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

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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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Introduction

Food security is defined as a situation 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). **Thus, 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.

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 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 approximately 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 support 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).

In Kenya for example, approximately 33% of Kenya's population experienced chronic food insecurity between 2004-2008 (Kumba, 2015). Thus, food security continued to deteriorate and by 2012, about 10 million people were food insecure a situation that has been attributed partly to insufficient domestic production leading to more than 50% of the population living below the poverty line (Glopolis, 2013).

Notably, smallholder farmers in the tea growing zones of Kirinyaga County have converted most of their land into tea production, while food crop production has been on the decline. According to Kirinyaga County Agriculture Annual report 2015/2016 the tea earnings for Kirinyaga County were Ksh. 4.3 billion compared to food crops earnings of Ksh. 2.1 billion. Despite this huge amount of money from tea, most tea farmers are in debts (KTDA Payment

returns) and food security remains a big problem. This paper examined the influence of land size on household food security in tea zones of Kirinyaga zones.

Objective of the Study

This study sought to establish the influence of land size on household food security in tea growing zones of Kirinyaga County.

Literature Review

According to Lang'at et al., (2010), issues related to food security were macroeconomic in nature and focused mainly on ensuring availability and price stability of foodstuffs. The concept of food security therefore, goes beyond availability to considerations of constraints that individual encounter to access food (Webb, et al 2006).

Arguably, households in Kirinyaga County tea zones 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) argued that there is an interlink between prevailing economic conditions and household income and that 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.

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. Notable marginal benefits were recorded among households that practiced mixed farming. These benefits were only short-lived since few farmers practised reliable saving cultures. Moreover, there are uncertainties in market availability for farm produce and were associated with uncertain demand, as well as financial and infrastructural aspects that have influence on household income generation capacity.

Carletto, et al (2009) evaluated long term impact of food crop production as compared to cash crop production on changes in household consumption status and asset accumulation in the Central Highlands of Guatemala. Results demonstrated that those who had practiced cash crop farming over a long period of time gained more compared to those who were not practicing it despite the land sizes. These findings may only be limited to Guatemala since

there are other aspects that may affect household food security and are unique to respective countries.

Methods and Materials

Research Design

Descriptive cross-sectional design was applied and mixed qualitative and quantitative data gathered.

Study Location

The location of the study was Kirinyaga County, central Kenya latitude 0^0 1‟ and 0^0 40‟ South longitude 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 is 528,054 with average growth of 1.5%. The climate is tropical with equatorial rainfall pattern. The County has two rainy seasons, with long rains in March to May average 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 zones respectively during the hot season. The main economic activity and income generating activity in upper zone is tea farming. The study was executed in one of 5 tea factories in tea growing zones of the County.

Population of the Study

The target population were smallholder tea farmers from 5 KTDA Tea Factories (Table 1), which included Ndima, Mununga, Kangaita, Kimunye and Thumaita with a registered population of 42,318 farmers (Ministry of Agriculture, 2016).

Sample Size and Sampling Technique

Sample size was determined using an online sample size calculator with a 5%margin of error of 95%, confidence level and a response distribution of 50%. 368 respondents were included in the study with 30% of the 368 respondents selected to give a final sample size of 110 farmers from 10 tea buying centers.

Data Analysis and Presentation.

Data from the field was coded, keyed into the computer and cleaned to ensure accuracy and analysed using Statistical Package for Social Sciences (SPSS). Descriptive and inferential statistics were used to analyse the results and interpreted and presented in frequency tables

and graphs. Descriptive statistics was adopted to explain selected factors affecting household food security in Kirinyaga County while Chi square test was used to examine association between land size, land size on tea and household food security as well as land size on food crops and household food security.

Results and Discussion

Household Food Security

Food security was measured by assessing access, availability and stability of access of food in the households during a 4-week period.

A five-point Likert scale was used to assess 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 1.

