in conducting training programmes for farmers on the need to diversify and grow appropriate food crops to ensure household food security throughout the year. Finally, the findings of this study may provide a reference for the researchers in similar or related studies.

1.7 Scope of the Study

Whereas there are many factors related to tea mono-cropping that may influence household food security, this study focused on land size, tea mono-cropping and access to credit by smallholder tea farmers. The study was also limited to five tea factories in the tea zone of

Kirinyaga County. This is because it was not possible to study all the factors, tea factories and a longer period in a single small study at the same time.

1.8 Assumptions of the Study

i. This study was conducted on the assumption that the factors under study; land size, tea mono-cropping and access to credit by smallholder tea farmers are critical in food security in tea zone of Kirinyaga County.
ii. All the respondents would provide complete and honest responses required of them.

1.9 Limitations of the Study

i. There were differing levels of education qualifications among respondents. This was managed through administration in presence of translators who understood the local language.
ii. Another challenge was on the availability of the respondents because of their busy schedule in the tea farms. The researcher overcame this by making prior arrangement and collecting the data at a time that was convenient for the respondents.

1.10 Definition of Terms

Definition of terms presents the meaning associated with key terms that were considered in the study.

Access to Credit: The ability of individual to access credit facilities and it can be linked to regular income and deposits. Further, it is the ability to be considered for and get financial assistance from financial organizations with ease (Ejaz et al., 2009). The indicators include the amount and type of credit. In the study this definition was adopted.

Food access: Ability of individuals to access adequate resources that would aid in sourcing healthy and nutritious food. Food access comprises availability to individuals, adequate incomes or other resources to purchase and /or exchange to obtain enough amounts of appropriate foods needed to maintain consumption of an adequate nutrition level (Saweda, 2011). This definition was adopted in this study.

Food availability: This is the availability of sufficient food quantities either through domestic production or imports. Food availability refers to the sufficient physical quantities of food of appropriate quality that is locally produced, stored, processed, distributed and exchanged or imported (including food aid) (Anouk, 2010). In this study food availability referred to households accessing adequate food throughout the year.

Food crops: These are crops grown for home consumption or for sale at the local market, like maize, bananas, potatoes and beans (Oni et al., 2010). These are crops grown by a household in addition to tea; they may include bananas, potatoes, maize and beans.

Food Insecurity: It refers to a condition in which a population does not have access to sufficient, safe and nutritious food over a given period, to meet dietary needs and preferences (FAO, 2006). In this study food insecurity referred to a situation whereby a household may not acquire appropriate and desired food quantity and quality to meet their nutritional needs.

Food Security: It is a situation that exists when all people at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 2003). In this study food security referred to a

household having adequate food throughout the year either purchased with income from tea or grown in their farms. The indicators include access, availability and stability of access of food security

Household: Is a domestic unit consisting of the members of a family who live together along with non-relatives such as servants and wholly depending on the same source of food and income (Kumba, 2015). This definition was adopted for this study.

Household Hunger Scale Index: Household hunger scale index is the measure of a household access, availability and stability of access to food (Saweda, 2011). For purposes of this study this definition was adopted.

Influence: It is the capacity to have an impact or effect on something (Kumba, 2015). For the purposes of this study, it was the effect of land size, tea mono-cropping and access to credit on household food security.

Mono-cropping: It is the agricultural practice of growing a single crop year after year on the same piece of land in the absence of rotation with other crops (Ejaz, et al., 2009). For the purposes of this study, mono-cropping was defined as cultivation of tea as the only major source of income for the households.

Smallholder: It is a farmer with not more than 3 acres of land, owns not more than five animals and practices animal/crop integration as a major source of livelihood (Kumba, 2015). For the purpose of this study, smallholder was the tea farmer with less than 3 acres of land.

Stability of Access of Food: It is a situation where a household is able to access appropriate and desirable food and income to purchase food stuffs at all times (Mustaf, 2007). For purposes of this study this definition was used.

Tea Zone: Refers to the region that is predominantly occupied by tea plantations either in small- or large-scale farms (Ministry of Agriculture, 2015). In this study it referred to predominant planting of tea crop by small scale farmers in Kirinyaga County. For purposes of this study this definition was adopted.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter presents literature on concept of food security and dimensions, global, African and local food security, cash crop/mono-cropping and food security, land size of and food security, access to credit and food security, emerging issues on food and nutrition security, demographic factors related to food security, theoretical framework, and conceptual framework.

2.2 Concept of Food Security

Food security is a multidimensional concept that has evolved over time and is measured in terms of availability, stability, access, and utilization. Food security concerns started increasing in the mid-1970s when there were international food problems that were a part of global economic crisis. According to Lang'at et al. (2010), issues related to food security were macroeconomic in nature and focused mainly on ensuring the availability and price stability of foodstuffs. Saweda (2011) argued that traditionally, food security was measured in terms of food supplies, food availability, accessibility, and adequacy. Economic factors, drought and famine in some developing countries led to rethinking of food security concept. The concept of food security therefore, goes beyond availability to considerations of constraints that individual encounter to access the food (Webb et al., 2006).

According to Kirinyaga County (2013) households in tea zone generate at least 50% of their income from cash crops of which 70% is from tea. Tea prices have faced volatility globally, this poses a threat to income generation capacity in Kirinyaga County and capacity to achieve household food security. Kuhlgatz and Abdulai (2011) argues that there is an interlink between prevailing economic conditions and household income. Then there are higher odds of experiencing food insecurity in those household whose income is highly affected by inflation and exchange rates. Moreover, there is no insurance of food security as household pursue production of cash crops to increase their revenue generation. Webb et al. (2006) asserts that there is need for evaluation on respective nations food availability, utilization, stability and access at household level. This would ensure proper plans and policies are developed to mitigate against situations of food insecurity. Further, household capacity to produce should be optimized.

An empirical examination on state of food security in Nandi South tea growing by Lang'at et al. (2010) documented that land productivity, land allocation to maize and tea, alternative sources of income, household social demographic characteristics such as education, gender and education has significant effect on food security. These results may not be replicated in Kirinyaga County hence the call for localized study. Consequently, this study evaluated the effect of land size, tea mono-cropping, access to credit and demographic factors and the household food security in the tea zone of Kirinyaga County.

Common to most definitions of food security are the elements of availability, access, utilization and stability or sustainability. Availability refers to the physical existence of food, be it from own production or on the markets. On national level food availability is a function of the combination of domestic food stocks, commercial food imports, food aid, and domestic food production, as well as the underlying determinants of each of these factors. Use of the term availability is often confusing, since it can refer to food supplies available at both the household level and at a more aggregate (regional or national) level. However, the term is applied most commonly in reference to food supplies at the regional or national level (Rielyet al., 1999).

Access emphasizes on having sufficient resources to obtain appropriate foods for a nutritious diet. It is the way different people can obtain the available food. Normally, we access food through a combination of home production, stocks, purchase, barter, gifts, borrowing or food aid. Food access is ensured when communities and households and all individuals within them have adequate resources, such as money, to obtain appropriate foods for a nutritious diet (Riely et al., 1995). Access depends normally on; income available to the household, the distribution of income within the household, the price of food, and other factors worth mentioning are individuals' access to market, social and institutional entitlement/rights (ibid).

Utilization has a socio-economic and a biological aspect. If sufficient and nutritious food is both available and accessible the household has to make decisions concerning what food is being consumed and how the food is allocated within the household. In households where distribution is unequal, even if the measured aggregate access is sufficient some individuals may suffer from food deficiency (Mesfin, 2014). Stability or sustainability refers to the temporal dimension of nutrition security (i.e., the time frame over which food security is being considered). In much of the food security literature, a distinction is drawn between chronic food

insecurity—the inability to meet food needs on an ongoing basis—and transitory food insecurity when the inability to meet food needs is of a temporary nature (Maxwell & Frankenberger, 1992).

To empirically characterize household food security, (World Food Program [WFP], 2009) has identified the determinants of household food security. The main determinants identified in those works include: household size; sex of the head of household; education level of the head of household; unemployment level; dependency ratio; land size; climate shocks such as floods, landslides, dry spell, rainfall deficit and drought; whether the household has enough income to purchase food at prevailing prices; food price volatility; access to agricultural credit; ownership of saving account; total income per adult equivalent; expenditure level on food and non-food items; asset possession; access to social services; owner of home garden; access to subsidized food; source of food; availability of food commodities and supply of food commodities; inadequate labor; inadequate land; not growing enough food during the season and soil infertility; poor health; lack of planting materials and low agricultural technology; rapid growth of the population; food availability instability and problem to supply markets with sufficient quantity to meet food demand; and problems related to food access and low purchasing power. In contrast, those works shows that the ability to achieve household food security is derived from the household's human capital, material, agricultural technology adaptation, farm size, land quality, agricultural extension services and institutional resources such as education and employment status, household demographics, assets, employment and saving, rural and urban agriculture, formal social assistance or direct transfer, informal social networks, access to clean water and sanitation, household food tastes and preferences.

For households headed by males, food insecurity has a weak relationship with land size, household asset index, household food acquisition problem, household spending level and coping strategy index; while it has a very weak relationship with age of household head, distance to market, food assistance, government support, market contribution to household food consumption, soil erosion index per village, household head's education level, household size, household's land amendment level, household's farm animal, household food acquisition level, number of livelihood activities, monthly food expenditure, per capita expenditure (year), own production used for own consumption, land suitability per cell, membership to agricultural

cooperative and agricultural loan. For households headed by females and when households headed by males and females are combined, only household asset index, household food acquisition problem, household spending level and coping strategy index have a weak relationship with food insecurity while other variables have a very weak relationship with food insecurity (François, 2010).

2.3 The Global Food Security Situation

Global financial crisis in 2008 led to increase in food prices. This posed global security threats and nutrition set that was culminated by humanitarian, social economic, political, human threats and environmental consequences. According to the United Nations (2011) this posed challenges to low-income earners and escalated cases of food insecurity with developing countries being the worst affected. The situation was averted through implementation of Millennium Development Goals (MDGs) that aimed at reduction of hunger and extreme cases of poverty. Escalation of food prices have been blamed on increased demand, growth in population, decrease in agricultural activities, increase in oil prices and increase in factors of production cost.

According to Anouk (2010) financial crisis resulted into structural problems in the food systems in developing countries, this causes sporadic challenges in world markets. There were disruptions in food productions subsidies and trade tariffs in different countries. These had trickling effects on not only food prices but also its availability. Bashir et al. (2010) argued that climate related events such as droughts, environmental degradation, floods and droughts. These factors have joint effect on food security at household level. According to Coates et al. (2007) prior to global crisis approximately 854 million had limited access to food worldwide. This may have worsened due to global financial crisis. The researchers in the above review have not fully shown how the global dynamics affect food security at the household level. This study sought to investigate how land size, tea mono-cropping and access to credit influence household food security in the tea zone of Kirinyaga County.

Food insecurity does not only occur in the countryside but also in urban areas. Many people migrate to urban areas in the hope of improving their welfare. Generally, people think that in the city there are more opportunities, but the opposite is true. The problem is more complex in the city especially for people who do not have the skills and education needed, such as unemployment and slum resulting in fragility of household food security (Neni Widayaningsih

& Barokatuminalloh, 2011). Household food security is associated with poverty. This is because poverty is a condition when a person or group of people are unable to meet their basic rights to maintain and develop a dignified life (January, 2014). In addition, Piaseu and Mitchell (2004) find that in Thailand, only 44.2 percent of urban poor households are food secure, 39.2 percent food insecure without hunger, 13.6 percent insecure with moderate hunger, and 3 percent insecure with severe hunger.

In addition to poverty, social and economic factors also have relevance to food security. Among them are age of household head, education of household head, household size, income, and rice for the poor (raskin) policy. According to Sukandar (2006), age of household head and household size significantly affect food security. Gebre (2012) find positive relationship between age of household head and food insecurity and negative relationship between education of household head and food insecurity. According to Neni et al. (2011), the greater the household income, the easier it is to reach sufficient food and vice versa. Accordingly, Mohammadi et al. (2011) finds that food insecure households in Iran have lower incomes than food secure households.

2.4 Africa's Food Insecurity Issues

Food production is not directly proportional to population growth. Factors such as the lack of basic services in rural areas, the poor performance (or scale down) of extension services, low investment in agriculture and farming advisory functions undermine food security situation in Africa. Sorre (2011) observed that 80% of farming in Africa is subsistence and the subsistence farmers are marginalized. Saweda (2011) indicated that in most developing countries, especially in Sub-Saharan Africa, food security is generally measured through consumption and anthropometric measures (weight and height). Coates et al. (2007) explain that food insecurity is also often used interchangeably with poverty, malnutrition, and hunger which are extreme forms of food insecurity. Therefore, there was need for this study to gather information in regard to tea farming and food crops production and their contribution to household food security.

Factors that affect household food security in various developing countries especially in Africa have been documented in some literature and these factors or determinants are most often than not location-specific (i.e., different study areas were found to have variant attributes as food security determinants with some attributes recurring). The study conducted in Nigeria by

Oluwatayo (2008) using probit model found out that sex of household head, educational level, age and income have positive influence on food security whereas household size has negative influence on household food security. Study by Sikwela (2008) in South Africa using logistic regression model showed that per aggregate production, fertilizer application, cattle ownership and access to irrigation have positive effect on household food security whereas farm size and household size have negative effect on household food security.

Babatunde et al. (2007) is another detailed work on food insecurity in Nigeria. The study utilized a three-stage random sampling technique to obtain a sample of 94 farm households and a cross sectional data in year 2005. Using the recommended calorie required approach; the study revealed that 36 per cent and 64 per cent of the households were food secure and food insecure respectively. The Shortfall/Surplus index showed that the food secure households exceeded the recommended calorie intake by 42 per cent, while the food insecure households fell short of the recommended calorie intake by 38 per cent. A logit regression model estimated showed that household income, household size, educational status of household head and quantity of food obtained from own production were found to determine the food security status of farming households in the study area.

Rural food insecurity is one of the defining features of rural poverty, particularly in the moisture-deficit northeast highland plateaus and some pastoral areas of Ethiopia (MOFED, 2002). The study area, the Teleyayen sub-watershed, is among these areas, which is mostly affected by food insecurity, land degradation in the form of soil erosion and nutrient depletion. Moreover, the area is prone to low and erratic rainfall and frequent droughts. Most cultivated lands in the sub-watershed are suffering from loss of topsoil leaving bare stones behind. Such a loss is linked with reduced crop and livestock productivity and forces farmers to move to native and intact ecosystems of the landscape and marginal lands to develop new farmlands. Thus, to establish the full picture of food security, land degradation, and economic benefits of sustainable land management, a greater understanding of food insecurity drivers and impacts at the sub-watershed level is needed.

