

**RELATIONSHIP BETWEEN LANDUSE PATTERNS AND LIVELIHOOD
OUTCOMES OF SELECTED HOUSEHOLDS IN ISINYA SUB-COUNTY OF
KAJIADO COUNTY, KENYA**

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Abstract

Isinya Sub-County of Kajiado County, Kenya had continued to experience poor livelihood outcomes typified by severe food shortages and endemic hunger. Studies had shown that the area had a food deficit of 78,131 MT of food. Interestingly, the Sub-county had a high mean monthly household income. None of the studies conducted in the area had considered the role of land use patterns in influencing the livelihood outcomes of these households. This research set out to seek relationship between land use patterns and livelihoods outcomes of households in Isinya Sub-county. The research compared land use patterns as well as income in 2005 and 2014. The data collection instrument used was a researcher administered questionnaire. The collected data was analyzed using Statistical Package for Social Sciences. Both inferential and descriptive statistics were used in data analysis. The research findings show that there had been a significant reduction in land sizes. Land use patterns had gradually shifted. Although livestock production still occupied a greater proportion of land, land had also been converted to residential use or sold out which led to reduction in sizes. Household income levels had significantly increased which could be attributed to an increase in employment opportunities and employment seeking behavior of the residents. The study concludes by making two recommendations to sustain better livelihood outcomes; efforts to safeguard livestock production as well as livelihoods diversification.

Keywords: Employment Opportunities, Household Income, Land Use Patterns, Livelihoods, Pastoralists, Sources of Income

Introduction

Land use is defined as the application of human controls, in a relatively systematic manner, to key elements within any ecosystem, in order to derive benefit from it. The use may be permanent or cyclic intervention. According to a study by (Campbell, David,

Smucker, & Wangui, 2005), changes in land use patterns can be as a result of a number of Demographic, Institutional and economic factors. Isinya sub-county is predominantly inhabited by a pastoralist community with sets of values and practices that have maintained order and sustained the existence of this very community for ages (Government of Kenya, 2013). Pastoralists rely on livestock products for food and cultural sustenance. Livestock production relies on land for grazing. However, changes in the external environment have tended to upset pastoralist livelihoods (Mbote, 2005). One major change that has occurred at Isinya is the subdivision of group ranches. Subdivision of group ranches conferred individual ownership to land (Haan, 2014). This individual ownership made it easier for households to sell their land. The new owners of this land have converted the land into other uses. There has been more settlement converting land into residential use, flower farming and other economic purposes like quarrying (Gitonga, 2013). Conversion of land to other uses other than livestock production could upset a pastoralist livelihood. Less land available for grazing would reduce livestock production and hence food available at household level.

This study considered three aspects of land use patterns; livestock production, crop production and human settlement. Land is a major food production resource. The more the land is available for food production the greater the quantities produced and available to the household. Conversely, if land is converted to other uses other than food production, less food would be available. Technology was considered as an intervening variable. It's possible to increase food production and therefore availability on the same piece of land with enhanced technology (Mohammad, Owuor, Groote, & Kimenju, 2006). Aspects of technology considered were improved livestock breeds and livestock husbandry practices. With better livestock breeds and improved livestock husbandry, households could enhance their livestock production, which is a major source of food to a pastoralist community. On the other hand, conversion of land to other economic uses, like flower production would increase employment opportunities in the area. Increased employment opportunities would enhance income. Increased household income would lead to better livelihood outcomes.

A livelihood comprises the capabilities, assets and activities required for means of living. According to DFID (2000), a livelihood has five elements: the vulnerability context, livelihood assets, policies, institutions and processes, livelihood strategies and livelihood outcomes. Livelihood Assets are an important element of livelihoods. Livelihood Assets are capitals which people endeavor to convert into positive livelihood outcomes. There are five

livelihood assets; Natural, Physical, Human, Social and Financial. Natural capital includes land and all assets attached to land (Morse, McNamara, & Acholo, 2009). Isinya sub-county has vast land. However, this land has continued to be sub-divided and converted into other uses, particularly in the period after 2005 (Gitonga, 2013). Physical assets refer to infrastructure such as road, buildings and other constructions. The sub-county is served by the Athi-River to Namanga Highway and is very close to Kenya's Capital, Nairobi. However, the sub-county has very poor access roads, poor housing, poor health facilities and education facilities (Government of Kenya, 2008). Human capital refers to skills and capabilities to perform certain functions or engage in given livelihood strategies. Human capital could be influenced by education level and physical health of an individual. Social capital emanates from social relationships established, both formal and informal. Social relationships can also have an influence on household financial capital. Financial capital includes incomes, remittances, credit and grants that enhance an individual's accessibility to cash. Financial capital was of particular interest to this study.