Table 1: Food Access, Availability and Stability

Measures of food security	N	R	S	O	A	Mean	Std. Dev.
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
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
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
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
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
In the past four weeks, did you or any household member have to eat fewer meals	23.3	15.5	16.5	29.1	15.5	3	1.4

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?	4.9	17.5	19.4	25.2	33	3.6	1.2
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
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
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

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

60.2% of respondents' households were often worried their households would not have enough food in the past four weeks while 50.5% reported that they were often unable to eat their preferred food due to lack of resources. 72.8% indicated that a member often had to eat limited variety of food due to lack of resources. 48.6% of respondent indicated that they often had to eat foods that they did not like due to lack of resources while 69.9% indicated that they often had to eat smaller meals than they needed because food was not enough. Majority (mean =3.9), reported that either themselves or the household members often did not have food due to lack of resources in their household and that majority of household members often slept hungry due to lack of food.

Whereas a varied and balanced diet is essential to reducing malnutrition, food insecurity jeopardizes dietary intakes making children vulnerable. Due to the high nutrient demands for growth, children are the most vulnerable to low school admission, absenteeism, early dropout and low academic achievement, which result in reduced productivity during adulthood. The existence of food insecurity at the household level is also associated with vulnerability to psychosocial dysfunction and overall poor health. 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.

Influence of Land Size on Household Food Security

We examined the perception of the respondents on the influence of land size on household food security.

38.8% of the respondents reported that land size greatly influenced household food security, 32% that it influences to a great extent, 14.6% moderately and 7.8% to no extent. 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 that need foreign exchange.

Table 2: 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**

Household Land Size

The study examined household land size in tea zone of Kirinyaga County. The findings are presented in Table 3.

59.2% of households owned more than an acre, 30.1% between 0.76-1 acres and 8.7% between 0.51 to 0.75 acres. Although, majority of respondents had more than once acre of land there is need for appropriate decision making on land allocation. In order not to constrain allocation of land for food crops. According to Afari (2007) there is causality between household land size and food security and that those households who optimize their land allocated for food crops production have 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, other factors determine food security. These results are consistent with report by Kenya National Bureau of Statistics (KNBS, 2019) that many small-scale farmers usually have at most 2 acres which would be the total land owned by the household.

Table 3: Household 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**

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.

Results indicate that 38.8% of households had allocated between 0.76 to 1 acre on Tea plantation, 32% above 1 acre and 14.6% 0.51 to 0.75 acres showing that most of the household land was used for tea production. 32% of households allocated above one acre for food crops, 29% 0.76 to 1 acre, 24.3% 0.51 to 0.75 acres and 14.6% less than 0.50 acres for food crops production.

Table 4: 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**

Uncontrolled allocation of household land to tea may expose households to food insecurity. Our observations are consistent with reports of Kuhlgatz and Abdulahi (2011) that though there is high propensity to cultivate cocoa in Ghana, housholds with small land sizes preferably grow food crops.

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 disagreeing to strongly agreeing. The rating ranged from 1-strongly disagree, 2-disagree, 3-moderately agree, 4-agree and 5-Strongly agree. These results are presented in tables

Table 5: Respondents' Perceptions of Influence of Land Size on HFS

	SD	D	MA	A	SA	Mean	Std. Dev.
My farm size is an enough guarantee of food availability in my household	3.9%	4.9%	21.4%	43.7%	26.2%	3.8	1.0
I prefer growing food crops other cash crops because I think my farm is small	1.9%	6.8%	19.4%	34%	37.9%	4.0	1.0
I prefer cash cropping for this gives me adequate cash for food purchases for the household	0%	4.9%	15.5%	38.8%	40.8%	4.2	0.9
Size of my land and crop choice alone is not a sufficient condition for improving food by access in my household.	4.9%	0%	4.9%	26.2%	64.1%	4.5	1.0
I believe my farm size is adequate for cash crop and food crop growing for stability of food access in my household	3.9%	2.9%	15.5%	27.2%	50.5%	4.2	1.1
I prefer growing food crops as opposed to cash crops to guarantee food availability	2.9%	3.9%	9.7%	33%	50.5%	4.2	1.0
I have future plans of increasing my farm size for food security reasons in my household	2.9%	7.8%	11.7%	23.3%	54.4%	4.2	1.1

