

# The Influence of Agricultural Land Use on Household Food Security Situation in Kisii Central Sub-County, Kenya

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## Abstract

Food security is a situation where people have access to sufficient, stable and safe food to meet their dietary needs for an active and healthy life. The aim of this paper is to determine the influence of agricultural land use on household food security situation in Kisii Central sub-county, Kenya. A sample of 209 households was picked from three sub-Locations within the three main agro-ecological zones of the study area. A structured questionnaire was used to collect the required data from household heads. Assessment of household food security status was based on experienced-based method. Agricultural land use was categorized into food crop, cash crop, fruits and vegetables and natural pasture and/or napier grass. The influence of agricultural land use on household food security situation was analyzed using the Pearson's Chi-square test. Data analysis showed that 77.5% of the sampled households were food secure while 22.5% were not. About (65%) of the agricultural land was allocated to food crops, 25% to cash crops and the remaining proportion was left for other agricultural land uses. Cash crop (0.000) and natural pasture and/or napier grass (0.002) were found to have a significant influence on household food security while food crop (0.228) and fruits and vegetables (0.192) did not. The study recommends that more efficient ways of utilizing the land resource through increased use of high quality seeds and fertilizers to increase productivity. Investment in projects that enhance commercialization of small-scale farming in order to generate household income should be promoted.

**Keywords:** Agricultural land use, Household food security, Kisii Central

## 1.0 Introduction

Food insecurity is a global problem and it exists when people do not have adequate physical, social or economic access to food (FAO, 2009). In 2010, the Food and Agricultural Organization (FAO) estimated that more than 900 million people globally were suffering from hunger (FAO, 2010). Recent reports show that there has been improvement on the food security situation globally as the number of those faced with hunger reduced from 868 million to 842 million (12% of the world's population) between 2011 and 2013 (FAO, IFAD, WFP, 2013). Despite this improvement, more than 2 billion people worldwide are affected by hidden hunger as a result of deficiencies in essential micronutrients such as Iron, Vitamin A and Zinc and about 25% of the children under the age of 5 years (162 million) are stunted (FAO, 2013).

Food insecurity in the sub-Saharan Africa is critical; about 240 million people (1 in every 4) lack adequate food for a healthy active life (Bremner, 2012). Food insecurity in the sub-Saharan region is due to many factors among them the high rate of population growth (about 2.5% per annum) which is estimated to reach 1.2 billion by 2025 (Diao *et al.*, 2012). Yields of food staples like cereals are low, averaging between 1500 kilograms per hectare and 2000 kilograms per hectare which is way below the world average of about 3000 kilograms per hectare (Oxford Analytica, 2009). Poverty is another contributing factor to food insecurity as over 40% of the population survives on less than 1.25 US dollars a day and therefore unable to purchase adequate food (Deutsche Bank, 2014). Inadequate access to land is also a critical challenge as farm size has declined over the past four decades to an average of 2.16 hectares and per capita access of 0.12 hectares leading to over subdivision of land into uneconomic units (Jayne *et al.*, 2010).

Kenya like the other countries in sub-Saharan Africa faces problems of food insecurity. In 1961, Kenya could feed 8.4 million people at more than 10% above WHO requirements assuming that basic foods contributed 75% of the dietary energy and this was because basic food production was high (Dietz, 2014). During the 1980s, the harvested area and crop yields stabilized resulting in Kenya being largely self-sufficient in food but in 1990s, yields deteriorated for all basic food crops such that in the year 2000 the amount of food produced could only feed 68% of the population (Ibid). By the 2005/06 reports indicated that 47.2% of people in the rural areas had food consumption levels that were insufficient to meet their basic daily energy requirement of 2250 Kilocalories per adult equivalent per day (KNBS, 2005/06). Production of the basic food crops has not kept pace with food demand and about 1.3 million people in the rural areas and between 3.5 to 4.0 million in the urban areas were food insecure in 2008 and the number increased to 10 million in the past few years (IFPRI, 2012; WFP, 2009).