All the above elements result in a livelihood outcome. A livelihood outcome refers to the achievement or output of a livelihood strategy such as more income, improved food security and more sustainable use of natural resources. Isinya sub-county had a high monthly mean household income of Ksh. 9,445. This placed it eighth countrywide in wealth ranking (GoK, 2011). According to the Commission for Revenue Allocation (CRA) in Kenya, Kajiado County had been ranked the richest for two years running, between 2012 and 2013 (Commission for Revenue Allocation, 2013). These characteristics made Isinya Sub-County of particular interest for study.

Statement of the Problem

Households' Livelihoods in Isinya sub-County had continued to be threatened by frequent famine and endemic hunger. This was mainly because these households were not able to produce and access sufficient food for their needs. Different studies on Livelihoods had focused on challenges to livestock improvement such as drought, animal diseases and lack of access to credit to invest in livestock improvement. However, such studies had not considered any possible influence of land use patterns on Livelihood Outcomes of the households in this sub-county. This study therefore considered the relationship between changes in land use patterns and livelihoods outcomes of the selected household heads in Isinya Sub-County.

Objectives of the study

The objectives of the study were to:-

- i. Determine changes in land use patterns at household level in Isinya sub-county for the years 2005 and 2014.
- ii. Establish the relationship between land use patterns and household incomes at Isinya sub-county.

Significance of the Study

The study findings are useful to stakeholders in understanding changes that have taken place in 2014 compared to 2005 in Isinya sub-County regarding Land use patterns and incomes at household level. The findings may be of value to policy makers, especially the County government on formulating policy regarding land use in Isinya sub-county. This can be achieved by adopting recommendations that have been made from the study on how changes in land use may have influenced incomes of households at Isinya. The findings may also be useful to households in understanding changes that have taken place in land use as well as household incomes between 2005 and 2014. This understanding may help households to adapt to changes in land sizes and embrace changes in the employment opportunities which would be available in the sub-county. Embracing these changes will help the community in Isinya Sub-County sustain the improved livelihood outcomes. The findings also add to the existing body of knowledge in research on livelihoods outcomes.

Scope of the Study

The study covered Isinya sub-county in Kajiado County. Isinya sub-county was of particular interest given the proximity of the sub-county to Nairobi city and livelihood strategy of majority of its inhabitants. This study was interested in comparing land use patterns in the Sub-county for the year 2005 and 2014. This period had witnessed an increased influx of immigrants into the sub-county in search for residential areas or commercial land. The focus of the study was on changes in land use patterns and how these changes could be related to changes in livelihoods outcomes at household level. The livelihood outcome considered was change in household incomes mainly change in income levels, sources of income and access to employment opportunities.

Limitation of the Study

Socio-economic factors of residents of the pastoralists in Isinya Sub-county may differ with other pastoralists even within the same county or outside the county.

Recommendations from this study may therefore not be generally applicable across counties inhabited by pastoralists.

Research Methodology

The study used a cross sectional survey design. Mugenda and Mugenda(2003) define a cross sectional survey as collection of data from members of a population in order to determine the current status of that population with respect to one or more variables. Data can be obtained about perceptions, attitudes, behavior or values. A cross sectional survey design was appropriate for this study because it does not attempt to alter or assign any conditions to the population to alter their behavior (Mutai, 2000). The survey assisted in comparing population characteristics at two points in time; 2005 and 2014.