Discussions about causes of food insecurity in Ethiopia have always been complex (Markos 1997) given that multiple factors affect food security. However, drought risk remains one of the key drivers of food insecurity in Ethiopia. Since 1950, 12 major drought-induced food

security crises have occurred, highlighting the sensitivity of food security to climate-related risks. According to Woldeamlak (2009), once every 3 or 4 years is a drought year in Ethiopia. Environmental degradation is also a critical factor which exacerbates soil loss, deforestation, and pest incidence—all of which affect food security. In addition, rapid population growth, poverty, rural-urban migration, and conflict can contribute to food insecurity.

Food insecurity in Ghana is concentrated in the rural areas. Majority of the Ghanaian rural population chronically suffer from mass poverty in more severe situations than the urban dwellers. In 2009, according to the report by Comprehensive Food Security and Vulnerability Analysis (CFSVA), 19% of rural households were food insecure as compared to 10% of urban households. Under-nourishment and malnutrition are common in rural Ghana and very large proportion of peasant farmers live under the absolute poverty line. Moreover, lack of means of production, and large family size (majority of which are dependants) are the main characteristics of Ghanaian peasant farmers at present. In 2000, world leaders committed themselves to the Millennium Development Goals (MDGs) and one aim of the MDGs is to eradicate poverty and hunger. The target is "to reduce by half the proportion of people who suffer from hunger" by 2015.Over 800 million people in the world are food insecure (Gyamfi, 2006). Ghanaians are no exception even though Ghana is endowed with numerous natural and human resources. Ghana's overall performance in terms of agricultural production and productivity remains inadequate and has failed to make progress on the food security front. Ineffective production techniques, low yielding varieties, inadequate supply of water, among others, are part of the constraints to the achievement of household food security (Gyamfi, 2006).

Urbanization has been associated with negative implications on food consumption patterns, and food and nutrition security in urban settings on the African continent (Global Panel 2017). According to the International Sustainable Unit (ISU) (2014), urbanization is a key driving force behind the nutrition transition giving rise to and accelerating profound shifts in diets, physical activity and the prevalence of several nutrition related non-communicable diseases. As urbanization increases, there is simultaneous increase in population growth and income which not only increases the demand for food but also increases the shifts in food consumption patterns (Frimpong, 2013). As a result, urban households are hypothesized to consume more sugar, fats, oils and processed foods and western-style foods due to lifestyle

changes, and increasing opportunity costs of preparing food in houses by especially female members (Mottaleb et al., 2018).

As rural food consumption choices are determined by their own production activities, this might not be the case for the urban residents (Ekpenyong, 2015). In fact, most urban residents in developing countries are net food buyers (Matuschke & Kohler, 2014; Musyoka et al., 2014) which has implications on their household food security. Thus, to most urban households, food prices are a key determinant whether they can acquire foodstuffs or not (Szabo, 2016). However, for most low and middle-income urban households their dependence on food markets may be as a result of smaller living spaces and inadequate time to prepare food (Lara et al., 2017). Though dependence on food markets may seem to be an easy way out for most of the poor urban residents, policy makers are left wondering whether it is possible to improve food and nutrition security status of most urban dwellers through the existing food systems especially for the urban poor (Bosire et al., 2017).

Food security, according to FAO (1996, 2008a), exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. The definition of food security as seen above consists of four dimensions namely; food accessibility, availability, utilization and stability. Food availability has to do with "Sufficient food" and is associated with physical quantities of food while food accessibility is a measure of the ability to obtain/secure food. Food utilization entails the consumption of food and how essential nutrients are acquired from consumed food by a person while stability deals with the phrase "at all times" in the food security definition by FAO (1996, 2008a). To this end, accomplishing a state of food security by an/a individual, household, region or country requires arriving at an adequate level of good nutrition and food consumption and maintaining this level at low risk over time (FAO, 2008a, 2008b). Consequently, food insecurity situation exists whenever one of the above conditions is not met or there is any negative shift in any of the dimensions of food security (Akukwe, 2019).

Food security as noted by Ogundari (2017), had been measured globally using various indicators which include; per capita expenditure on food, food insecurity access scale (self-report/assessment), food consumption score, per capita food consumption, anthropometry measures, share of dietary intake and coping strategy index among others. Paradoxically, despite

extensive studies on food security indicators, there is no agreement on the core indicators that are needed to satisfactorily measure and examine household food security situations at both the micro- and macro-levels around the world (Carletto et al., 2013) because these indicators only revolve round one dimension at a time. However, despite the extensive food security evaluation methods, measuring food security status at household level seemed neglected as supported by Ojogho (2010) and Dawit and Zeray (2017) since most studies had measured food security at the national and regional levels. Nonetheless, this study focused on food accessibility dimension of food security that deals with the ability to obtain/secure food, and had adopted the per capita expenditure on food which measures food security on the basis of money spent on food monthly, against the household size. The choice of the per capita expenditure method was informed by the ease of generating/obtaining data on household size and monthly food expenditure from households 'heads, and due to non-existence of food security data at the household level in the study area.

There exists extant literature on the determinants of household food security classified into demographic, socio-economic and physical factors such as; sex and age of head of household, household size, land holding (farm size), membership to agricultural cooperative, climatic adaptation, agricultural technology, shocks, distance to the market, income diversification, household asset index, sufficiency in own food production, dependency ratio, farm size, income, level of education, livestock ownership, credit access, marital status (Ahmed & Dotti, 2014; Ajaero, 2017; Arene & Anyaeji, 2010; Dawit & Zeray, 2017; Djangmah, 2016; Goshu, 2016; Habyarimana,2015; Ogundari, 2017; Welderufael, 2014;).

2.5 Food Security Situation in Kenya

Food security is a challenge facing several households in rural and urban Kenya. In urban those living in slums have higher odds of facing household food insecurity. According to Kirimi (2016) those household that rely on tea as main source of income have higher odds of food insecurity due to changes in tea prices that decrease as compared to changes in cost of living. Kumba (2015) asserts that though tea price are on decline, input prices are on the raise hence availability of disposable income in respective households may not match changes in cost of living. According to Coates et al. (2007) globalization have integrated global markets hence local

tea is exposed to global market prices competition thus there is need for adoption of measures that may cushion smallholder farmer in respective countries.

Global competition and changes in macroeconomic environment have squeezed smallholder farmers over time. Smallholders have challenges associated with access to farm input and they have high dependence on traditional farming practices. Moreover, unplanned population have constrained the production capacity of farms due to continued subdivision (Kirinyaga County, 2013). This study focused on how tea farming affects household food security in the tea zone of Kirinyaga County.

2.6 Land Size and Food Security

An investigation on the impact on the degree of household commercialization on food productivity in Kenyan was evaluated by Strasberg et al. (1999). The research design applied was survey. The respondents were households drawn from different parts of Kenya. Univariate and multivariate analyzed the data. Study results indicated that degree of agricultural commercialization had positive effect on gross food crop productivity per food per acre. However, its effect of cash crops differed in regions and it was not contingent to levels of commercialization. For example, French beans, sugarcane and tea had negative impact on food productivity though coffee was positively related. Further, comparative analysis among Counties indicates coffee had negative effect in Meru and positive impact of sugarcane in Bungoma on equal land size allocated food crop production.

An investigation on distributional effects of cash crops export value chains among small scale farmers in Southern Ghana was documented by Afari (2007). The design applied was descriptive. Descriptive and inferential statistics analyzed the data. Study findings documented that there was significant effect of land size on production of food crops. The production capacity was dependent on income and food availability. Further, those farms that had higher proportions of land allocated to cash crops had higher chances of experiencing food insecurity. The study concluded that household production capacity was not dependent alone on land size and crop choices since there were other endogenous features such as environmental conditions and quality of farm inputs. According to Kumba (2015) those households that have access to large farms and practices large scale farming had higher odds of practicing mixed farming. Kirimi (2016) recommended on the need for adoption of mixed farming since cash crops are

credited with fetching of foreign currencies, creates employment opportunities and have significant contribution on economic empowerment in heterogenous households. Though, their contribution in small households have negative diminishing marginal contribution.

An assessment on determinants and welfare impacts of cultivation in Ghana was evaluated by Kuhlgatz and Abdulai (2011) through application of propensity scores. There was a non-linear relationship between household income and food security. It was noted that there was an increasing trend of income with changes in specialization. Bashir et al. (2010) argued that diminishing sizes of land were dominated by food crop farming to minimize odds of food insecurity. This was because increased allocation of land to cash crops whose market was not guaranteed had implications on household capacity to purchase household food. Consequently, there is need for examination of capacity of respective households to produce enough food. This would aid in proper planning and adoption of policies that would alter likelihood of experiencing household food insecurity.

According to Department for International Development of the Government of United Kingdom [DFID] (2004) the odds of achieving household food security among households was dependent on their capacity to acquire farm inputs, areas of land allocated to cash crop cultivation and ability of adopting specialized farming. The relative risk of facing food insecurity due to cash crop farming was not conclusive since in some instances it was 40% though it would rise to 70%. From these findings it was concluded that there was no guarantee of raising standards of living and alienating food security challenges due to cash cropping. However, notable marginal benefits were recorded among households that practiced mixed farming. These benefits were short-lived since few farmers practiced reliable saving cultures. Moreover, there are uncertainties in markets for farm produce, associated with uncertain demand, financial and infrastructural aspects that have influence on household income generation capacity.

Carletto et al. (2009) evaluated long term impact of food crop productions as compared to cash crop production on changes in household consumption status and asset accumulation in the Central Highlands of Guatemala. Results of the study indicated that there were changes in welfare levels among households with increase on land under cash crop cultivation, adoption status, length of period under cultivation. Moreover, significant contribution of farming differed across households. Those who had practiced cash crop farming over a long period of time gained

more as compared to those who were not practising it despite their land sizes. These findings may only be limited to Guatemala since there are other aspects that may affect household food security and they are unique to respective countries.

Food insecurity affects majority of the population in both rural and urban areas of Kenya. In Western Kenya, over 70% of the populations that are food insecure are in rural areas. Fifty percent of them are smallholder farmers, who produce most of the food (Sabila, 2014). Socio-economic factors such as the level of education of household heads, crop yields, household size, amount of land owned and household income among others, have been linked to household food insecurity (Walingo et al., 2009). Moreover, Grimm (2012) also found that factors causing food insecurity in Central and Western highlands of Kenya were multi-dimensional and included high prices of agricultural inputs, poor marketing structures and agricultural practices.

In developing countries, increasing food production and commercialization of agriculture are the cornerstones for increasing food security and economic development (Khan et al., 2009). One particular manifestation of commercialization involves cash cropping which consist of crops produced for cash, have a higher value than those consumed for food within the household and tend to require a greater degree of specialization (FAO, 2006). Cash cropping may affect household food security either positively or negatively. It affects household food security positively when the finances accrued from sale of cash crops supplement the home budget of food crops and negatively when it is a barrier to full realization of growth of food crops for domestic consumption (Naeem & Niazi, 2010).

2.7 Cash Crop Farming/Mono-Cropping and Food Security

According to Ali and Abdulai (2010) the shift to mono-cropping has significant positive effect on food price increases. This is due to transfer of factors of production, decrease in supply capacity and inability to access market due to lack of transport and marketing capacity. Reliance on monocropping is associated with increased household prices and fluctuations of food prices. Moreover, cash crop produces rely on access to market to enhance their productivity and purchase food. Further, Sorre (2011) posited that mono cropping may displace food crops and household food consumption due to fall in production of staple food. Hence, household vulnerability to food insecurity increases with increased fluctuation of food prices as well as other market related uncertainties.

Coates et al. (2007) argued that pursuance of mono cropping limits available time for engagement in other economic activities that may earn more revenue as compared to food production. Ali and Abdulai (2010) argued that mono cropping minimizes land available for planting staple food and hence it pressurizes organization staple food capacity. Anouk (2010) purported that food crops does not always compete with cash crops though there is need for practice of rotation and inter cropping so as to enhance the production capacity. Further, some cash crops can be used as food crops. To meet household food needs there is need for budgetary allocations and income generation capacity can be complemented by cultivation of cash crops. Bashir et al. (2010) argued that this is not automatic in all households since there are unique household characteristics, lack of food markets and individual decision making on the control of household income.

An investigation on the effect of agricultural and economic parameters on food supply and nutritional status in Nambale Kenya was carried out by Sorre (2011). The design adopted in the study was descriptive. Study findings indicated that there was significant difference between food and cash crop cultivation. Moreover, there was limited food crop cultivation a situation that escalated odds of household food insecurity. These findings were in support of an empirical examination on factors associated with performance of flow export companies in Bogota region of Colombia. The study indicated that households preferred venturing into cash crop farming since it improved on their standards of living. There was no guarantee for food security since there were instances in which their production capacity exceeded the market demand hence it affected their source of income (Anouk, 2010). A study by McCulloch and Ota (2002) indicated that there was an inverse effect on poverty levels and household cash crops production. This was because it enhanced income generation capacity.

Strassberg et al. (1999) argued that cash cropping system have impact on food security though the discussion was not conclusive. Those in support of the arguments purports that cash crops are prerequisite to agricultural growth and development and they have a role in developing synergies in cash and food crops. Those against cash cropping argues that small holders should set aside land for food crops owing to unprecedented changes in market conditions and environment that may have implication on production and marketing of cash crops. Irregular sourcing of income may alter household food security. Kennedy and Cogill (1987) argues that

there is a significant positive effect of cash cropping on food production due to significant energy generated from blended farming model. Prior to adoption of specific model there is need for examination of organization factor of production, since the duo models have capacity to compete and strain available resources. Langata et al. (2010) recommended that there is need for diversification among tea farmers to enhance their capacity to produce household food. This study therefore attempted to establish if tea mono-cropping influence household food security in the tea zone of Kirinyaga County.

2.8 Access to Credit and Food Security

An investigation on the effect of access to credit on household's food security was documented by Ejaz et al. (2009). Though, credit access has significant effect on production capacity. The level of financial deepening and inclusion among households is not in tandem with household needs. This is because there are low levels of financial literacy among farmers and distribution of microcredit facilities is not uniform in comparison to household demand for financial services. Although, international development agencies and non-governmental organizations are involved in activities aimed at poverty eradiation their output is not optimal since access to credit facilities is not in agreement with household demand for financial services.