Kisii Central sub-County also faces household food insecurity and about 60% of the population is associated with food poverty (Kisii County, 2013). This situation has been attributed to many factors among them diminishing land resource due to high human population growth (2.72% per annum) and an average of population density of 1056 persons per square kilometer. This is a threat to agricultural production as arable

land has been reduced due to continued land sub-division and allocation to non-agricultural uses such as construction of settlements. The land holdings are small, averaging about 0.5 hectares for farm families of about five people (Kisii Central District, 2009). Soil fertility has declined due to continuous cropping and this has a negative impact on food production as most crops are associated with low yields (Place *et al.*, 2004). This problem is further compounded by use of low levels of yield enhancing inputs for both food and cash crops, resulting in low levels of crop income (Dietz, 2014). Kisii Central sub-County is also associated with a high poverty level of 54.2% which has a negative influence on agricultural production and household food security (Kisii County, 2013).

Household food security is based on the premise that households will meet most of their food needs through their own production and/or through purchase from the market. For majority of poor rural households, own food production holds a central role as a source of food and income. Land utilization, therefore, becomes an important determinant of the type of land use and subsequent source of livelihood. This study, therefore, sought to determine the influence of agricultural land use on household food security situation in Kisii Central, sub-County.

## 2.0 Research Methodology

### 2.1 Study Area

Kisii Central sub-County is located in Kisii County in the Western part of Kenya. It lies between latitudes 0°30' and 0°58' south, longitudes 34°42' and 35°05' East. It occupies a total area of 361.0 km<sup>2</sup> (Kisii Central District, 2009). Topographically, the sub-County is a highland region with altitude ranging slightly less than 1500m and slightly over 1800m above sea level (Jaetzold *et al.*, 2009). The area generally experiences mild temperatures of between 18°C and 21°C. Average rainfall ranges between 1200mm to about 2400mm although most of the sub-County receives between 1600mm to 2000mm of rainfall per annum. The main agro-ecological zones are the Lower Highland (LH) and Upper Midland (UM) with a few of their subzones (Ibid). Most of the area (> 75%) is a Coffee-Tea zone (UM<sub>1</sub>), and covers the central part of the sub-County. Kisii Central sub-County had a population of 381,159 and a density of 1056 by 2012 (Kisii Central District, 2009). This means that the sub-County experiences enormous population pressure with great implications on household food security.

### 2.2 Data Sources and Sample Size

Primary data was collected from a defined group of household heads using a structured questionnaire. Food security is an elusive concept and the multidimensional nature of phenomenon poses considerable challenges to researchers in terms of operationalizing the concept (Barret, 2010). However, information on household food security situation was collected based on the experience-based method and household heads were asked to assess their food security status in the twelve months preceding the study. Their assessment was based on information on food available at the household level based on all food sources, that is; 'own farm production', 'purchasing', 'working for food', and 'gifts in form of food'. The food security status of households was categorized as 'adequate food', 'mild shortage (1 - 2 months)', 'shortage (3 - 5 months)' and 'severe shortage (more than 6 months)'. This method was used by Amaza *et al.*, (2009) in the study of changes in household food security and poverty status in Southern Borno State, Nigeria.

The study conceptualized agricultural land use as comprising four categories: Cash crop land use was all land used for production of tea, coffee and sugarcane. Food crop was the land allocated to crops such as maize, beans, bananas, sorghum, finger millet and sweet potato. Fruits and vegetable land use referred to all the land used to grow avocados, pineapples, paw paws, cabbages, kales, onions, tomatoes and traditional vegetables. Pasture and napier grass was the land use referring to natural pasture and production of napier grass. Therefore, data was collected based on the four land uses; cash crop, food crop, fruits and vegetables and pasture and napier grass.