The research also employed Snow balling in its design. Snowballing also known as chain referral sampling is that research technique that is used by researchers to identify respondents who are hard to reach. There are three methods of Snowballing, Linear Snowballing, Exponential Non-Discriminative Snowballing and Exponential Discriminative Snowballing (Streeton, Cooke, & Campbell, 2004). This research employed Exponential Non-Discriminative Snowballing so as to identify and reach out to respondents who owned land in the area by the year 2005. (Campbell, David, Smucker, & Wangui, 2005). The research also used document analysis in data collection. The research reviewed public records and reports.

The study was conducted in Isinya Sub-County which is one of the five Sub-Counties within Kajiado County. By 2016 when this research was conducted, Isinya had a population of 87,009 people (GOK 2009) with about 3,000 households. It covered an area of approximately 1056km². The sub-county was sparsely populated with a density of 77 persons per square kilometer. The sub-county had six main locations with different number of people per location. The sub-county has a close proximity to the capital city of Nairobi. Isinya sub-county headquarters, Isinya, is located 60km south of Nairobi (Government of Kenya, 2008). The area is mainly an Arid and Semi-Arid Lands (ASAL). Livestock rearing was the main economic activity in sub-county supporting 85% of the population. Isinya also had a high monthly mean household income of Ksh 9,445 (Commission for Revenue Allocation, 2013). According to the ministry of lands, there were 3,000 household heads who owned land in the area by 2005. This formed the sample frame. Sample size of 340 respondents was obtained from the sample frame. Data was collected using a researcher administered questionnaire. This was because of the low literacy levels prevalent in the area. Information was also

collected through document analysis using a checklist as a guide. To ensure that questions would be understood as the researcher expected and therefore enhance reliability of the research instrument, piloting was conducted in the neighboring Ngong sub-county because Ngong sub-county possessed similar characteristics as Isinya sub-county. The analysis from the pilot study gave a coefficient of 0.86 indicating a high degree of reliability of the research instrument.

This data was then analysed by use of the Statistical Package for Social Sciences (SPSS) software. Descriptive statistics which included means and frequencies and inferential statistics in particular students' t-test were used to analyse data. The t-test was used to determine whether there had been significant changes in household income for the year 2005 and 2014.

Findings and Discussions

Demographic Characteristics of respondents

The study set out to document the demographic characteristics of respondents. This helped in relating some of the study findings to these demographic characteristics and therefore contextualizes the findings. Findings on demographic characteristics of the respondents are provided in Table 1

Table 1: Demographic Characteristics of Respondents

Characteristic	Frequency	Percentage
Family Type		
Nuclear	271	79.7
Extended	69	20.3
Total	340	100
Gender of Respondents		
Male	249	73.2
Female	91	26.8
Total	340	100
Household Head		
Male Headed	293	86.2
Female Headed	47	13.8
Total	340	100
Educational Level		
None	58	17.0
Primary	82	24.1
Secondary	81	23.8
Mid-Level College	81	23.8
University	38	11.2
Total	340	100

A majority of the respondents were males, representing 73.2%, whereas 79.7% reported to be living within nuclear families. With 79.7% of respondents reporting that they

are from nuclear families, this could be a change from the general practice of polygamous and extended families among the pastoralists. However, it should also be noted that 73.2% of respondents were male. It is very easy for men to consider their families as a nuclear family even when they are polygamous. Similarly, 86.2% of respondents indicated males to be heads of households. This confirms to the general practice of patriarchy amongst the pastoralist (Mbote, 2005).

Majority of the respondents (24.1%) had primary education as their highest level of education. This was followed those who had secondary and mid-level college education at 23.8% each. Another 17.0% had no education at all while 11.2% had university education. These findings also relate to a study by Osunga (2007) on literacy levels in Kajiado County which provided literacy level at 28.0%. However, this differs with data which is based on the 2009 census by the Kenya National Bureau of Statistics. In 2009, the primary education level in Kajiado was 62.0%, secondary2 level was 12.5% and tertiary level was 6.0% (Kenya National Bureau of Statistics, 2009). A report on inequality in Kenya notes that Kajiado County has serious socio-economic inequalities (Kenya National Bureau of Statistics, 2013). Depending on location of study, the data obtained could be substantially different from another location.