An investigation by Adebayo (2012) on the role of United Nations Development Programs (UNDP) in support of micro credit operations in Nigeria indicated that it developed policies and models that encouraged provision of financial services among small scale borrowers. This was achieved through development of complementary roles of financial institutions, government and non-governmental organizations in promotion of financial literacy and provision of financial services among micro and small borrowers who were involved in agricultural activities. Through these efforts small and micro borrowers accessed financial services that enhanced their production capacity and minimized reliance on donations. According to Ejaz et al. (2009) development of healthy financial environment through financial liberalization it would be easier for achievement of household food security. In Nigeria it was recommended that UNDP micro credit scheme should seek development partners so as to enhance credit access among farmers. There were calls for development of cooperative societies and credit unions that may escalate farming. While forming farmers' cooperative unions and societies there is need for consideration on aspects such as farm size, farming experience, farmer

capacity to service the loan and knowledge of farmers in activity of interest to him or her. Moreover, it was noted that there was need to grow loan access among farmers in line with their needs and payment history and interest charges should not be detrimental to the extent of discouraging borrowing. Loan repayment period should support credit creation capacity of respective organizations.

In Kenya, although the Kenya Tea Development Authority (KTDA) has made attempts to supply tea farmers with inputs such as the fertilizer, planting seedlings and tea pruning machines, it is mostly done on credit and deducted from their pay. Data obtained from KTDA on access of loans by tea farmers in the tea zone of Kirinyaga County indicated that income from tea is used to service loans advanced to farmers on certain proportions even with possibilities of food shortages in the households (Kirinyaga County, 2013). Impact evaluation of institutionalized and non-institutionalized micro credit schemes on the income; productivity and welfare of beneficiaries have both positive and negative effects on the farmers (Afari, 2007). In the tea zone of Kirinyaga County, there is limited information about the access to credit by tea farmers. This study established how access to credit by tea farmers affects household food security in the tea zone of Kirinyaga County.

2.9 Theoretical Framework

This study was guided by the household food economy theory (Carletto et al., 2009). The Household Food Economy theory aims at estimating who is at risk of future food insecurity. The household food economy theory has mainly been used to assess food crisis, where temporary shocks have left large numbers of people food insecure. Its focus lies in identifying and quantifying households' means of access to food (Carletto et al., 2009). The theory has three distinct steps:

In step one development of a baseline of how families in respective geographical regions manage their food security in normal period is evaluated. Specific geographical region examination enables segmentation of respective region wealth as poor, medium and rich. This is achieved through analysis of sources of income for households, social and economic networking capacity and assets that may be used as tools for evaluation of historical expenditure patterns. In the current study information on sources of income among households in Kirinyaga County was

sought. The second step is the problem specification where potential changes in agricultural, economic and security conditions that will affect families' access to food are identified.

The third step is the scenario analysis where calculation of the extent to which the changes in food security in this case food access, availability and stability due to change in land size, mono-cropping and access to credit were made. There are two stages to the scenario analysis: firstly, a calculation of the 'initial 'deficit' resulting from the changes, and secondly, a calculation of the extent to which the people are able to cope with this deficit (Coates et al., 2007). Hence, the theory was significant in exploring how the land size, mono-cropping and access to credit influence household food security in the tea zone of Kirinyaga County. Since the theory is concerned with identifying, as well as quantifying the means used by household to acquire food, it was useful in identifying whether land size, tea mono-cropping and access to credit have any significant influence on food availability, access and stability of access, all being parameters of food security situation in the tea zone of Kirinyaga County.

2.10 Conceptual Framework

The conceptual framework was based on the presumption that food security is influenced by factors such as the land size, tea-mono-cropping and access to credit. Household food security was the dependent variable and the direct measures were to assess food availability, access and stability of access by the households, whereas land size, tea-mono-cropping and access to credit; were the independent variables. Land size influences food security depending on the level of land distribution in terms of land under tea and food crops. Tea mono-cropping influence food security in terms of the level of competition between the tea and the food crops, as well as the amount of land under tea or food crops. Access to credit influence food security in terms of the general access to credit, availability of credit and amount of credit provided to the tea farmers. The assumption was that all the independent variables have a direct influence on the household food availability, access and stability of access.

Demographic characteristics of a household may control its food security status in one way or the other depending on the age, size of the household and gender. For example, a household with few members will probably have adequate food compared with another with more members. The study assessed if the gender, different age brackets, education levels of

household head and the size of household have any degree of influence on household food security status.

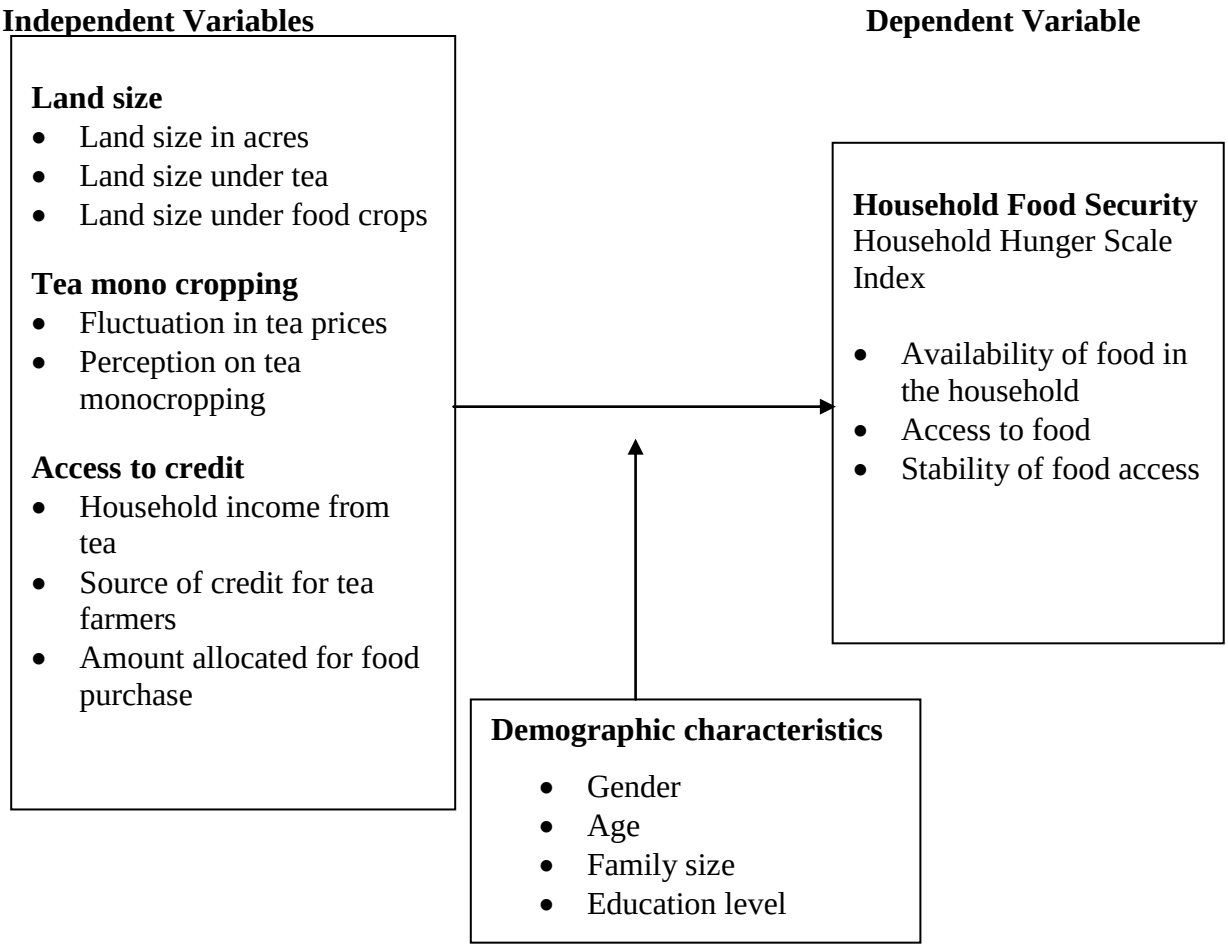

Figure 1

Conceptual Framework on the Expected Linkage of Factors influencing Food Security in Tea zone of Kirinyaga County

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology that was applied in the study. The topics include; research design, study location, population of the study, sampling procedures and sample size, instrumentation, data collection procedures and data analysis.

3.2 Research Design

Research design is a research blueprints detailing the procedure to be followed from collection, measurement and evaluation of research questions (Cooper & Schindler, 2008). Descriptive design was applied and qualitative and quantitative data gathered. According to Bryman and Bell (2007), descriptive cross-sectional design has specific time frame for collection of required information that is used for examination of association between variables under examination. According to Sekaran and Bougie (2013) descriptive research design is appropriate whenever the research seeks to respond to questions on what, why and how the current situation is. The design fits the study since the study evaluated factors influencing household food security in tea zone of Kirinyaga County.

3.3 Study Location

The location of the study was Kirinyaga County. It is located central Kenya with latitude of 0^0 1‟ and 0^0 40‟ South and longitudes 37^0 and 38^0 East. The county neighbours Nyeri County in North West, Murang'a County in the West and Embu County to the East and South. Its coverage is 1478.1 square kilometres and the population size is 528,054 and average growth of 1.5% (Republic of Kenya, 2019). The climatic condition is tropical with equatorial rainfall pattern. The County has two rainy seasons, with long rains in March to May with an average of 2,146 mm/pa and short rains in October to November averaging 1212 mm. The average temperature ranges between 8.1^0C and 30.3^0C in upper and lower zone respectively during the hot season. The main economic activity and income generating activity in upper zone is tea farming. The study was executed in five tea factories in tea zone of Kirinyaga County.

3.4 Population of the Study

The target population of the study were smallholder tea farmers in Kirinyaga County. The accessible population consisted of smallholder tea farmers from 5 KTDA tea factories of the tea zone of Kirinyaga County (Table 1), which included Ndima, Mununga, Kangaita, Kimunye and Thumaita with a registered population of 42,318 farmers (MOA, 2016).

Table 1

Tea Factories and Number of Farmers

No.	Tea factory	No of registered farmers
1	Ndima	8,530
2	Mununga	8,200
3	Kangaita	6,400
4	Kimunye	8,327
5	Thumaita	10,861
	Total	**42,318**

3.5 Sampling Procedure and Sample Size

A sample is a fragment of the population under study (Bryman & Bell, 2007). Sampling can be done through subjective or probabilistic approaches. In subjective approach there are inclusion and exclusion rules that ought to be complied with. In probabilistic methodology all respondents have equal chances of being considered (Kombo & Tromp, 2006). Sampling frame is a complete list of respondents who are considered in a given study. Sampling frame for the respondents of the study comprised of smallholder tea farmers that was obtained from Mununga tea factory which was randomly selected from the five Kenya Tea Development Agency factories, namely Ndima, Mununga, Kangaita, Kimunye and Thumaita.

The sample size was determined using an online sample size calculator by RaosoftInc (2016) with a margin of error of 10%, confidence level of 90% and a response distribution of 50%. In calculating the sample size for the population of 8200 tea farmers from Mununga tea factory, the calculator yielded a sample size of 110 respondents. Simple random sampling was

applied in selection of the 110 respondents who farmers were delivering their tea in Mununga tea factory.

3.6 Instrumentation

Data was collected using a self-administered structured questionnaire (Appendix B). The questionnaire collected quantitative data through use of closed ended questions. The questionnaire had 5 sections. Section A was on demographic characteristics of the farmers (Bio-data), section B was on land size, Section C was on Mono-cropping, and Section D was on access to credit. Section E was on Household food security, using the Household Hunger Scale (HHS). The HHS is the most appropriate food security measure to use in areas of substantial food insecurity (FAO, 2011). The approach used by the HHS was based on the idea that the experience of household food deprivation causes predictable reactions that may be captured through a survey and summarized in a scale testing the access, availability and stability of access food in the household.

3.6.1 Validity of the Instruments

Validity of research is it capacity to measure what it ought to be measuring (Sekaran & Bougie, 2009). Questionnaire validation was evaluated through piloting. According to Bryman and Bell (2007) research instrument can be piloted in a sample of at least 10% of the study sample size. A sample of 11 respondents was considered for piloting and it was drawn from Murang'a County, tea zone. Feedback from respondents after piloting was used in improvement of research tool prior to actual study. Upon administration of questionnaires there were several questions that depicted difficulty while soliciting for information. They were paraphrased and others dropped from the research instruments. A valid research instrument should cover all information that is under examination. Content validity was evaluated through assistance of supervisors in Applied Community Development Studies Department and experts in Ministry of Agriculture. Their feedback was crucial in improvement of research instrument.

3.6.2 Reliability of the Instruments

Reliability of the instruments is its capacity to yield similar findings when administered in different groups of respondents (Kombo & Tromp, 2006). In this study the reliability test was carried out through a pilot test, Cronbach's Alpha was used for reliability test. The pilot study

was done in Gacharage tea factory in Murang'a County. The choice of tea factory in Murang'a County was based on the need to minimize of Kirinyaga Cunty farmers holding a meeting and discuss the research items prior to the actual study. Sample size for pilot testing was 15, this is in line with (Mugenda & Mugenda, 2012) who asserts that at least 10-30% of the sample size may be adopted for piloting research instruments. The Cronbach's coefficient of reliability was computed as follows:

$$\alpha = K / (K - 1) [1- (\Sigma\sigma_k^2 / \sigma_{total}^2)]$$

Where:

K is the number of items,

$\Sigma\sigma_k^2$ is the sum of the k item score variances; σ_{total}^2 is the variance of scores on the total measurement. Thus, the consistency in the answers provided was an assurance of reliability of the instrument (Bryman & Bell, 2007). In this study, the overall Cronbach's alpha statistic for credit access, land size, tea mono-cropping was 0.7362, 0.8169 and 0.7463, for household food was 0.7546 respectively which were greater than the threshold value of 0.7.

3.7 Data Collection Procedure

The researcher obtained a permit from National Commission of Science, Technology and Innovation (NACOSTI) (Appendix C) through Egerton University's graduate school. Introductory letters were obtained from the Department of Education and Interior Coordination, Kirinyaga County to conduct the research. Data was collected using self-administered questionnaires which were issued to the respondents by the researcher. Appointments were sought with respondents for the purpose of managing any challenges associated with confidentiality and use of data being sought. To address the informed consent issue, the respondents were provided with a consent form (Appendix A) to sign before responding to the questions.

In addition, they were provided with an information sheet attached with an official letter from Education department of Kirinyaga County (Appendix D), to increase the response rate and also inform the respondents that the data collection exercise is an official university exercise.