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

69.9% of respondents indicated that their farm size was enough to guarantee them food availability for their households, 71.9% that they prefer growing food crops rather cash crops because they think their farm is small while 79.6% prefered cash cropping because it gave them adequate cash to purchase food for household. 90.2% indicated that the size of land and crop choice alone is not a sufficient condition for improving food access in their households. 77.7% had future plans of increasing their farm size for food crop production to ensure availability, access and stability access of food for their households. Overall respondents agreed (mean = 4.1, standard deviation = 1) that land size influences household food security.

Results of this study are consistent with reports of Afari (2007) that food security in developing economies is dependent on value chain small scale farmers have on cash crops since those families that do not optimize their land allocation on food crops are exposed to household food insecurity. This was in contrast to large scale farmers whose production capacity was higher since they could practice crop rotations (Kumba, 2015). Further, large scale farmers tended to engage in cash crop farming to reap from cash exchange while those with small land acres were disadvantaged since their production capacity was comparatively lower.

Table 6: Chi Square Results on Influence of Household Land Size on HFS

Household land size		Food security Availability		Stability		Access	
		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	

Influence of Household Land Size on Household Food Security

Influence of household land size on household food security was examined through use of Chi square test of association (Table 6).

There was significant influence of household land size on availability of food (χ^2=11.108, d.f = 3 p value = 0.004). 61% of those who had land size of between 0.76 and 1 acre reported that food was available. Household land size had significant influence on stability of household food access (χ^2=10.22, d.f = 3 p value = 0.005). 67% of households with at least 0.51 acres and above reported food stability while household 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 are consistent with reports of Karanja and Strauss (1999) that food productions were dependent on land size.

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 (Table 7).

An investigation into the influence of household land size under tea production and household food security indicated that 43% of those families with 0.5 acres of land and below on tea production reported food unavailability. Chi square tests indicated 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 to tea production reported that they experienced food stability. Chi square test demonstrated significant influence of size of land on tea production and food stability (χ^2=21.04, d.f = 4 p value = 0.000). 52% of those who allocated above 1 acre to tea production reported that they had no access to food for the household. Chi square results demonstrated 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 reports of Kuhlgatz and Abdulai (2011) who argued that household production propensity is contingent to welfare that farmers receive from players in the value chain process. This observation also contradicts reports of Bashir et al., (2010) who asserted that household food security was in congruence with land allocated to cash crops resulting from household capacity to raise funds to purchase food.

Table 7: 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	

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 and results showed that 60% of households that allocated 0.51 to 0.75 acres to food crops reported food availability. Chi square results demonstrated significant influence of size of land on food crops and availability of food (χ^2=11.36, d.f = 4 p value = 0.000). 67% of households that allocated at most 0.25 acres to food crops reported food access. Chi square test demonstrated significant influence of size of land on food crops and household food stability (χ^2=23.05, d.f

= 4 p value = 0.000). On the other hand 83% of those who allocated 0.26 to 0.5 acres to food crops reported access to food. Similarly, Chi square test demonsrated significant influence of size of land on food crops on food access (χ^2=14.19, d.f = 4 p value = 0.000).

Table 8: Chi Square Results on Influence of Land Size under Food Crops and HFS

Size of Land on Food Crops		Food security Availability		Stability		Access	
		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	

Conclusion and Recommendations

Results of this study demonstrate significant influence of land size and household food security. Thus, the higher the land allocated to food crops production 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.

Since land is a fixed factor of production, there is need for households in Kenya to adopt farming technologies that are geared to value addition rather than purely primary production. Equally, farmers should designate sizeable land for food crops production, to minimize reliance on purchase of food in situations when income from tea is minimal.

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