Changes in Land Use Patterns among Households

An understanding of changes in land size and changes in land use was to help in determining whether there was still enough land sizes dedicated to food production enterprises of crop and livestock production. The findings are presented in the following sections:

Changes in land sizes

In order to collect data on land sizes, four ranges were established. The ranges categorized land based on knowledge of land holdings in the area from data acquired from the registrar of land in Kajiado. The findings are provided in Table 2.

Table 2: Land Sizes for the years 2005 and 2014

Size in Acres	2005		2014	
	Frequency	Percentage	Frequency	Percentage
≤ 100	135	39.7	203	59.7
101 – 200	97	28.5	61	25.3
201 – 300	45	13.2	33	9.7
301 – 400	50	14.7	8	2.4
> 400	13	3.8	10	2.9
Total	340	100.0	340	100.0

Generally, there is a decrease in land holding sizes comparing 2005 and 2014. Households who owned larger pieces of land have reduced while households who own smaller pieces of land have increased. The larger pieces of land have been subdivided into smaller pieces of land and changed ownership. However, before examining probable reasons behind change in land sizes, it was important to establish whether the change in land sizes observed in comparing the year 2014 and 2015 was significant. First the analysis determined the mean and standard deviations of the land sizes for the year 2005 and 2014. The findings are provided in Table 3.

Table 3: Mean and Standard Deviation in land sizes

Land sizes	N	Mean	Std. Deviation
Land size in acres in the year 2005	340	1.98	1.116
Land size in acres in the year 2014	340	1.66	0.971

A t-test was further conducted to determine whether there had been a significance difference in land sizes for the year 2005 and 2014. The findings are given in Table 4.

Table 4: t-test for the land sizes in 2005 and 2014

Paired Differences						
Mean	Standard Deviation	Standard Error of mean	95% Confidence Interval of the Difference		t-value	Degrees of Freedom
			Lower	Upper		
0.322	0.704	0.046	0.231	0.413	6.983*	340

Statistical significance: $p < 0.05$ *

As shown in Table 4, the t-value obtained was 6.983 with a p-value of 0.000. This test was done at the 0.05 level of significance or 95% confidence level. The mean difference between the average land size in 2005 and 2014 of 0.322 was significant given the p-value

was less than 0.05. The finding based on the individual means was that on the average, the land ownership in 2005 was significantly higher than that in 2014 in terms of the acreage. The data also shows a greater standard deviation in land sizes of 1.116 in 2005 compared to 2014 with a standard deviation of 0.971. This implies that there is a greater dispersion in land sizes in 2005 compared to 2014. In other words, land was not just reducing in size but also variation in household size was reducing.

Land subdivision can result from a number of factors including Demographic, Institutional, Economic and even natural/environmental factors (Museleku, Kimani, Mwangi, & Syagga, 2018). There has been population explosion in Nairobi which has forced people to seek for housing in the neighboring areas. Isinya sub-county which is only 60km from the capital offers a very conducive environment for residential housing. More people have settled here leading to land sub-division and hence reduction in land sizes. Similarly, the population growth rate in Kajiado is at a high of 5.5% compared to the Kenya national population growth rate of 2.9% per annum (County government of Kajiado 2013). More people are born and as they mature, they establish families of their own which further subdivides the family land.

Economic factors relate to the use of land for productive purposes. These factors can be viewed as push and pull factors. Push factors compel land owner to sell their land. The need for money to pay school fees, hospital bills, construction of better houses were cited as some of the reasons that have compelled land owners either to lease or sell their land. Pull factors on the other hand attract immigrants into the county. There has been an increase in number of people seeking land in Isinya sub-county for economic purposes. Gitonga (2013) found that there were large tracts of land that were bought from owners and were being turned into flower farming. This is yet another reason leading to land subdivision in the sub-county.

Natural/Environmental factors relate to the advantages that land could have. These include topography, location, climatic conditions as well as quality/fertility of land. Fertile lands are good for farming. Owners of such lands would be unwilling to sell which reduces fragmentation. Conducive climatic conditions that favour productivity also discourage selling and subdivision. Hilly areas or valleys may not be good for cultivation due to soil erosion. They are also not good for settlement due to flooding or landslides. Isinya sub-county is mainly flat plains which makes it very suitable for settlement. The land is easy to mechanize under flower production. Although rainfall is inadequate for rain fed agriculture, irrigation

equipment is easy to install and maintain given the flat topography. These factors have made land in Isinya sub-county to be very attractive and therefore have been some of the drivers to subdivision.