The introductory letter informed the respondents on the identity or name of the researcher, title of the study and name of the university among other details. The respondents were also informed that information they gave would be confidential and used only for the purpose of the study.

3.8 Data Analysis and Presentation

Data from the field was coded, keyed into the computer and cleaned to ensure accuracy. The Statistical Package for Social Sciences (SPSS) computer program (Version 24) was used to analyse data. Descriptive and inferential statistics were applied in the analyses and the results interpreted and presented in tables. In order to measure objectives one, two and three, descriptive statistics such as mean, frequencies, percentages and standard deviations were used. Descriptive statistics was adopted to explain selected factors affecting household food security in Kirinyaga County.

Land size comprised of indicators like acreage of land, land size under tea and land size under food crops. Access to credit comprised of factors such as ease of access to loans, amount of loan and types of loans available. Demographic factors constituted aspects such as age, size of the household, education level, gender and alternative source of income in Kirinyaga County. Chi square test was used to examine the influence of land size, land size on tea and household food security, land size on food crops and household food security. Summary of analysis procedure is as shown in Table 2.

Table 2

Summary of Data Analysis

Hypothesis	Independent Variable	Dependent Variable	Statistics
Ho_1: There is no statistically significant influence of land size on household food security in the tea zone of Kirinyaga County.	Land size	Household food security (Food Access, availability and stability of access)	Mean, Frequencies, and Standard Deviation, Chi square
Ho_2: There is no statistically significant influence of tea mono-cropping on household food security in the tea zone of Kirinyaga County	Tea mono-cropping	Household food security (Food Access, availability and stability of access)	Mean, Frequencies, and Standard Deviation, Chi square
Ho_3: There is no statistically significant influence of access to credit by smallholder tea farmers on household food security in the tea zone of Kirinyaga County.	Access to credit	Household food security (Food Access, availability and stability of access)	Mean, Frequencies, and Standard Deviation, Chi square

3.9 Ethical Considerations

The researcher sought consent from the participants in the study. Prior to questionnaires administration the respondents were inducted on their rights in line with participation in the study. According to Kombo and Tromp (2006) research studies should conform to voluntary consent principle through allowing respondents to willingly participate in a study and withdraw at their own choice. Moreover, participant's confidentiality was upheld and there was no misrepresentation of facts. Further, intellectual property rights were complied with through acknowledgements and citations of all citations in the documents.

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents data analysis, interpretation and presentation of findings on influence of selected factors influence household food security in tea zone in Kirinyaga County, Kenya. Specifically, the study sought to establish the influence of land size, tea mono-cropping and access to credit on household food security in tea zone of Kirinyaga County, Kenya.

4.2 Response Rate

Out of 110 questionnaires that were issued 103 were correctly filled and returned. This gave a response rate of 94%, and according to Sekaran and Bougie (2013) the response rate was appropriate since in social sciences response rate of at least 50% is perceived to be good and if above 70% then it's excellent. This response rate was associated with self-administration of questionnaires and prior mapping of target respondents. The findings are given in Table 3.

Table 3

Response Rate

Response	**Frequency**	**Response rate**
Responded	103	94
Not responded	7	6
Total	**110**	**100**

4.3 Demographic Information of the Respondents

Respondents' demographic information was sought. It included gender, age and family size, size of nuclear family and highest level of education. Study findings are summarized in Table 4.

Table 4

Demographic Information

Characteristics of the Respondents		**Frequency**	**Percent**
Gender	Male	64	62.1
	Female	39	37.9
Age	15 -25 years	2	1.9
	26-35 years	6	5.8
	36-45 years	25	24.3
	46-55 years	29	28.2
	Above 55 years	41	39.8
Family Size	1-2 members	13	12.6
	3-4 members	26	25.2
	5-6 members	39	37.9
	Above 6 members	25	24.3
Size of Nuclear Family	3-4 members	7	6.8
	5-6 members	52	50.5
	Above 6 members	44	42.7
Education Level	KCPE	51	49.5
	KCSE	34	33
	Diploma	13	12.6
	Degree	5	4.9
	Total	**103**	**100**

Study findings indicate that 62.1% were male and 37.9% were female. This skewed distribution can be attributed to household leadership model that advocates for male leadership due to social cultural practices. These findings were in agreement with Walingo et al. (2009) who reported that gender roles have a significant influence on food security in a household.

Majority of the respondents (39.8%) were aged above 55 years, followed by 28.2% aged between 46 and 55 years, 24.3% aged 36 to 45 years and 5.8% aged 26 to 35 years. These results mirrored Hazarika and Khasnobis (2005) who argue that there are age differences in heading of

household. Since most households are headed by elderly people in Kirinyaga County in tea growing zone there is need for caution since they may have energy limitation on their search for house hold food. Furthermore, since majority are above 55 years which is a retirement age they may have retired and ventured in farming as a source of income.

The modal nuclear family size in tea zone of Kirinyaga County was between 5 to 6 members (50.5%), followed by 42.7% with above 6 members and 6.8% had 3 to 4 members. This indicates that these families may be constrained in accessing source of man power among family members and if they cannot manage to hire labourers then they may be exposed to household food insecurity. Moreover, there is a low likelihood of allocating large sizes of land to food crops.

Regarding the level of education attained, majority (49.5%) had Kenya Certificate of Primary Education followed by 33% with Kenya Certificate of Secondary School Education certificate while the least, (4.9%) were degree holders. This implies that farmers in the tea Zone of Kirinyaga County have low level of formal education. This is likely to have an effect on their capacity to make decisions on how to integrate tea and food crop farming.

4.4 Findings on Household Food Security

In this study food security referred to the household having access, availability and stability of access of food throughout the year either purchased with income from tea or grown in their farms. Household food security was measured by adopting the household hunger scale (HHS). This was measured in terms of assessing the access, availability and stability of access of food in the households. The HHS makes reference to a period of 4 weeks, to assess aspects of food security. The respondents are requested to recall occurrences about food in the household.

In order, to determine household food security a five-point Likert scale was used with statements representing the three aspects of food security; access, availability and stability of access. In the scale the rating was; 1= Never, 2= Rarely, 3 = Sometimes, 4= Often and 5=Always. The first three statements in the scale represent access, the next three, availability and the last three stability of access. The findings are shown in Table 5.

Table 5

Findings on Household Food Security Access, Availability and Stability

		n=103						
	Measures of food security	**N**	**R**	**S**	**O**	**A**	**Mean**	**Std. Dev**
i	In the past four weeks, did you worry that your household would not have enough food?	5.8	13.6	20.4	34	26.2	3.6	1.2
ii	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	7.8	23.3	18.4	28.2	22.3	3.3	1.3
iii	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	4.9	5.8	16.5	45.6	27.2	3.8	1
iv	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	10.7	18.4	22.3	20.4	28.2	3.4	1.4
v	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	8.7	9.7	11.7	36.9	33	3.8	1.3
vi	In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	23.3	15.5	16.5	29.1	15.5	3	1.4

N-Never, R-Rarely, S-Sometimes, O-Often & A-Always

Table 5 Continued

		n=103						
	Measures of food security	**N**	**R**	**S**	**O**	**A**	**Mean**	**Std. Dev.**
vii	In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	4.9	17.5	19.4	25.2	33	3.6	1.2
viii	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	1.9	10.7	18.4	34	35	3.9	1.1
ix	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	10.7	7.8	13.6	36.9	31.1	3.7	1.3
x	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	5.8	11.7	11.7	25.2	45.6	3.9	1.3
	Overall average						**3.6**	**1.2**

N-Never, R-Rarely, S-Sometimes, O-Often & A-Always

The findings indicate that 60.2% of the respondents' households in the past four weeks were often worried that their households would not have enough food. Secondly, 50.5% in the past four weeks either were or a household member was often unable to eat their preferred food due to lack of resources. Majority 72.8% in the past four weeks either were or a household member often had to eat limited variety of food due to lack of resources. Further, 48.6% in the past four weeks often had to eat some foods that they did not like due to lack of resources to obtain other foods. Moreover, 69.9% in the past four weeks either were or household members often had to eat smaller meals than they needed because it was not enough.

Majority mean =3.9, reported that in the past four weeks either they or household members often did not have any kind of food due to lack of resources in their household. A mean of 3.7 indicates that majority either they or household members often had to go to sleep hungry due to lack of food. Majority mean = 3.9, reported that in the past four weeks either they or their household members often had to go a whole day or night without eating anything because there was no enough food. The findings show that overall majority of households in Tea Zone in Kirinyaga County, often had likelihood of experiencing household food insecurity as indicated by the mean of 3.6.

Food insecurity remains a public health threat; it is widespread in developing countries, as millions of people continue to suffer from food scarcity and death due to food insecurity. Whereas a varied and balanced diet is essential to reducing the rate of malnutrition, food insecurity jeopardizes dietary intakes. Due to the high nutrient demands for growth, children are the most vulnerable. Poor nutritional status among children leads to low school admission, absenteeism, early dropout and low academic achievement, which results in reduced productivity during adulthood. The presence of food insecurity at the household level implies a high level of vulnerability to broad consequences, including psychosocial dysfunction among household members, especially children, socioeconomic predicaments and poor overall health status (Aguayo et al., 2016). Food insecurity at the household level is related to several factors, including poverty, low income, level of education, household size, employment status, age, the type of household head (gender) and food price. Understanding the characteristics and determinants of household food insecurity is crucial to developing policies that address the challenges associated with household hunger and food insecurity (Ihab et al., 2015)

4.4.1 Lack of Food to Eat in the House

Household food security was measured in terms of assessing the access, availability and stability of access of food in the households. According to the findings in table 6, 55% of the respondents reported that in the past (4 weeks/30 days), they had no access to food in the house due to non-availability of resources to buy food. However, 48% stated that in the past (4 weeks/30 days), they had access to food due to availability of resources to buy and thus had stability of access in the household.

Table 6

Lack of Food to Eat in the House

Response	Frequency	Percent
Yes	55	53
No	48	47
Total	**103**	**100**

4.4.2 Lack of Resources to Acquire Food

The study aimed at establishing how often there was lack of food to eat in the house because of lack of resources to access food in the past (4 weeks/30 days) at the time of data collection. The findings as presented in table 7 shows that, 62% of the respondents stated that rarely (1-2 Times) was there lack of food to eat in the house because of lack of resources to get food in the indicated period. The others, 25% stated that sometimes (3-10 Times) there was lack of food to eat in the house because of lack of resources to get food while 13% said that often (more than 10 times), there was lack of food to eat in the house because of lack of resources to get food.

Table 7

Lack of Resources to get Food in the Past (4 weeks/30 days)

How often	Frequency	Percent
Rarely (1-2 Times)	64	62.1
Sometimes (3-10 Times	26	25.2
Often (More Than 10 Times)	13	12.6
Total	**103**	**100.0**

4.4.3 Lack of Access to Food

The researcher further sought to establish whether in the past (4 weeks/30 days), any household member went to sleep at night hungry due to lack of food. Findings are shown in Table 8.

Table 8

Lack of Access to Food

Response	Frequency	Percent
Yes	56	54
No	47	46
Total	**103**	**100**

Findings in table 8 revealed that 54% of the respondents revealed that in the past (4 weeks/30 days), had a household member who went to sleep at night hungry because of lack of access to food. In addition, 46% stated that no household member went to sleep hungry because of unavailability of food.

4.4.4 Frequency of Unavailability of Food

Table 9 shows the findings on how often a member went to sleep hungry due to unavailability of food in the past (4 weeks/30 days).

Table 9

Frequency of Unavailability of Food

How often	Frequency	Percent
Rarely (1-2 Times)	52	50.5
Sometimes (3-10 Times)	38	36.9
Often (More Than 10 Times)	13	12.6
Total	**103**	**100.0**

The findings indicate that 51% of the respondents stated that rarely (1-2 Times) a member went to sleep hungry because due to unavailability of food. In addition, 36% stated that sometimes (3-10 times) often a member went to sleep hungry due to unavailability of food while 13% revealed that often (more than 10 times) often a member went to sleep hungry due to unavailability of food.

4.4.5 Frequency of Access to Food

Respondents were required to indicate whether in the past (4 weeks/30 days) any household member was unable to access food for a whole day and night. Findings are summarized in Table 10.

Table 10

Frequency of Access to Food

Response	Frequency	Percent
Yes	77	74.8
No	26	25.2
Total	**103**	**100.0**

Majority 77% of the respondents stated that a household member had no access to food for a whole day and night. A few, 25% revealed that no household member lacked accessibility to food.

4.4.6 Frequency of Access and Availability of Food

Respondents were required to state how often a household member had access and availability of food for a whole day and night in the past (4 weeks/30 days). Findings are in Table 11.

Table 11

Frequency of Access and Availability of Food

How often	Frequency	Percent
Rarely (1-2 Times)	77	74.8
Sometimes (3-10 Times)	13	12.6
Often (More Than 10 Times)	13	12.6
Total	**103**	**100.0**

Majority 77% of the respondents indicated that there was no access and availability of food. This is because rarely (1-2 times) a household member went for a whole day and night without food. Further, 13% revealed that sometimes (3-10 times) household members had no

access and no food available since they went for a whole day and night without food. Finally, 13% indicated that often (more than 10 times) household members had no access and no food available since they went for a whole day and night without food.

4.5 Influence of Land Size on Household Food Security

The first objective of the study sought to establish the influence of land size on household food security in tea zone in Kirinyaga County. The findings are presented in the following sections.

4.5.1 Extent to which Land Size Influences Household Food Security

The research examined the perception of the respondents on the influence of land size on household food security. Study findings are tabulated in Table 12.

Table 12

Extent to which Land Size Influences Household Food Security

Perceptions of Respondents	Frequency	Percent
No Extent	8	7.8
Little extent	7	6.8
Moderate Extent	15	14.6
Great Extent	40	38.8
Very great extent	33	32
Total	**103**	**100**

The findings indicate that 38.8% reported that land size has great extent of influence on household food security followed by 32% who perceived that it has very great extent, 14.6% perceived moderate extent and 7.8% perceived that it has no extent. This implies that land is an important factor among tea growing farmers in the Tea Zone of Kirinyaga County and has an influence on tea and food crops production. Moreover, land would have influence on access, production and stability since variation of land allocation between tea and food crops can impact household food security. The findings confirmed Karanja and Straus (1999) who argues that gross food productivity per acre is dependent on commercialization. There was an inverse effect

of tea and food production while coffee and food production positively impacted each other which was attributed to mixed farming. According to Afari (2007) food security should not be pegged only on land size alone since there are those in need of foreign exchange.