The sampling frame comprised all rural farm households in Kisii Central sub-County who were within LH<sub>1</sub>, UM<sub>1</sub> and LM<sub>2</sub> agro-ecological zones. The sub-location with the highest population density within each agro-ecological zone was selected as a sampling unit. A total of 209 households were picked proportionally from the sub-locations.

### 2.3 Methods of Data Analysis

Data was analyzed using both descriptive and inferential techniques. The first step in data analysis involved generation of statistical summaries such as frequencies, percentages, means and sums. Out of these frequencies and percentages, tables were constructed to help in the description of the characteristics of the sample population. The Chi-square test was used to analyze the influence of agricultural land use on household food security situation (Yates, *et al.*, 1999).

This test was used to check whether a systematic association existed between two or more variables that had been cross-tabulated. Only Chi-square values significant at 0.05 ( $p \leq 0.05$ ) were considered as

representing significant relationships.

### 3.0 Results and Discussion

#### 3.1 Household food security situation

Respondents reported various household food security situations, 18.7% reported that they had adequate food within the period, 58.9% (majority) had experienced mild shortage (1-2 months), 19.6% experienced food shortage lasting (3-5 months) while a small proportion (2.9%) had severe shortage (more than 6 months). Households with adequate food and those who had experienced mild food shortage (1-2 months) were grouped together and categorized as food secure. On the basis of that, the majority (77.5%) of the households were termed as food secure while 22.5% were considered food insecure as shown in Table 1.

**Table 1: Food Security Situation among Sample Households in the Study Area**

Household Food security situation		Frequencies	Percentage (%)	
Food secure	Adequate food	39	18.7	} 77.5%
	Mild shortage (1 - 2 months)	123	58.8	
Food insecure	Shortage (3-5 months)	41	19.6	} 22.5%
	Severe shortage (> 6 months)	6	2.9	
<b>Totals</b>		<b>209</b>	<b>100</b>	

These findings compare well with other studies conducted on issues of food insecurity, for example, Kaloi *et al.* (2005) found that 62% of the households in Mwingi district, Kenya were food secure while 38% were not. A study by Keino *et al.* (2014) in the Rift Valley region of Kenya also found that over 70% of the 656 households in the sample were severely food insecure. On the other hand, Kabui (2012) found that 44.7% of the households in Tharaka Central division were food insecure and 43.3% were vulnerable to food insecurity and only 12% were secure.

Respondents identified seven causes of food shortages as presented in Table 2. A fairly large proportion (38.3%) of respondents considered farm size to be the most constraining factor in the achievement of food security. The other causes were low yields (19.6%), drought (13.4%), soil exhaustion (11.5%), and poor crop breeds (4.8%). High population, poor crop breeds, high food prices and poverty were also associated with food shortages at household level.

**Table 2: Causes of Food Shortages among Households**

Causes	Frequencies	Percentage
Scarcity of land/Small farm size	80	38.3
Low yields	41	19.6
Drought	28	13.4
Soil exhaustion	24	11.5
High population	17	8.1
Poor crop breeds	10	4.8
Others (high food prices, poverty)	9	4.3
<b>Totals</b>	<b>209</b>	<b>100</b>

These findings are in line with those of the Kisii County Integrated Development Plan (2013 - 2017), which lists high cost of farm inputs, poor crop farming methods, use of uncertified seed and small farm sizes as main causes of food insecurity in the study area (Kisii County, 2013). Households had various ways of coping with food shortages and majority (78%) reported that they purchased the food they required, 17.5% received in exchange for their labour, and only a few (4.5%) received it from friends and relatives as gifts.