Changes in land sizes under different enterprises

This study also sought to analyse changes that have occurred in land sizes under different enterprises. There were four main categories of enterprises that were compared for the two years of 2005 and 2014. The findings for the mean sizes per household for the different enterprises are provided in Table 5.

Table 5: Average land use in acres for different enterprises

Enterprise	Mean for 2005 (Acres)	Mean for 2014 (Acres)
Proportion of land under livestock	159.00	116.00
Proportion of land under crop farming	2.25	5.36
Proportion of land under residential	1.92	2.75
Proportion of land under lease/sold	2.95	32.27

The largest proportion of land was put under livestock for both years 2005 and 2014. However, average size of land in terms of acres put under livestock production reduced by 27.04% from an average of 159 acres in the year 2005 to 116 acres in the year 2014.

Being a pastoralist community, livestock has a significant role in the livelihood options of the community, especially food availability. A reduction of average land holding under livestock from 159 acres in 2005 to 116 acres in 2014 would have effect on the number of animals kept and therefore food security (Nkedianye, Leeuw, Ogutu, Said, & Kifugo, 2011). The proportion of land under crop production had more than doubled over this period. This would imply more crop production and therefore an improvement in the food availability. But of great concern is the proportion of land that has moved away from crop and livestock production to other uses. Land under residential use has increased. Land under lease or land which has been sold out has increased with more than 10 times. Indeed respondents indicated that their land size had reduced as they had to subdivide their land for their children who had grown up and established their own families.

Similarly, respondents indicated that they had sold part of their land due to economic pressures like providing school fees for their children in schools or pay for medical treatment whenever a family member became sick. This is supported by findings from a study on

welfare of flower workers in Kajiado which reported a rapid increase in flower farming in the area (Gitonga, 2013).As observed by another study on implications of subdivision of agricultural land, continued fragmentation of land could have an effect on agricultural productivity (Museleku, Kimani, Mwangi, & Syagga, 2018).

Changes in Household Incomes

The study considered changes in household incomes for the years 2005 and 2014. Available data indicated that the average household income was Ksh. 9,445 per month (GoK 2011). This guided the study to categorize incomes into five ranges. Respondents were then asked to provide their salary ranges for the years 2005 and 2014. The data on salary ranges is provided in Table 6. In 2005, majority of the respondents representing 25.9% were earning Kshs 2,500 or less. In 2014 majority of the respondents accounting for 43.8% were earning more than Kshs 10,000 per month.

Table 6: Household Income Levels in Isinya

Income levels (Kshs)	2005		2014	
	Frequency	Percent	Frequency	Percent
2500 or less	88	25.9	10	2.9
2501 – 5000	75	22.1	20	5.9
5001 – 7500	50	14.7	29	8.6
7501 – 10000	81	23.8	132	38.8
More than 10000	46	13.5	149	43.8
Total	340	100.0	340	100.0

The study sought to further determine whether this change in incomes was statistically significant. To achieve this, the analysis generated means and standard deviations for the incomes in the two years of 2005 and 2014. The data for mean and standard deviation is provided in Table 7.

Table 7: Mean monthly income and standard deviation

Mean Monthly Incomes	n	Mean	Std. Deviation
Mean monthly household income in 2005	340	2.77	1.411
Mean monthly household income in 2014	340	4.18	0.977

The implication from Table 7 was that on the average, the respondents earned between Kshs 7,501 and Kshs 10,000 per month in 2014. This finding corresponds to the finding of commission for revenue allocation that established average income in the county to be Ksh

9,445 per month. However, a report by Kenya National Bureau of Statistics and Society for International Development notes that household Expenditure in Kenya averages Ksh. 3,440. Kajiado County with average of Ksh. 9,445 is higher than the national average. However, the same report notes disparities between rural and urban areas with rural areas averaging Ksh. 2,270 and urban areas Ksh. 6, 010 (Kenya National Bureau of Statistics, 2013).