4.5.2 Land Size

The study examined land size in tea zone of Kirinyaga County. The findings are presented in Table 13.

Table 13

Land Size

	Frequency	**Percent**
0.26- 0.50 acres	2	1.9
0.51-0.75 acres	9	8.7
0.76-1.00 acres	31	30.1
Above 1.00 acres	61	59.2
Total	**103**	**100**

As shown majority, 59.2% of households in the tea zone of Kirinyaga County own more than an acre, followed by 30.1% who own between 0.76-1 acres and 8.7% own between 0.51 to 0.75 acres. Although, majority in tea growing zone has one acre of land and above there is need for quality decision making on land allocation so as not to constrain food crops land allocation. These results are in agreement with Afari (2007) who argues that there is causality between land size and food security and those households who optimize their land allocated for food crops production has higher odds of food security. Moreover, this has implication on household earning capacity since households prioritizes food budgetary allocations. Though, the study concluded that land size allocation is not an insurance that household will be food secure due to other factors that may have influence on food security. The findings confirm statement by Kenya National Bureau of Statistics (KNBS, 2019) that many small-scale farmers have land sizes that are usually at most 2 acres which would be the total land owned by the household.

4.5.3 Size of Land Under Tea Production and Food Crops

Further, the study sought information on the size of land allocated for tea production and food crops. Frequency and percentages are summarized as shown in Table 14.

Table 14

Size of Land under Tea Production and Food Crops

	Land under Tea		Land under Food crops	
	Frequency	**Percent**	**Frequency**	**Percent**
0.0 - 0.25 acres	8	7.8	3	2.9
0.26- 0.50 acres	7	6.8	12	11.7
0.51-0.75 acres	15	14.6	25	24.3
0.76-1.00 acres	40	38.8	30	29.1
Above 1.00 acres	33	32	33	32
Total	**103**	**100**	**103**	**100**

Study findings indicate that majority 38.8% of households had allocated between 0.76 to 1 acre on Tea plantation followed by 32% who has allocated above 1 acre and 14.6% had allocated 0.51 to 0.75 acres. It shows that most of the household land was used for tea production. Majority 32% of households in the tea zone of Kirinyaga County have allocated above one acre on food crops, followed by 29% who allocated 0.76 to 1 acre, 24.3% allocated 0.51 to 0.75 acres and 14.6% have allocated less than 0.50 acres of land on food crops production. Uncontrolled allocation of household land to tea may expose them to food insecurity. The study concurs with Kuhlgatz and Abdulahi (2010) who argues that though in Ghana there is high propensity to cultivate cocoa those whose land sizes are small have preference for food crops. Further, Bashir et al. (2010) argues that food crop farming promotes food security among small scale farmers.

4.5.5 Perceptions on Land size and Household Food Security

The respondents were required to indicate their level of agreement on five-point Likert scale that ranged from strongly disagree to strongly agree. The rating ranged from 1- strongly

disagree, 2-disagree, 3-moderately agree, 4-agree and 5-Strongly agree. Study findings are tabulated in Table 15.

Table 15

Respondents' Perceptions on Influence of Land Size on HFS

	n=103						
	SD	**D**	**MA**	**A**	**SA**	**Mean**	**Std. Dev**
i. My farm size is an enough guarantee of food availability in my household	4	5	21	44	26	3.8	1
ii. I prefer growing food crops other cash crops because I think my farm is small	2	7	19	34	38	4	1
iii. I do not prefer cash cropping for this gives me adequate cash for food purchases for the household	0	5	16	39	41	4.2	0.9
iv. Size of my land and crop choice alone is not a sufficient condition for improving food by access in my household.	5	0	5	26	64	4.5	1
v. I do not believe my farm size is adequate for cash crop and food crop growing for stability of food access in my household		4	3	16	27	51	4.2	1.1
vi. I do not prefer growing food crops as to cash crops to guarantee food availability		3	4	10	33	51	4.2	1
vii. I have future plans of increasing my farm size for food security reasons in my household		3	8	12	23	54	4.2	1.1
Overall average							**4.1**	**1**

SD-Strongly disagree, D-Disagree, MA-Moderately agree, A-Agree, SA-Strongly Agree

The findings indicate that majority 69.9% agreed that their farm size was enough to guarantee them food availability in their households. Majority, 71.9% agreed that they prefer growing food crops rather cash crops because they think their farm is small. About 79.6% agreed that they prefer cash cropping because it gives them adequate cash for food purchases in the household thus enhancing food stability of access. Also 90.2% of respondents agreed that the size of land and crop choice alone is not a sufficient condition for improving food access in their households.

Further, 77.7% agreed and 6.8% disagreed that their households land is adequate for cash and food crops growing to stabilize food access in their household. About 83.5% agreed that they prefer growing food crops as opposed to cash crops so as to guarantee food availability. Moreover, 77.7% agreed that they have future plans of increasing their farm size for food crops production to ensure there is availability, access and stability of access of food in their households. On overall respondents agreed (mean = 4.1, standard deviation = 1) that land size has influence on their household food security in terms of availability, access and stability of access. The study findings are in support of Afari (2007) who argues that food security in developing economies is dependent on value chain small scale farmers have on cash crops since those families that does not optimize their land allocation on food crops are exposed to household food insecurity. This was in contrast of large scale whose production capacity was higher since they could practice crop rotations (Kumba, 2015). Further, farmers had affinity of engaging in cash crop farming so as to reap from foreign exchange though those with small land were disadvantaged since their production capacity was lower compared to others.

4.5.6 Chi Square Test to Examine Influence of Land Size on HFS

Chi square test for association was adopted to examine the influence of land size on household food security. The study examined the influence of total land size, land size under tea, land size under food crops and on household food security in tea zone of Kirinyaga County.

4.5.7 Influence of Land Size on Household Food Security

Influence of land size on household food security was examined through use of Chi square test of association as shown in Table 16.

Table 16

Chi Square Results on Influence of Land Size on HFS

		Food security					
		Availability		Stability		Access	
Land size		**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
0.26- 0.50 acres	Frequency	1	1	1	1	2	0
	Percentage	50%	50%	50%	50%	100%	0%
0.51-0.75 acres	Frequency	4	5	6	3	6	3
	Percentage	44%	56%	67%	33%	67%	33%
0.76-1.00 acres	Frequency	19	12	24	7	16	15
	Percentage	61%	39%	77%	23%	52%	48%
Above 1.00 acres	Frequency	31	30	46	15	32	29
	Percentage	51%	49%	75%	25%	53%	48%
Total	Frequency	55	48	77	26	56	47
	Percentage	53%	47%	75%	25%	54%	46%
		χ^2=11.108, d.f = 3 p value = 0.004		**χ^2=10.22, d.f = 3 p value = 0.005**		**χ^2=12.412, d.f = 3 p value = 0.001**	

There was significant influence of land size on availability of food (χ^2=11.108, d.f = 3 p value = 0.004). About 61% of those who had land size of between 0.76 and 1 acre reported that food was available. Further, land size had significant influence on stability of household food access (χ^2=10.22, d.f = 3 p value = 0.005). About 67% of household with at least 0.51 acres and above reported food stability. Further, land size had no significant influence on access to household food security (χ^2=12.412, d.f = 3 p value = 0.001). These results concur with Karanja and Strauss (1999) who argued that food productions were dependent on land size.

4.5.8 Influence of Land Size under Tea Production on Household Food Security

Chi square test was used to examine the influence of land size under tea production and household food security as shown in Table 17.

Table 17

Chi-Square Results on Influence of Household Tea Production on HFS

		Food security					
		Availability		Stability		Access	
Size of Land on Tea Production		**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
0.0 - 0.25 acres	Frequency	4	4	5	3	6	2
	Percent	50%	50%	63%	38%	75%	25%
0.26- 0.50 acres	Frequency	4	3	6	1	4	3
	Percent	57%	43%	86%	14%	57%	43%
0.51-0.75 acres	Frequency	8	7	12	3	10	5
	Percent	53%	47%	80%	20%	67%	33%
0.76-1.00 acres	Frequency	23	17	30	10	20	20
	Percent	58%	43%	75%	25%	50%	50%
Above 1.00 acres	Frequency	16	17	24	9	16	17
	Percent	49%	52%	73%	27%	49%	52%
Total	Frequency	55	48	77	26	56	47
	Percent	53%	47%	75%	25%	54%	46%
		χ^2=16.7, d.f = 4 p value = 0.000		**χ^2=21.04, d.f = 4 p value = 0.000**		**χ^2=23.08, d.f = 4 p value = 0.000**	

An investigation on the influence of land size under tea production and household food security indicate that 43% of those families that had allocated 0.5 acres of land and below on tea production reported cases of food unavailability. Chi square tests indicate that size of land under tea production has significant influence on food availability (χ^2=16.7, d.f = 4 p value = 0.000). About 75% of those who allocated 0.51 to 0.75 acres of land on tea production reported that they experienced food stability. Chi square test indicated that there was significant influence of size of land on tea production and food stability (χ^2=21.04, d.f = 4 p value = 0.000). Further, 52% of those who had allocated tea production in land above 1 acre reported that they no access to food

in the household. Chi square results indicated that there was significant influence of size of land on tea production on food access (χ^2=23.08, d.f = 4 p value = 0.000). These results contradict Kuhlgatz and Abdulai (2011) who argue that household production propensity is contingent to welfare that farmers receive from players in the value chain process. But this was in conflict with Bashir et al. (2010) who purported that household food security was in congruence with land allocated to cash crops due to capacity to raise funds that would be used in purchase of food stuffs.

4.5.9 Influence of Land Size under Food Crops and Household Food Security

The influence of land size under food crops and household food security was examined as shown in Table 18.

Table 18

Chi Square Results on Influence of Land Size under Food Crops and HFS

		Food security					
		Availability		Stability		Access	
Size of Land on Food Crops		**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
0.0 - 0.25 acres	Frequency	1	2	2	1	1	2
	Percentage	33%	67%	67%	33%	33%	67%
0.26- 0.50 acres	Frequency	6	6	11	1	10	2
	Percentage	50%	50%	92%	8%	83%	17%
0.51-0.75 acres	Frequency	15	10	19	6	13	12
	Percentage	60%	40%	76%	24%	52%	48%
0.76-1.00 acres	Frequency	15	15	21	9	15	15
	Percentage	50%	50%	70%	30%	50%	50%
Above 1.00 acres	Frequency	18	15	24	9	17	16
	Percentage	55%	46%	73%	27%	52%	49%
Total	Frequency	55	48	77	26	56	47
	Percentage	53%	47%	75%	25%	54%	46%
		χ^2=11.36, d.f = 4 p value = 0.002		**χ^2=23.05, d.f = 4 p value = 0.000**		**χ^2=14.19, d.f = 4 p value = 0.00**	

It was found that 60% of households that allocated 0.51 to 0.75 acres on food crops reported cases of food availability. Chi square results indicates that there was significant influence of size of land on food crops and availability of food (χ^2=11.36, d.f = 4 p value = 0.000). About 67% of households that allocated at most 0.25 acres on food crops reported food access. Chi square test indicate there was significant influence of size of land on food crops and household food stability (χ^2=23.05, d.f = 4 p value = 0.000). About 83% of those who allocated 0.26 to 0.5 acres on food crops reported access of food. Chi square test indicate that there was significant influence of size of land on food crops and food access (χ^2=14.19, d.f = 4 p value =

0.000). The results concur with DFID (2004) who argue that unless a farmer accrues marginal benefits from crop specialization criterion adopted then there are lower chances of solving household food security challenges. These results suggest that cash crop cultivation cannot be considered as a magic bullet in raising farmers' living standards and solving the issue of food insecurity. Marginal benefits from low and medium cash crop production intensity may be easily outweighed by immeasurable benefits realized by households that cultivate food crops.

4.6 Influence of Tea Mono-cropping on Household Food Security

The second objective of the study investigated the influence of tea mono-cropping on household food security. The findings are presented in the sections that follow.

4.6.1 Extent of Influence of Tea mono-cropping on Household Food Security

The views of the respondents on the extent to which tea monocropping influenced the household food security were sought. The findings are as indicated on Table 19.

Table 19

Extent of Influence of Tea Monocropping on Household Food Security

	Frequency	**Percent**
No Extent	3	2.9
Little extent	17	16.5
Moderate Extent	30	29.1
Great Extent	25	24.3
Very great extent	28	27.2
Total	**103**	**100**

About 51.5% of the respondents reported that to a great extent and very great extent, tea monocropping has an influence on household food security. Around 48.5% of people felt that to at least moderate extent tea monocropping has an influence on household food security.

4.6.2 Influence of Tea Monocropping on Household Food Security

The study sought the views of the farmers on the influence of tea mono-cropping on household food security in tea zone of Kirinyaga County. The Likert scale consisted of; strongly

agreed (5), Agreed (4), moderately agree (3), disagree (2) and strongly disagree (1). The findings are as shown in Table 20.

Table 20

Influence of Tea Monocropping on Household Food Security

		n=103				
		SD	**D**	**MA**	**A**	**SA**
i.	Dependence on tea income makes my household to face food shortages.	9.7%	17.5%	29.1%	35.9%	7.8%
ii.	Drop in tea prices affect my household's ability to purchase food	7.8%	18.4%	15.5%	30.1%	28.2%
iii.	Mono cropping has led to reduction in the area of land available for household production of staple foods	3.9%	4.9%	17.5%	52.4%	21.4 %
iv.	I have uprooted tea bushes in the recent past to give space to stable food farming	7.8%	8.7%	20.4%	36.9%	26.2 %
v.	Food prices in this region has gone up because of so much tea cash cropping in the area	1%	3.9%	21.4%	38.8%	35%
vi.	Households in this region are dependent on imported food products available in the market	2.9%	17.5%	13.6%	33%	33%
vii.	Tea production leads to food shortages for the household.	6.8%	7.8%	15.5%	35%	35%
viii.	Growing tea is better than food crops because tea brings regular income	10.7%	17.5%	33%	17.5%	21.4%
ix.	Income from tea compliment food needs in the household.	6.8%	7.8%	15.5%	35%	35%

SD-Strongly disagree, D-Disagree, MA-Moderately agree, A-Agree, SA- Strongly agree

The results indicate that 43.7% agreed and 27.2% disagreed that dependence on tea income makes their households face food shortages. 58.3% agreed and 26.2% disagreed that drop in tea prices affect their household ability to purchase food. 73.8% agreed and 8.8% disagreed that mono cropping has led to reduction in the area of land available for household food crops production. Further, 53.1% agreed and 16.5% disagreed that they have uprooted tea bushes in the recent past to give space for food crops farming. Moreover, 73.8% agreed and 4.9% disagreed that food prices in their region has gone up because of a lot of tea cash cropping in the area.

