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Analysis Of Socioeconomic Characteristics That Contextualize Livelihoods In The Semi Arid Area Of Kieni, Kenya

[1]Fred K. Wamalwa, [2]Dr. Florence Ondieki – Mwaura, [3]Dr.Frederick O. Ayuke

[1]Ph.D. Candidate, Department of Development Studies, Jomo Kenyatta University of Agriculture and Technology (JKUAT), 2018; [2]Department of Development Studies, JKUAT, [3]Department of Land Resource Management & Agricultural Technology, University of Nairobi; Nairobi, Kenya.

Abstract: **Poverty continues to present livelihood challenges among rural populations in the developing world. One of the important impacts of socioeconomic profiles of rural households is their implication on poverty reduction strategies. Often studies regarding poverty overlook implications of socioeconomic factors on rural poverty. The purpose of this study was to investigate the socioeconomic features of Kieni East and West sub counties households in Nyeri County. The study adopted cross sectional research design, involving mixed method approaches to collect data. Household survey was the main source of quantitative data collection, while the qualitative aspect of data was collected using semi structured interviews, participant observations, and desk reviews. Proportionate Stratified Random Sampling Technique was used to establish a 400 sample size in 10 sub locations. Data was analyzed using statistical descriptive techniques, and independent T-Test was applied to test statistical significance ($p<0.05$) at the two sites. Qualitative data was analyzed using grounded theory, discourse and narrative analyses. Results show that the proportion of female household heads and single headed households was 23% and 36% respectively. Illiteracy level for household heads was 11% with an average age of 55 years. Results also indicate that household heads have lived at their present land holding for an average of 28 years. The average family size was established at an average of four members and comprised of an the adult labour force(19-59 years) proportion of 57%. Also the study results show that the main household livelihood choices included cropping (77% of respondents), off-farm (61%), forest (49%), and livestock (40%) activities. The results of the study demonstrate that households in the study have unique socio economic features that contextualise poverty prevalence in the area. The study concludes with some recommendations for policy consideration.**

Keywords: **Household, livelihood, socioeconomic characteristics, poverty, household wellbeing, semi-arid areas, rural areas, Kenya.**

1. INTRODUCTION

Poverty is generally associated with rural populations because they are usually deprived of both basic and economic livelihood opportunities. Contemporary enquiries about the level of poverty in rural areas have caused significant interests in research. Three out of four poor people in developing countries, according to [1] live in rural areas with a large proportion depending on agriculture for livelihood. For instance, agriculture remains the main source of income for around 2.5 billion people in the developing world [2]. To improve living standards of populations in developing countries, rural development strategies have been associated with continuous evolution of development approaches. These approaches have been applied as policies for poverty reduction though models like sustainable livelihoods, small farm development, integrated rural development, market liberalization, participatory development, and human development. Additional examples are community development, poverty reduction strategies, food security programmes, sustainable agriculture and rural development, and since the year 2000, the Millennium Development Goals (MDGs) [3] and from 2015, sustainable development goals [4]. However, poverty remains a significant issue despite these efforts. Evidence by [5] illustrates there are millions of people worldwide who are still living in chronic poverty in spite of progress made in the achievement of MDGs.

For decades, promotion of rural livelihoods to alleviate poverty by rural development agents in developing countries has focused on basic approaches of adopting sustainable livelihoods. As a result, a lot has been learnt about poverty reduction and environmental conservation in the last decade (2008-2018) in terms of the relationship between poverty and environmental degradation. Regardless of advances in the development and promotion of sustainable development, rural households' incentive to take up new sustainable livelihoods, particularly among the traditional rural households has remained minimal. This has led to the recognition that livelihood adoption is not only a technical problem but also a socioeconomic problem. This realisation has in recent times directed attention to the influence of socioeconomic factors in rural households' livelihood choices. The body of literature on households' livelihood decisions highlights the complexity of factors involved in the interactive function. The intricacy arises from the variety of circumstances under which rural households operate. It is generally also documented in literature that a number of factors explain the differences in household livelihood choices by rural households. However, the specific socio-economic variables affecting the decisions differ across countries, regions, villages, and households. Like in other areas, livelihood activities are the sources of household means of survival in semi-arid areas. According to [6], livelihood activities are depended on assets access and determine the living gained by the rural households. As in most contemporary developing countries, the fundamental characteristic of rural households in Kenya is their ability to adapt, through rural livelihoods diversification, in order to survive. Rural livelihoods diversification is thus a survival strategy in which socioeconomic factors of both threat and opportunity cause the rural household to adapt intricate and diverse livelihood strategies in order to survive [7]. Although participation in multiple activities by rural households is not new, there was been relative neglect of diverse dimensions of rural livelihoods other than access to farming until mid1980s. The dominant strategy then for improving rural welfare was small farm output growth. Therefore, the extent of diversification away from agriculture is an indicator of the degree to which farming operations only cannot provide a secure and improved livelihood.