#### 3.2 Categories of agricultural land use in the study area

Allocation of agricultural land to different land uses was varied. Food crops took the largest share of farm land (65%). Food crop production was conducted on field sizes ranging from 0.01-3.5 acres. Maize was the most popular food crop grown by 98.0% of the households while finger millet was cultivated by only 6.7% of the households. Cash crops were allocated about 25% of the crop land. Tea was the most prevalent and was grown by 60.3% of the households followed by coffee (32.1%) and then sugarcane (24.4%). The rest of land (about 10%) was allocated to the other two land uses. Vegetables were cultivated by most households (76.6%) although on small field sizes averaging 0.16 acres. Napier grass was a popular crop grown by 91.4% of the households on field sizes ranging between 0.01- 4.63 acres with an average field size of 0.35 acres. A large proportion (89.5%) of the sample households kept livestock and the amount of land devoted to natural pasture was generally less than one acre as reported by 76.6% of the households. These findings corroborate those of Conelly and Chaiken

(2000) who found that typical small scale farming households in Kenya devote 10-25% of their land to cash crops and the remaining portion to the food crops such as maize, beans and potatoes.

Household food production is a significant contributor to food security especially among small scale farmers. Maize is a primary staple food in the study area and nationally it is estimated to account for 20% of the agricultural production and contributes 68% of daily per capita cereal consumption apart from providing 25% of agricultural employment (Shroeder *et al.*, 2013). The agricultural activities discussed are important sources of livelihoods and determine, to a large extent, whether households get access to adequate food or not.

### 3.3 The influence of agricultural land use on household food security situation

The relationship between the four categories of agricultural land use and household food security was tested and the findings presented on Table 3. Two agricultural land uses were found to be significantly related to household food security namely: cash crop ( $P=0.000$ ) and pasture and napier grass ( $P=0.002$ ). On the other hand, food crop (land use) was not significantly related ( $P=0.228$ ) to household food security and the situation was similar with fruits and vegetable ( $P=0.192$ ) production.

**Table 3: Chi-square Test Results on the Influence of Agricultural Land Use on Household Food Security Situation**

Land uses	Chi-square	<i>n</i>	<i>df</i>	<i>p</i>
Cash crop	12.319	209	1	0.000*
Food crop	1.451	209	1	0.228
Fruits/vegetable	1.700	209	1	0.192
Pasture/napier grass	9.387	209	1	0.002*

\* Significant at  $\leq 0.05$

These findings suggest that engaging in cash crop farming improved the households' food security situation. Cash crops are important sources of household income that could be used to buy food for households or buy inputs that would boost food production and general agricultural productivity.

Studies have shown that cash crop production can increase food security by increasing food availability either through household production or by increasing the income available to purchase food, (Schneider and Gugerty, 2010; Achterbosch *et al.*, 2014;). In theory, farmers might be better off if they could produce only cash crops and use the earned income to purchase food, however, rural farming households perceive this to be a risk livelihood strategy according to a study by Lukanu *et al.* (2004) in Mozambique among smallholders.

The presence of natural pasture and napier grass is an indication of livestock ownership in a household and this increases a households probability of being food secure. These findings are consistent with those of Khan and Gill (2009) who found that food availability in the rural areas of Pakistan was significantly associated with increased production of crops and livestock products. Kidane *et al.*, (2005) also found that livestock ownership was significantly related to household food security in Ethiopia and that this relationship was positive. This is because crop and livestock complement each other in ensuring household food security.

Results indicate that household food security was not dependent on households' allocating land for food production. The reason may have been that the mere allocation of land did not guarantee that adequate amount of food was produced. These findings collaborate those by Kuwornu *et al.* (2011), which showed that growing of food crops is not a guarantee of household food security, their study on the food security status of farming households in Central Ghana found that the majority (68.8%) of food crop producers were food insecure. However, Babatunde *et al.*, (2007) found that food from own production had a low but positive coefficient that was significant at 5% with household food security status of rural farming households in North Central Nigeria. The implication was that the higher the amount of food from own production the higher the likelihood of food security. Households prefer to produce food crops even when the returns are higher from market oriented production, this is due to uncertainty about food prices in the local markets, unfavourable price trends or unknown technology associated with production of commercial crops (Schneider and Gugerty, 2010). The reason why fruits and vegetables were found to be insignificantly related to household food security could be the fact that these crops are allocated with very little land (given the low farm sizes) resulting in low production, therefore, the income generated from their sales does not form an important source of money for the purchase of food. A study by Tufa *et al.* (2014) on determinants of smallholder commercialization of horticultural crops in Ethiopia revealed that farm size had a positive and significant influence on farmers' likelihood to participate in horticultural crops market.