The study finding can also reveal greater disparities in incomes in 2005 compared to 2014. The standard deviation in income was 1.411 in 2005 compared to 0.977 in 2014. This therefore implies a greater dispersion in income levels in 2005 compared to 2014. However, to determine the statistical significance, a t-test was carried out using the means and standard deviation for incomes of the two years. Table 8 provides data for the parameters used to run the t-test.

Table 8: T-test for household monthly income

Paired Differences						
Mean	Standard Deviation	Standard Error of mean	95% Confidence Interval of the Difference		t-value	Degrees of Freedom
			Lower	Upper		
-1.411	1.222	0.080	-1.568	-1.254	-17.638*	340

Statistical significance: * $p < 0.05$ *

The test was done at the 0.05 level of significance. A t-value of -17.733 was obtained together with a p-value of 0.000. Due to the fact that the p-value was less than the level of significance, it was concluded that there was a significant mean difference between the 2005 income and the 2014 income. Again comparing the mean for 2005 and 2014, a mean difference of -1.411 was obtained. Both t-value and mean difference are negative. This is so because the mean income for 2005 which was the base year was lower than the mean income of 2014. The study therefore concluded that the respondents had significantly higher monthly incomes in 2014 than in 2005.

Sources of Household Income

This study considered different sources of livelihood incomes with a view to understand changes in income sources and how these could relate to employment opportunities and income levels. Sources of household income were grouped into four main categories. Table 9 presents data captured on main sources of household income for the year 2005 and 2014.

Table 9: Main Source of household income

Source of Household Income	2005		2014	
	Frequency	Percent	Frequency	Percent
Formal employment	64	18.8	118	34.7
Informal employment	40	11.8	57	16.8
Direct sale of livestock	201	59.1	109	32.0
Sales from livestock products like milk	35	10.3	56	16.5
Total	340	100.0	340	100.0

In the year 2005, the most important source of household income was direct sale of livestock (59.0%). Total growth in both the formal and informal sectors grew from 30.6% in 2005 to 51.5% in 2014. There is an increase in income from employment opportunities, more so formal employment. This could be attributed to livelihoods diversification observed. Although livestock still provides greatest proportion of household income, this proportion is diminishing as respondents seek for alternative sources of income.

Employment Opportunities

This study was further interested in understanding the most accessible job opportunities available and whether this could have any relationship with income levels and sources of household income in Isinya Sub-County. Table 10 presents findings on job opportunities reported by the respondents for the years 2005 and 2014.

Table 10: Most accessible employment opportunities

Employment Opportunity	2005		2014	
	Frequency	Percent	Frequency	Percent
Employment in on farm work (flower farms, chicken farms)	40	11.8	149	43.8
Employment in off farm work (processing farm products)	79	23.2	53	15.6
Employment in non-farm work (institutional, self-employment)	123	36.2	38	11.2
Employment in other sectors.g Quarrying, Transport.	98	28.8	100	29.4
Total	340	100.0	340	100.0

There has been an increase in employment on farm work as the most accessible employment opportunity for households in Isinya Sub-County from 11.8% in 2005 to 43.8% in 2014. Access to off farm and non-farm work experienced a decrease in 2014 compared to

2005. There is some deviation between this study findings and a report by the government of Kenya in 2013. According to the government of Kenya report, the employment rate in Isinya sub-county was 46.9% in 2013. Most employed category of people was that of primary education at 47.6%, followed by those with secondary education at 46.9% while those without any form of education at 40.6% (Kenya National Bureau of Statistics, 2013). However both findings note that employment in informal sector where education level is low and focus is more on skills has a significant contribution to overall employment level in Isinya Sub-County.

A study on education and income diversification strategies in Kenya noted the role of education in increasing access to employment opportunities and therefore income to the household (Wambugu, 2017). Lower levels of education provide limited options for employment. With 41.1% of the population either in primary or no education, informal employment either in farm or off-farm ventures was highest. Whereas a study on income diversification and poverty reduction in Kenya found that off-farm employment offers employment to at least 50% of the population in rural Kenya, the same study emphasizes the role of non-farm employment in ensuring sufficient incomes to escape poverty in rural Kenya (Thuo, Oluch-Kosura, Nyikal, Odumbe, & Marenya, 2006). In other words, employment in non-farm work earns more income compared to employment in off-farm work.