Further, 66% agreed and 20.4% disagreed that households in this region are dependent on imported food products available in the market mainly from other counties. 70% agreed and 14.6% disagreed that tea productions lead to food shortages for households. 70% agreed that income from tea compliment food needs in the household by enhancing availability, access and stability of access of food. On overall there was an agreement that tea monocropping has influence on household food security in tea growing zone in Kirinyaga County (Mean = 3.6). The findings are in support of Ali and Abdulai (2010) who argues that there are higher odds of increased food prices since the shift to mono-cropping may decrease food crops supply capacity and increase over supply of cash crops that would minimize income generation capacity. Ali and Abdulai (2010) further state that mono cropping of cash crops should be discouraged since it may injure household capacity to provide staple food. Sorre (2011) also cautions against mono cropping since it may increase chances of food insecurity due to production uncertainties and volatility of food prices.

4.6.3 Chi Square Test to Examine the Influence of Tea Mono-Cropping on HFS

The second hypothesis of the study stated that tea mono-cropping has no statistically significant influence on household food security in the tea zone of Kirinyaga County. Chi Square test of association was used for the analysis and results are in Table 21.

Table 21

Chi Square Test Results on the Influence of Tea Mono-Cropping on HFS

		Food Security					
		Availability		**Stability**		**Access**	
Tea mono-Cropping		**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Low	Frequency	20	21	32	9	22	19
	Percentage	49%	51%	78%	22%	54%	46%
High	Frequency	35	27	45	17	34	28
	Percentage	57%	44%	73%	27%	55%	45%
Total	Frequency	55	48	77	26	56	47
	Percentage	53%	47%	75%	25%	54%	46%
		χ^2=9.24, d.f = 1 p value = 0.002		**χ^2=6.73, d.f = 1 p value = 0.004**		**χ^2=7.42, d.f = 1 p value = 0.001**	

*P<0.05

There was significant influence of tea mono cropping on availability of food in the tea zone Kirinyaga County (χ^2=9.24, d.f = 1 p value = 0.002). There was a significant influence of tea mono cropping on stability of food in Tea zone of Kirinyaga County (χ^2=6.73, d.f = 1 p value = 0.004). Of those who practiced low levels of tea mono cropping 78% reported food security as compared to 73% of those who had higher levels of tea mono cropping. There was a significant influence of tea mono cropping on access to food in households in the Tea zone of Kirinyaga County (χ^2=7.42, d.f = 1 p value = 0.001). Hence, it can be deduced that decreased land allocation on Tea enhanced the level of household food security in tea zone in Kirinyaga County. The findings support Anouk (2010) who argues that not in all situations that food crops compete with cash crops and increased production of any does not mutually exclude the other especially when there is enough land to allow intercropping and crop rotations. Further, household capacity to meet household food needs can be improved through increased cash crop production that may generate revenue.

4.7 Influence of Access to Credit on Household Food Security

The third objective of the study examined the influence of access to credit on household food security in Tea zone of Kirinyaga County. The study examined average income raised from household sale of tea and food crops. Further, sources of credit, duration of access to credit and type of credit were determined. The influence of access to credit on food security was examined in a five-point Likert scale ranging from strongly agree to strongly disagree.

4.7.1 Household Income from Tea

Ability to generate income has influence on borrowing capacity. An examination on average income raised from tea sales is summarized as shown in Table 22. Study findings indicate that the average household income from tea sales from January to March was Ksh. 123, 975.2, there was an increase to an average of Ksh. 182, 767.10 and a decline to Ksh. 180, 713.4 in April- June and July -September respectively. There was a sharp decline in the last quarter to an average of Ksh. 154, 949.70 in fiscal year 2016/17.

Table 22

Average Household Income from Tea

	Mean	**Std. Deviation**
Average income Jan-March	123975.2	78383.79
Average income April-June	182767.1	94160.91
Average income Jul-Sept	180173.4	91444.31
Average income Oct-Dec	154949.7	82887.11

4.7.2 Average Household Income from Food Crops

The average income raised from sale of food crops per household is as shown in Table 23. The findings indicate that the average income from sale of food crops declined from Ksh. 194, 533.4 to Ksh. 166, 761. 1 and increased to Ksh. 173, 540.1 from first quarter to third quarter and fourth quarter respectively in fiscal year 2016/17.

Table 23

Average Household Income from Food Crops

	Mean	Std. Deviation
Average food crop income Jan - March	194533.4	95868.85
Average food crop income April-June	167533.9	96040.4
Average food crop income Jul-Sept	166761.1	87741.37
Average food crop income Oct-Dec	173540.1	93927.19

4.7.3 Sources of Credit for Tea Farmers

There are alternative sources of credit for tea farmers in Kirinyaga County. They include farmers Savings and Cooperative societies (SACCOs), Kenya Tea Development Agency (KTDA), microfinance and commercial banks. Study findings are summarized as shown in Table 24. Majority 40.8% had accessed loans from banks followed by 33% who had accessed from KTDA and 26.2% who had accessed it from famers SACCO. Bank credit was provided in cash. KTDA provided farm inputs in addition to cash.

Table 24

Source of Credit

	Frequency	Percent
Farmers SACCO	27	26.2
KTDA	34	33
Bank	42	40.8
Total	**103**	**100**

4.7.4 Duration of Credit Access for the Tea Farmers

Further, the study studied the length of credit period as shown in Table 25. The findings indicate that 37.9%, of the respondents' accessed loans within a period of over 2 months followed by 35.9% who accessed loan within 2 months only and 26.2% who accessed loan within only one month.

Table 25

Duration of Credit Access

	Frequency	**Percent**
1 month	27	26.2
2 months	37	35.9
Over 2 months	39	37.9
Total	**103**	**100**

4.7.5 Views of Respondents on influence of Access to Credit on HFS

The study examined the level of agreement on five-point Likert scale on the influence of access to credit on household food security. The Likert scale consisted of; strongly agreed (5), Agreed (4), moderately agree (3), disagree (2) and strongly disagree (1). The findings are in Table 26.

Table 26

Respondents level of agreement on Influence of Access to Credit on HFS

		n=103						
		SD	**D**	**MA**	**A**	**SA**	**Mean**	**Std. Dev.**
i.	I have ever accessed some credit in the last financial year 2016/17	15.5%	37.9%	17.5%	9.7%	19.4%	2.8	1.4
ii.	I have received income from tea in the last one-year 2016/17 that is adequate enough for buying food in my household	12.6%	14.6%	19.4%	39.8%	13.6%	3.3	1.2
iii.	Access to credit leads to high tea yields that helps household to achieve food security	3.9%	11.7%	10.7%	33%	40.8%	4.0	1.2
iv.	Proceeds from tea bonus were all deducted to recover my credit	5.8%	11.7%	18.4%	27.2%	36.9%	3.8	1.2
v.	Access to credit is dependent on amount of tea picked	6.8%	8.7%	28.2%	28.2%	28.2%	3.6	1.2
vi.	Access to credit is dependent on credit rating scores	3.9%	4.9%	29.1%	35.9%	26.2%	3.8	1.0
vii.	**Overall Average**						**3.5**	**1.2**

****SD-Strongly disagree, D-Disagree, MA-Moderately agree, A-Agree, SA- Strongly agree***

The findings in Table 27 indicate that 29.1% respondents agreed and 53.4% disagreed that they have ever accessed some credit in the last financial year 2016/17. Of the respondents 53.4% agreed and 27% disagreed that they have received reliable income from tea in the last one-year 2016/17 adequate enough for purchase of food in their households. Further, 73.8% agreed and 15.6% disagreed that access to credit has led to high tea yield that helps household to achieve food security in terms of availability, access and stability of access. Moreover, 64.1%

agreed and 17.5% agreed that proceed from tea bonus were all deducted to recover their credit thus leaving them vulnerable in terms of food security in their households.

The study confirmed arguments by Ejaz et al. (2009) who reported there are various institutions that have enhanced credit access to lessen household food insecurity and promote food security. In fact, governmental and non-governmental organizations have recorded success in micro credit among small scale farmers after providing credit services, according to Anouk (2010) on credit growth of small-scale farming in Nigeria due to credit provision from banks, government and NGOs.

4.7.6 Chi Square Test to Examine Influence of Access to Credit on HFS

The third hypothesis of the study stated that access to credit has no statistically significant influence on household food security. Chi square test results are in Table 27.

Table 27

Chi Square Results on Influence of Access to Credit on HFS

		Food Security					
		Availability		**Stability**		**Access**	
Credit Access		**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
No	Frequency	8	42	40	10	26	24
	Percentage	16%	84%	80%	20%	52%	48%
Yes	Frequency	40	13	37	16	30	23
	Percentage	75%	25%	70%	30%	57%	43%
Total	Frequency	48	55	77	26	56	47
	Percentage	47%	53%	75%	25%	54%	46%
		χ^2=6.24, d.f = 1 p value = 0.001		**χ^2=14.15, d.f = 1 p value = 0.002**		**χ^2=22, d.f = 1 p value = 0.000**	

P<0.05

Results in Table 27 indicate that there was a significant influence of access to credit and availability of food in a household (χ^2=6.24, d.f = 1, p value = 0.001). Of those who had access

to credit 75% reported food availability. There was significant influence of access to credit and stability of household food security (χ^2=14.15, d.f = 1, p value = 0.002). Further, the access to credit has significant influence on household food access (χ^2=22, d.f = 1, p value = 0.000). On average wide access to financial services including credit provide opportunities for improved food security, economic vitality and agricultural output for the communities and nations at large (Oni et al., 2010). Further, Anouk (2010) documented that the micro credit scheme started in the year 2000 by UNDP in ten Local Government Areas of Kaduna State with the aim of assisting farmers with farm inputs like fertilizers, herbicides, and seeds had great impact on food security. Increased crop production was the major objective of the UNDP Micro Credit Scheme in Kaduna State.

CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of study findings, conclusion and recommendations drawn from main findings.

5.2 Summary of Findings

The study sought to examine the influence of selected factors on household food security in tea zone of Kirinyaga County. Specifically, the study sought to establish the influence of land size on household food security in the tea zone of Kirinyaga County; to determine the influence of tea mono-cropping on household food security in the tea zone of Kirinyaga County; and to investigate the influence of access to credit by smallholder tea farmers on household food security in the tea zone of Kirinyaga County. To achieve this, the study was anchored on household food economy theory. Descriptive cross-sectional research design was adopted and primary data gathered through questionnaires administration. A sample of 110 respondents was selected through simple random sampling. Data was analyzed through descriptive statistics; mean, standard deviation, percentage and frequencies. Inferential analysis was done by use of Chi square test of association.

The response rate was 94% which was excellent. Most households were headed by males, most respondents were aged above 55 years, most families had at least 5 children and the highest level of education achieved by majority was Kenya Certificate of Primary Education. Most households were not food secure since majority reported that they often worried about food they would take, were unable to take their desired food and they would survive with no meals for some time. This indicates that the food was not accessible, available and there was no stability of access in different households.

Regarding the influence of land size on household food security in the tea zone Kirinyaga County, the study findings indicate that 70.8% reported that to a great extent land size has influence on food security. Further, 89.2% reported that they owned at least 0.76 acres of land and 70.8% of them had allocated it to tea production while 61.1% were using it for food crops production. Moreover, most respondents agreed that their land sizes were not enough to guarantee them enough food security in terms of availability. Further, most respondents agreed

that they have future plans of expanding their agricultural land. Chi square test for the influence of land sizes, land under tea, land under food crops production and household food security indicated significant association. The higher the land allocated to food crops the higher the chances of achieving food security.

The second objective investigated the influence of tea mono-cropping on household food security in tea zone of Kirinyaga County. Study findings indicate that 51.5% considered tea mono-cropping to have a great extent of influence on household food security. Further, most respondents neither agreed nor disagreed that dependence on tea income makes their household face food shortages or whether growing tea generates more income than food crops. Most respondents agreed that drop in tea prices has influence on household food security and some have uprooted tea bushes to venture into staple food production. Chi square test results indicate that there is a significant influence of tea mono-cropping on household food security in tea zone of Kirinyaga County. This indicates that an increase in tea monocropping minimizes access to food security in households in tea growing zone of Kirinyaga County.

The third objective of the study investigated the influence of access to credit on household food security in tea zone of Kirinyaga County. Study findings indicate that most of the respondents accessed credit from banks and KTDA. Most of borrowers repaid back their credit after a period of over three months. The respondents neither agreed nor disagreed whether they had accessed credit in the year 2016/17. Further, they neither agreed nor disagreed whether the proceeds from tea income was enough to guarantee them food security. Most respondents agreed that their credit access was dependent on amount of tea picked and the proceeds from tea bonus were used in repayment of their credit. Chi Square test indicates a significant influence of access to credit and household food security in the tea zone of Kirinyaga County. This indicates that an increase in credit access improves household food security in tea zone in Kirinyaga County.

5.3 Conclusions

Study findings indicate that there is a significant influence of land size and household food security. Hence, it can be concluded that the higher the land allocated to food the higher the chances of achieving household food security. Further, households should adopt innovative farming models that would ensure they increase chances of achieving food security.

Regarding the influence of tea mono-cropping the study findings indicates that there was positive and significant influence of tea production and household food security. Though tea production influenced household food security there is need to engage in alternative income generating activities. Tea mono-cropping should be adopted with caution since it has influence on access to staple food. Furthermore, there is likelihood of food shortages among households that practice purely tea mono-cropping in the event that tea production is disrupted by unforeseen circumstances.

Concerning the access to credit study findings depicts that there was positive and significant relationship between access to credit and household food security in tea zone of Kirinyaga County. There is need for development of credit facilities that would be in line with tea farmers' capacity to service loans. Loan facilities available to farmers should support production capacity of the respective households.

5.4 Recommendations

Based on study findings that food security is influenced by land size, tea mono-cropping and access to credit, the following recommendations can be given.

i. Since land size have significant influence on household food security there is need for smallholders' tea farmers in Kirinyaga county to designate some land for food cropping. Further, there is need for adoption of technology that can support farming so to optimize land production capacity.

ii. Tea monocropping has significant influence on household food security. Thus, there is need for striking a balance between tea mono cropping and food crops production. Further, smallholders' tea farmers may examine their comparative advantage between tea monocropping and food cropping. Proper balance between tea mono-cropping and food crops production would enhance household food security. Positive influence would be attributed to income generated from tea sales being allocated in purchase of food.

iii. Significant influence between access to credit and household food security, depicts the need for creation of strategies aimed at enhancing access to credit and minimization of odds of moral hazard and adverse selection. This may amplify household capacity to access resources. Through increased income, tea farmers would increase their borrowing

capacity. Hence, increased credit access would enhance household food production and tea production and consequently enhance food security at the household level.