### 4.0 Conclusion and Recommendation

Household food insecurity is a challenge for some of the households who identify farm size and low crop yields as the main causes of this situation. Households allocate most of their agricultural land for cultivation of food crops and cash crops and only a small proportion is left for other agricultural activities. Agricultural land use

had a significant impact on household food security and households engaged in cash crop cultivation and livestock/napier grass production were more likely to be food secure compared to those who devoted their land to other agricultural uses.

The appropriate remedy to the problem of food insecurity lies in the use of extension workers in training farmers and subsequently recommending appropriate technologies, agronomic practices and best practices in relation to individual farmers' land resources in order to improve general agricultural productivity. Most of the agricultural land was devoted to food crop production yet the extent of food insecurity at the household level does not justify this allocation. More efficient ways of utilizing the land resource should be sought without expanding the area under food crops. The study recommends promotion of increased use of high quality seeds and fertilizers to increase productivity. The agricultural land use types that were significantly related to household food security were those that generate household income. This means that household income is very essential to the survival of farm families. There is, therefore, need for investment in projects that enhance commercialization of small-scale farming.

## 5.0 References

- Achterbosch, T., Berkum, S. & Meijerink, G., (2014). Cash Crops and Food Security. Contribution to Income, Livelihood Risk and Agricultural Innovation. [www.wageningenur.nl/.../a16b98bc-948d-41f0-8e58-6e1b8070297\\_201...](http://www.wageningenur.nl/.../a16b98bc-948d-41f0-8e58-6e1b8070297_201...)
- Amaza, P., Abdoulaye, T., Kwaghe, P., & Tegbarn, A., (2009). Changes in household Food Security and Poverty Status in PROSAB area of Southern Borno State, Nigeria. International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria.
- Babatunde, R. O., Omotesho, O.A. & Sholotan, O.S. (2007). Factors Influencing Food Security Status of Rural Farming Households in North Central Nigeria. *Agricultural Journal* 2(3) 351-357.
- Barret, C.B. (2010). Measuring Food Insecurity. *Science* 327: 825-828
- Bremner, J., (2012). Population and Food Security: African's Challenge. Population Reference Bureau (pamphlet).
- Connely, W.T., & Chaiken, M. (2000). Intensive Farming, Agro-diversity, and Food Security under Conditions of Extreme Population in Western Kenya. *Human Ecology*, 28(1): 19-51
- Deutsche Bank, (2014). Agricultural Value Chains in Sub-Saharan Africa. Deutsche Bank Research. [www.dbresearch.com/.../Agricultural+value+chains+in+Sub-Saharan+Afri.....](http://www.dbresearch.com/.../Agricultural+value+chains+in+Sub-Saharan+Afri.....)
- Diao, Thurlow, Benin & Fan (2012). Strategies and Priorities for African Agriculture. IFPRI
- Dietz, A. J., (2014). Agricultural Dynamics and Food Security Trends in Kenya. <http://openaccess.leidenuniv.nl/.DRA%20ASC%20Research%20Report%>
- FAO, IFAD & WFP (2013). The State of Food Insecurity in the World 2013. Multiple Dimensions of Food Security. FAO, Rome.
- FAO, (2013). The State of Food Insecurity in the World 2013: The Multiple Dimensions of Food Security. Rome: FAO, 2013. <http://www.fao.org/docrep/018/i3434e/i3434e.pdf>
- FAO, (2010). The State of Food Insecurity in the World. FAO, Rome.
- FAO (2009). Gender Equity in Agriculture and Rural Development: A Quick Guide to Gender Mainstreaming in FAO's New Strategic Framework. Food and Agriculture Organization of the United Nations, Rome.
- IFPRI, (2012). Annual Report. International Food Policy Research Institute. Washington DC.
- Jaetzold, R., Schmidt, H., Hornetz, B., & Shisanya, C., (2009). Farm Management Handbook of Kenya Vol. II: National Conditions and Farm Management Information. 2<sup>nd</sup> Edition Part A West Kenya Sub-part A2 Nyanza Province.
- Jayne, T.S., Marther, D. & Mghenyi, E., (2010). Principal Challenges Confronting Smallholder Agriculture in sub-Saharan Africa. *World Development*. 38(10):1384-1398.
- Kabui, I.B. (2012). Household food insecurity and coping strategies among small scale farmers in Tharaka Central Division, Kenya. [www.http://ir-library.ku.ac.ke](http://ir-library.ku.ac.ke)
- Kaloi, E., Tayebwa, B., & Bashaasha, B., (2005). Food Security Status of Households in Mwingi District, Kenya. *African Crop Science Conference Proceedings*, 7:867-873.
- Keino, S., Plasqui, G., Bart van den Borne, (2014). Household Food Insecurity Access: a Predictor of Overweight and Underweight among Kenyan Women. *Agriculture and Food Security* 3(2)
- Khan, R.E.A. & Gill, A.R., (2009). Determinants of Food Security in Rural Areas of Pakistan. Munc. Personal RePEc Archive (MPRA).
- Kidane, H.Z., Alemi, G., & Kundhlande, G., (2005). Causes of Household Food Security in Koredegaga Peasant Association, Oramiya Zone, Ethiopia". *Agrekon* 44(4):543-560
- Kisii Central District (2009). Kisii Central District Development Plan 2008-2012. Office of the Prime Minister, Ministry of State for Planning, National Development and Vision 2030.
- Kisii County (2013). The First County Integrated Development Plan 2013 – 2017. Kisii County Government.