The findings were that employment in other sectors like quarrying and transport had remained almost steady at 28.8% in 2005 and 29.4% in 2014. A similar study on employment creation among the youth in Kitengela found that employment in transport sector, mainly motorcycle riding had made a significant increase in income among the youth (Nyachieo, 2013). Similarly, a study on environmental effects of quarrying in Kajiado noted that there had been an increase in quarrying activities offering youth more employment opportunities (Isabella, 2017).

There has been an increase in household income as a result of more people seeking employment. Most of this employment has been on-farm activities like working on flower farms, and chicken farms. This can be related to changes in land use. This change in land use has created more job opportunities in Isinya sub-county which has resulted in more household income (Gitonga, 2013).

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings and discussions presented in the sections above, the study made conclusions and recommendations on land use patterns and household incomes. These conclusions and recommendations are provided as follows:

The conclusions were that: There was a significant decrease in land sizes in Isinya sub-county. Majority of respondents owned smaller land sizes in 2014 compared to 2005. There was also a lesser dispersion in average land sizes in 2014 compared to 2005. The average land holding had reduced with a mean of 0.971 in 2014 compared to a mean of 1.116 in 2005. The decrease in land sizes had resulted from various factors including population increase, increased demand for residential housing and conversion of land into other commercial purposes.

Livestock enterprise occupied greater land proportion in both years. However, the proportion of land under livestock was lesser in 2014 compared to 2005 with a mean of 116 acres and 159 acres in 2014 and 2005 respectively. The proportion of land that had been leased or sold increased significantly which would explain why lesser land was put under livestock in 2014 compared to 2005. Interestingly also, although the land under crop farming was still very small, it had more than doubled in proportion which is a pointer towards greater interest in crop farming.

By comparing the mean income in 2005 and the mean income in 2014, this study found out that there had been a significant increase in household incomes in Isinya sub-county. The study also found greater dispersion in incomes in 2005 compared to 2014. There was therefore not just an increase in household income but also an increase in uniformity in household incomes in Isinya Sub-County. Direct sale of livestock provided a greater proportion of Household income in 2005. However in 2014, more people were seeking employment. Most of those employed sought employment on-farm in farming related activities including flower farms. There was an increase in employment opportunities in on-farm activities. It was from these diversified and increased employment options that people were able to earn more income. Increase in literacy levels could be a factor in the increase in proportion of population seeking more employment. Increase in employment opportunities as well as an increase in employment seeking behavior of the respondents resulted in an increase in household income in Isinya Sub-County of Kajiado County.

Based on the findings of this study, the following recommendations can be made;

- i. Isinya Sub-County was still predominantly pastoral. Livestock production still occupied considerable space of land and made significant contribution towards food security and livelihoods. However this was being threatened by conversion of land into other uses. This study therefore recommends that the Kajiado County puts measures in place to ensure livestock production is safe guarded to enhance food availability in the Sub-County. Such measures may include policy reforms regarding land use, land transfer and minimum land holdings especially to the pastoralists' community that would ensure sustainable livestock production. Such policy would for instance designate certain areas as livestock production zones. Inhabitants of such zones would be incentivized to engage in livestock production which would make land more valuable to retain than dispose. Such policies would also define land holdings, leases and sizes in such designated livestock production zones.
- ii. The population of the Sub-County would continue to increase either due to natural birth or people seeking land for residential and other reasons. The land sizes will therefore continue to diminish. The community will therefore have to adopt other livelihood options like seeking employment to earn income as the study has found out. This study therefore recommends further venture into other livelihood options as well as building capacity of the households in alternative livelihood options so as to increase income levels and food access. Investment in quality education would definitely be the way to go for long term human capacity development. However, skills development in form of vocational skills training in various enterprises will be more responsive and achieve enhanced household incomes in the short and mid-term.

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