5.5 Suggestions for further Research

i. Although, the current study limited its empirical examination on influence of land size, tea mono-cropping, access to credit and household food security there is need for a follow up study that would consider use of secondary data. Secondary data may show short run and long run influence of tea monocropping, land size and access to credit on house hold food security over a period of time.

ii. The study was limited to smallholder tea farmers in tea zone of Kirinyaga County, and a similar study should be carried out in other parts of the County to examine the level of household food security in the County. This would aid in development of short- and long-term plans that are aimed at achieving household food security.

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APPENDICES

Appendix A: Informed Consent

STUDY TITLE: Selected Factors Influencing Household Food Security in the Tea Zone of Kirinyaga County, Kenya

Institutions and Investigators

Researchers	Institution	Contact
Miss. Jane Wanjiku Kamau	Egerton University	0722213559
Dr. Catherine Ng'endo Munyua	Egerton University	0723808734
Dr. Susan Muthoni Kamuru	Egerton University	0722785338

Introduction

My name is Jane Wanjiku Kamau, a Master's student at Egerton University. I am the principal researcher in the study on the **selected factors influencing household food security in the tea zone of Kirinyaga County, Kenya.**

You were asked to participate in this study because you are eligible. The questionnaire filling may last approximately 25 minutes only. You can ask any questions you have at any time.

This is a consent form that gives you information about the purpose, procedure, risks, benefits, confidentiality/privacy and the process that was expected during the study. If you agree to take part, please sign your name at the bottom of this form.

Purpose of the study

The purpose of the study is to establish influence of selected household factors influencing household food security in the tea zone of Kirinyaga County, Kenya.

Contacts and questions

If you have any questions about your right as research participant you may contact the researcher Jane Wanjiku Kamau on her email address: **janekamau35@yahoo.com** and the Egerton

University Department of Applied Community Development Studies Department P.O. BOX 536, Egerton email lol@egerton.ac.ke Tel number: +254 0722154111

Your statement of consent and signature:

The above information has been read and explained to me. I have asked questions and received answers. I consent voluntarily to participate in this study. You may be given a copy of this signed form to take with you.

…… ……..

Respondent's name Signature/Thumb print and date

……

……..

Researcher's name Researcher's signature and date

Appendix B: Questionnaire for Tea Farmers

I am Jane Kamau, a student from Egerton University pursuing a Master of Science Degree in Community Studies and Extension. I am conducting a research on **selected factors influencing food security at household level among the farm families of the tea zone of Kirinyaga County**. The research is for academic purpose and any findings can in future be used by the interested parties to design food security interventions. The information that you will give will be treated with utmost confidentiality and will be greatly appreciated.

Section 1: Demographic Information of the Respondents

1. Gender of respondent: Male [ ] Female [ ]
2. Age bracket

   15-25 ( ) 26-35 ( ) 36-45 ( ) 46-55 ( ) Above 55 ( )
3. Size of the Family? 1-2 members ( ) 3-4 members ( ) 5-6 members ( )

   Above 6 members ( )
4. Size of the nuclear family: 1-2 members ( ) 3-4 members ( ) 5-6 ( ) members
   above 6 members ( )
5. Education level of the respondent:

   KCPE ( ) KCSE ( ) Diploma ( ) Degree ( ) Others ( )

Section B: Influence of Land Size on Household Food Security in the Tea Zone of Kirinyaga County

6. What is the extent to which land size is an influence on Household Food Security in the Tea Zone of Kirinyaga County

Very great extent [ ] Great Extent [ ] Moderate Extent [ ] little extent [ ] No Extent [ ]

7. How many acres of land do your household own?

   0.0 - 0.25 acres [ ] 0.26- 0.50 acres [ ] 0.51-0.75 acres [ ]

0.76-1.00 acres [ ] Above 1.00 acres [ ]

8. What is the size of land is under tea production in acres?

   0.0 - 0.25 acres [ ] 0.26- 0.50 acres [ ] 0.51-0.75 acres [ ]

   0.76-1.00 acres [ ] Above 1.00 acres [ ]

8. What is the size of land you have put under food crops production in acres?

   0.0 - 0.25 acres [ ] 0.26- 0.50 acres [ ] 0.51-0.75 acres [ ]

   0.76-1.00 acres [ ] Above 1.00 acres [ ]

9. Kindly rate your level of agreement with the following statements related to land size influence on household food Security in the Tea Zone of Kirinyaga County. Where 1= strongly agree, 2= agree, 3= moderately agree, 4= disagree and 5= strongly disagree respectively.

Statements	**1**	**2**	**3**	**4**	**5**
My farm size is an enough guarantee of food availability in my household					
I prefer growing food crops other cash crops because I think my farm is small					
I prefer cash cropping for this gives me adequate cash for food purchases for the household					
Size of my land and crop choice alone is not a sufficient condition for improving food by access in my household.					
I believe my farm size is adequate for cash crop and food crop growing for stability of food access in my household					
I prefer growing food crops as opposed to cash crops to guarantee food availability					
I have future plans of increasing my farm size for food security reasons in my household					

Section C: Influence of Tea Mono-Cropping on Household Food Security in the Tea Zone of Kirinyaga County

10. To what extent does tea Mono-Cropping influence Household Food Security in the Tea Zone of Kirinyaga County?

Very great extent [ ]

Great extent [ ]

Moderate extent [ ]

Little extent [ ]

No extent [ ]

11. Kindly rate your level of agreement with the following statements related to Tea Mono-Cropping influence on Household Food Security in the Tea Zone of Kirinyaga County. Where 1= strongly agree, 2= agree, 3= moderately agree, 4= disagree and 5= strongly disagree respectively.

Statements	**1**	**2**	**3**	**4**	**5**
Dependence on tea income makes my household to face food shortages.					
Drop in tea prices affect my household's ability to purchase food					
Mono cropping has led to reduction in the area of land available for household production of staple foods					
I have uprooted tea bushes in the recent past to give space to stable food farming					
Food prices in this region has gone up because of so much cash cropping in the area					
Households in this region are dependent on imported food products available in the market					
Tea production leads to food shortages for the household.					
Growing tea is better than food crops because tea brings regular income					
Income from tea compliment food needs in the household.					

Section D: Influence of Access to Credit by Smallholder Tea Farmers on Household Food Security in the Tea Zone of Kirinyaga County

12. What is the Average income you have received from tea in the last one year in ksh

a) Jan-March……. b) April-June…….

c) July-Sept……. d) Oct-Dec…….

13. What is the average income you have received from food crops in the last one year in Ksh a) Jan- March…… b) April-June…….

    c) July-Sept…….. d) Oct-Dec……

14. Where did you get your credit from Farmers SACCO ( ) Bank ( ) KTDA ( )

    Others ( )

15. How long do you take to get the credit? 1 month ( ) 2 months ( ) over 2 months ( )

16. What type of credit do you get from KTDA Cash ( ) Inputs ( )

17. Kindly rate your level of agreement with the following statements related to Access to Credit influence on Household Food Security in the Tea Zone of Kirinyaga County. Where 1= strongly agree, 2= agree, 3= moderately agree, 4= disagree and 5= strongly disagree respectively.

Statements	**1**	**2**	**3**	**4**	**5**
I ever accessed some credit in the last financial year 2016/17					
I have received average income from tea in the last one-year 2016/17 adequate enough for food in my household					
Access to credit lead to high tea yield that helps household to achieve food security					
Proceeds from tea bonus were all deducted to recover my credit					
Access to credit is dependent on amount of tea picked					
I buy food on credit from the stores					

Section E: Household Hunger Scale Index

On a five-point Likert indicates the frequency with which you have experienced the following in your household. 1= Never, 2=Rarely, 3=Sometimes, 4= Often 5=Always.

Occurrence	Never	Rarely	Sometimes	Often	Always
In the past four weeks, did you worry that your household would not have enough food?					
In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?					
In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?					
In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?					
In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?					
In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?					
In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?					
In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?					
In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?					
In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?					

THANK YOU FOR YOUR TIME IN ANSWERING THE QUESTIONS

Appendix C: NACOSTI Research Permit

THIS IS TO CERTIFY THAT:
MS. JANE WANJIKU KAMAU
of ERGERTON UNIVERSITY, 392-10300
Kerugoya,has been permitted to
conduct research in *Kirinyaga County*

on the topic: *SELECTED FACTORS INFLUENCING HOUSEHOLD FOOD SECURITY IN THE TEA ZONES OF KIRINYAGA COUNTY, KENYA*

for the period ending:
3rd August,2018

.....
Applicant's Signature

Permit No : NACOSTI/P/17/34663/18295
Date Of Issue : 3rd August,2017
Fee Recieved :Ksh 1000

.....
Director General
National Commission for Science, Technology & Innovation

CONDITIONS

1. The License is valid for the proposed research, research site specified period.
2. Both the Licence and any rights thereunder are non-transferable.
3. Upon request of the Commission, the Licensee shall submit a progress report.
4. The Licensee shall report to the County Director of Education and County Governor in the area of research before commencement of the research.
5. Excavation, filming and collection of specimens are subject to further permissions from relevant Government agencies.
6. This Licence does not give authority to transfer research materials.
7. The Licensee shall submit two (2) hard copies and upload a soft copy of their final report.
8. The Commission reserves the right to modify the conditions of this Licence including its cancellation without prior notice.

REPUBLIC OF KENYA

NACOSTI

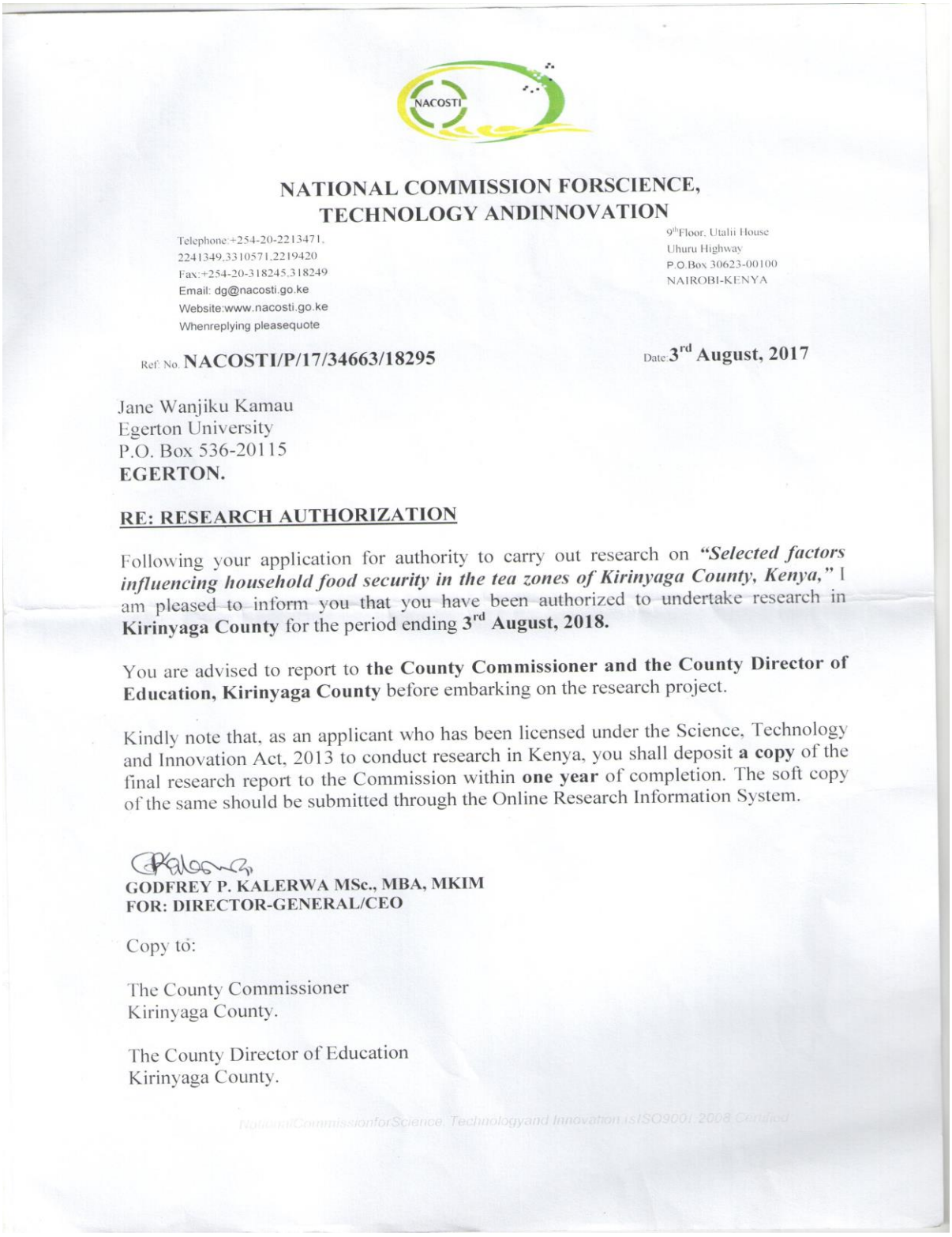
National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No.A 15254

CONDITIONS: see back page

Appendix D: NACOSTI Research Authorization



NATIONAL COMMISSION FORSCIENCE,
TECHNOLOGY ANDINNOVATION

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Website:www.nacosti.go.ke
Whenreplying pleasequote

9th Floor, Utalii House
Uhuru Highway
P.O.Box 30623-00100
NAIROBI-KENYA

Ref. No. **NACOSTI/P/17/34663/18295**

Date: **3rd August, 2017**

Jane Wanjiku Kamau
Egerton University
P.O. Box 536-20115
EGERTON.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Selected factors influencing household food security in the tea zones of Kirinyaga County, Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Kirinyaga County** for the period ending **3rd August, 2018.**

You are advised to report to **the County Commissioner and the County Director of Education, Kirinyaga County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Kirinyaga County.

The County Director of Education
Kirinyaga County.

Appendix E: County Research Authorization

MINISTRY OF EDUCATION
STATE DEPARTMENT OF BASIC EDUCATION

Telephone: 060-21835/0202641217
Email kirinyagacde1@gmail.com
When replying please quote
Ref. No. and date

COUNTY DIRECTOR OF EDUCATION
KIRINYAGA COUNTY
P. O. BOX 96
KERUGOYA

REF.NO.MOE/CDE/KRG/GEN/09/85/170

8th September, 2017

Jane Wanjiku Kamau
Egerton University
P O Box 536-20115
EGERTON

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Selected factors influencing household food security in the tea zones of Kirinyaga County, Kenya"***.