- KNBS, (2005/2006). Kenya Integrated Household Budget Survey. Ministry of Planning and National Development.
- Kuwornu, J.K.M., Mensah-Bonsu, A., & Ibrahim, H., (2011). Analysis of Foodstuff Price Volatility in Ghana: Implications for Food Security, *European Journal of Business and Management* 3 (4):100-118.
- Lukane, G., Maryann, G., Peter, G., & Steve, W., (2004). Farmers' Cash Crop Cultivation Decisions in Southern Niassa Province, Mozambique. *Development Southern Africa* 21:3, 531-554.
- Oxford Analytica, (2009). East Africa: Expansion of Agribusiness Faces Obstacles. Oxford Analytica Global Strategic Analysis, London.
- Place, F., Franzel, S., & Noordin, Q. & Jama, B., (2004). Improved Fallows in Kenya: History, Farmer Practice and Impacts. EPTD Discussion Paper No. 115. IFPRI and ICRA.
- Schneider, K., & Gugerty, M. K., (2010). The Impact of Export-Driven Cash Crops on Smallholder Households. EPAR Brief No. 94 Evans School of Public Affairs, University of Washington.
- Shroeder, C., Onyango, K'Oloo, T., Ranabhat, N.B., Jick N. A., Parziers H. K., & Gemenet, D. C., (2013). Potentials of Hybrid Maize Varieties for Small-holder Farmers in Kenya: A Review Based on SWOT Analysis. *African Journal of Food, Agriculture, Nutrition and Development*.
- Tufa, A., Bekele, A., & Zemedel, L., (2014). Determinants of Smallholder Commercialization of Horticultural Crops in Gemechis District, West Hararghe Zone, Ethiopia. *African Journal Agricultural Research* 9(3):310-319.
- WFP (2009). Kenya Food Security Update. World Food Program, New York.
- Yates, D., Moore, D. & McCabe, G., (1999). *The Practice of Statistics*. (1<sup>st</sup> Ed.). New York: W.H. Freeman.

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