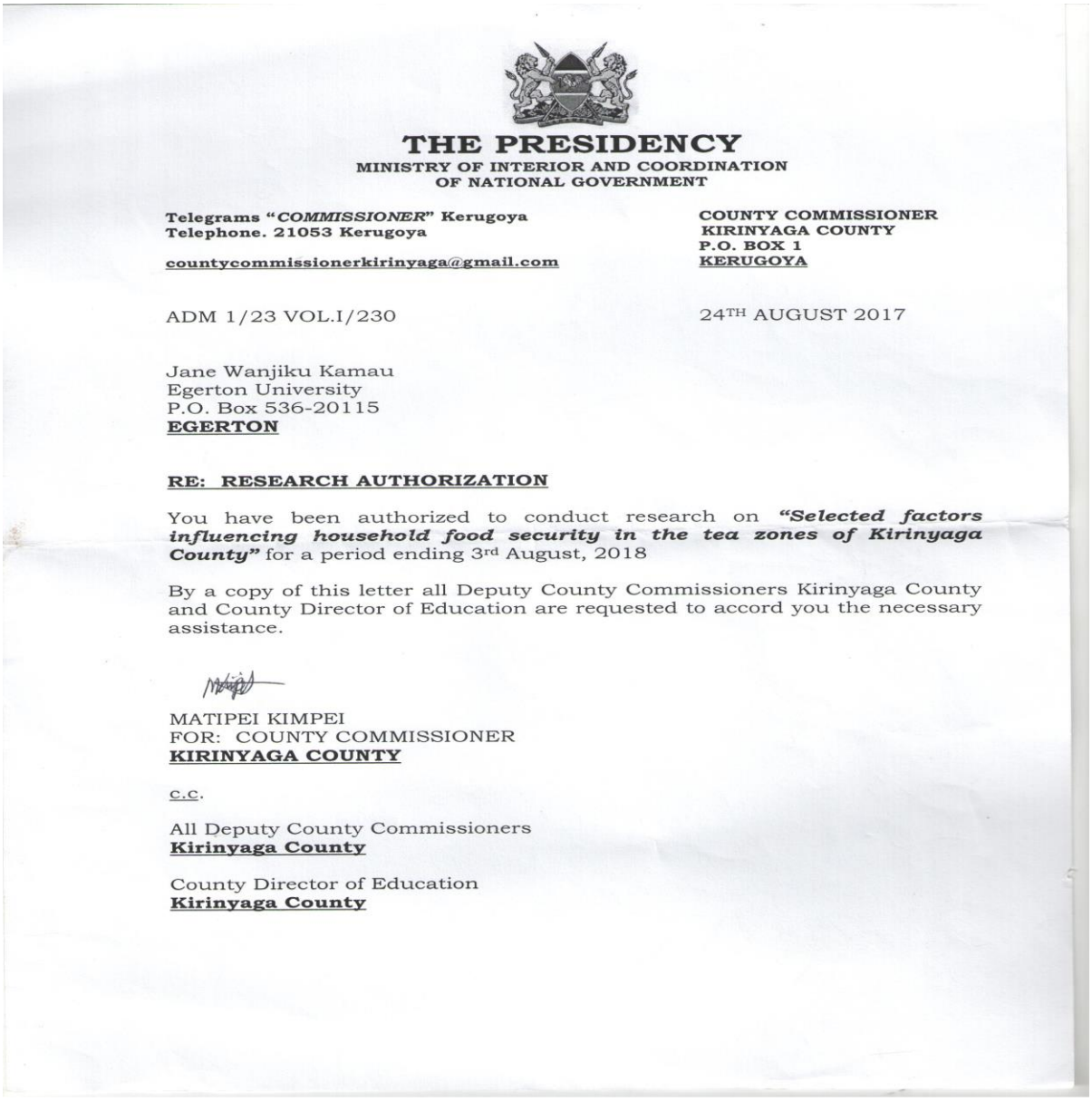
I am pleased to inform you that you have been authorized to undertake research in Kirinyaga County for a period ending 3rd August, 2018.

MAGIRI P. M
COUNTY DIRECTOR OF EDUCATION
KIRINYAGA

CC: COUNTY COMMISSIONER
KIRINYAGA

Vision: To have a globally competitive quality Education, Training and Research for Kenyans sustainable development.

Appendix F: Research Approval Kirinyaga County Education Office



THE PRESIDENCY
MINISTRY OF INTERIOR AND COORDINATION OF NATIONAL GOVERNMENT

Telegrams "*COMMISSIONER*" Kerugoya
Telephone. 21053 Kerugoya

countycommissionerkirinyaga@gmail.com

COUNTY COMMISSIONER
KIRINYAGA COUNTY
P.O. BOX 1
KERUGOYA

ADM 1/23 VOL.I/230

24TH AUGUST 2017

Jane Wanjiku Kamau
Egerton University
P.O. Box 536-20115
EGERTON

RE: RESEARCH AUTHORIZATION

You have been authorized to conduct research on ***"Selected factors influencing household food security in the tea zones of Kirinyaga County"*** for a period ending 3rd August, 2018

By a copy of this letter all Deputy County Commissioners Kirinyaga County and County Director of Education are requested to accord you the necessary assistance.

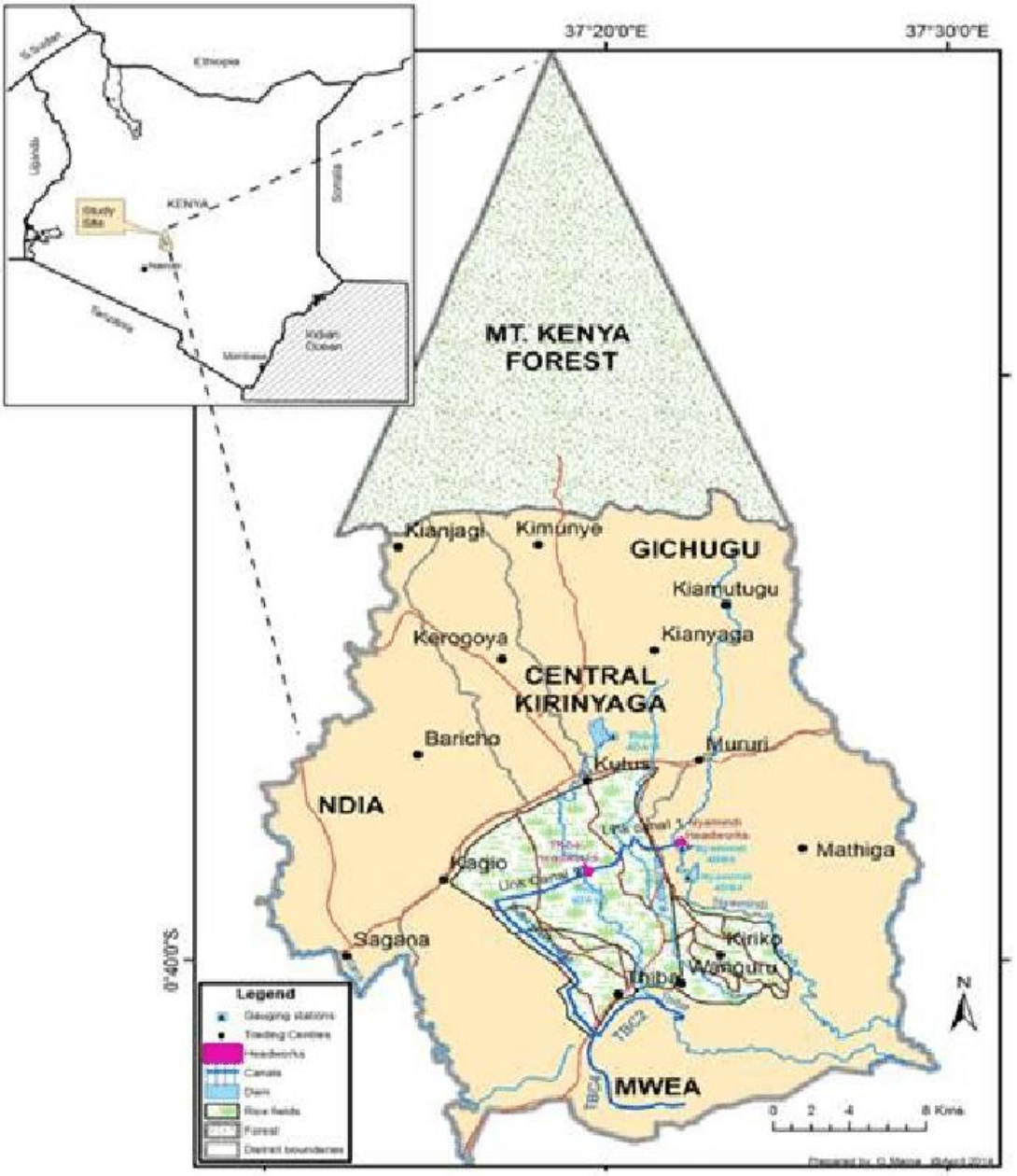
MATIPEI KIMPEI
FOR: COUNTY COMMISSIONER
KIRINYAGA COUNTY

c.c.

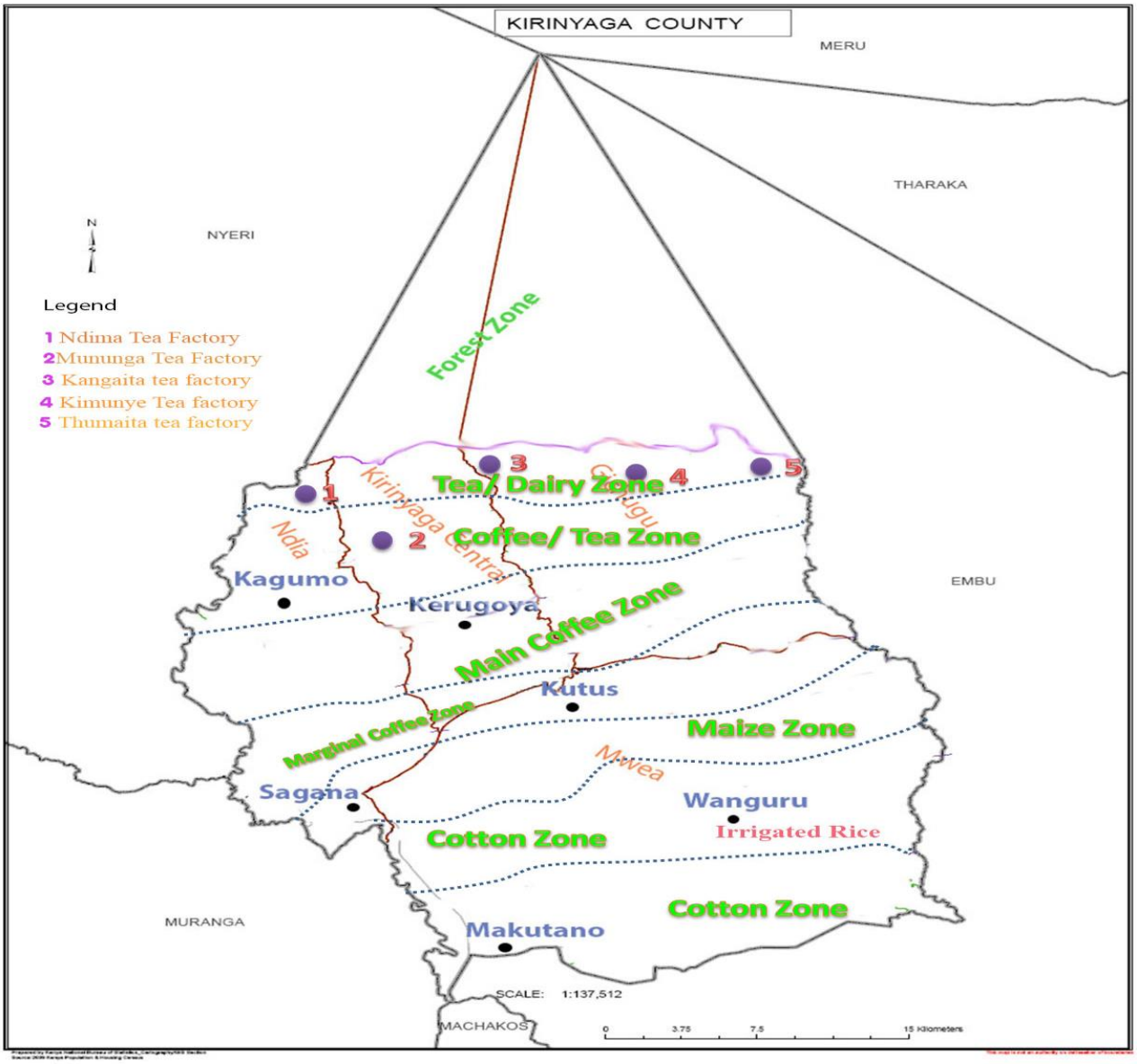
All Deputy County Commissioners
Kirinyaga County

County Director of Education
Kirinyaga County

Appendix G: Map of Kirinyaga County



Appendix H: Map of Tea Zone of Kirinyaga County



Appendix I: Publication

AJoBEH

Influence of Land Size on Household Food Security in the Tea Zones of Kirinyaga County

Wanjiku, K.J, Ng'endo, M.C & Muthoni, K.S.

Egerton University, KENYA
***Correspondence*:** janekamau35@yahoo.com

Abstract

Food is recognized as a basic human right and inadequate food consumption has serious implications for general body health and well-being, growth, development and cognitive ability. Thus, food insecurity which in this case refers to a condition where a population does not have access to sufficient, safe and nutritious food over a given period to meet dietary needs and preferences is a threat to overall human well-being, as well as efforts geared toward poverty reduction and economic growth. A guarantee of household food security requires adequate home production of food and/or adequate economic and physical access to food. Smallholder farmers in the tea zones of Kirinyaga County have converted most of their land to tea production, while food crop production has been on the decline. Nevertheless, the extent to which this trend has affected food security is not clear. This study examined the influence of land size on household food security in the tea zones of Kirinyaga County. Descriptive cross-sectional design was applied and primary data collected through administration of questionnaires. Data was analyzed using descriptive statistics and Chi square test of association. There was a significant association between household land size and food security. There is need for deliberate efforts to safeguard household food security.

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Published: 9th Nov 2022

Key words: *Household, Food security, Land size.*