A World Bank study[1] further shows that poverty reduction in sub-Saharan Africa may be achieved through livelihood diversification in rural areas based on household socioeconomic potency. Coherent with this finding, rural households have four possible options to choose livelihoods for their wellbeing. They practice farming, raise livestock, and engage in small businesses. The last option is not attractive, at least for poor households. It is the access to common forest resources when the need to survive arises. As an active social process, livelihood diversification involves the maintenance and continuous adaptation of diverse portfolio of activities over time in order to secure survival and improve living standards [8]. However, livelihood diversification has consequences for the rural communities, and therefore the overall process of structural transformation impacts on the use of resources and the environment in general [9]. Since the environment is a critical input for rural households, environmental degradation in turn implies a shrinking input base for the poor households that increase severity of poverty. More inquiries made on livelihoods adoption in Africa identify a number of household characteristics, biophysical and socio-economic factors that influence rural households' decision to improve their lives and impact on the environment. They include agro-ecological characteristics, family landholding size, household demand for forest products, availability of existing wood resources, farming practices, cultural influences, changes in rural economy, access to market, and external interventions including policies and extension services [10]; [11]; [12]; [13]; [14]; and [15].

The battle against poverty remains an important priority on Kenya's development agenda as articulated in Vision 2030[16]. The Vision aims to make Kenya a "middle" income country providing high quality life for Kenyans by the year 2030. However, the majority of the poor and food insecure groups continue to be concentrated in rural areas, where their livelihoods [17] depend on subsistence agriculture, making poor farmers encroach on fragile land that lead to degradation of natural resources. The purpose of this study is to explore socio economic characteristics of rural households in Kieni East and West Sub counties so that rural development programmes objective to improve household welfare and prevent environmental degradation prompted by livelihood pressures can be achieved.

2. LITERATURE REVIEW

The Basics of Livelihood Approaches

Livelihood approaches recognise that household resources are at the centre of livelihood choices. Resources are seen in terms of 'capitals' and which are viewed as accessible or inaccessible to people mainly on the basis of structural factors. Approaches like these focus on sustainable livelihoods and were largely developed by DFID in the 1990s [18]; [19]. Livelihood studies in the recent past have come to the fore in response to the limited success of poverty studies [20]; [21].

Poverty studies have consequently come to be seen as too engrossed on the powerlessness of poor people, and therefore livelihood approaches [22] enhance poverty studies by starting its analysis with the creative choices of people in making a living. The approach therefore changes from a focus on what poor people lack to analysis of how they manage to survive.

Livelihood approaches view resources as assets and categorise them into five categories: human, physical, financial, natural and social [23]; [24]; [25]. To investigate the behaviour of rural households in their attempt to improve their welfare, the rural household approach is most appropriate since it requires information on household members. Definitional concepts of livelihoods vary among researchers. [26] define livelihood as 'comprising the capabilities, assets, and activities required for means of living' focusing directly to the links between assets and options households possess in pursuit of alternative activities that can generate the income level required for survival. On the other hand, [7] and [27] describe a livelihood as comprising the assets, the activities, and the access to these assets and activities as mediated by social capital which together determine the living gained by the rural individual or household. The authors identify assets, mediating processes, trends and shocks, and activities as the critical components and processes that jointly contribute to rural livelihood strategies. Therefore, we strongly argue that rural livelihoods approach is essentially a micro policy analysis framework in which the assets or resources are the activity components that improve livelihoods. Consequently, household assets are viewed as a basket of goods whose availability and access is directly related to the environment in which they occur.

Socioeconomic Characteristics of the Rural Poor

Previous studies ([28]; [29]) have shown that demographic features, labour, asset possession, age, gender, and education of the household head and other adult members of the family influence preferences of rural households in production and consumption decisions. The way households choose livelihoods changes over time as their experience advances, the characteristics of their farms change, or their household resources increase or decrease as they age [10]. The objectives, knowledge and attitudes of household heads have an influence on household activities. In his study on the economics of farming systems, [30] showed that rural households normally have multiple objectives for choosing a livelihood (for instance livestock keeping for own consumption, source of cash, and other service functions) and these are likely to influence the decision-making process. The farm experience and education (both formal education and informal training) of the household head are also important characteristics that influence decisions made in livelihood diversification [31].

A study on social and economic challenges [32] shows the likelihood of households choosing a particular livelihood e.g. farming is also dependent on their attitudes and perceptions; i.e. perceptions of feasibility and value of the likelihood that farming will promote the households' overall objectives. More importantly is also the perceived risk in the agricultural production system ([33]; [10]). Household's risk assessment, for instance crop farming, often also arises from tenure insecurity and production failures. Similarly, where households perceive uncertainties in land tenure, they do not show interest in investing in multiyear crops such as trees ([10]; [34]). On the other hand where farmers perceive possible failures in food crops, they tend to diversify their farming systems by also incorporating other livelihood activities [7].

Investigations in the forest sector have shown the significant contribution of forests towards household economies. Some people depend solely on forests as their only source of subsistence, with its contribution sometimes being found to offset other household livelihood portfolios such as agriculture [35]. However, despite the contribution of forests on livelihoods, human dependence on forests is a multifaceted phenomenon [36]. Therefore level of use and degree of reliance on forests and its importance as a source of subsistence varies geographically, over time and across communities ([37]; [38]). Since communities are not homogenous in nature, variation on household reliance on forests is inevitable ([39]; [40]). Further drawing upon the forest dependency literature, [41] and [42] show that reliance on forest is a function of various factors and key among them includes household' socio-economic factors. For instance, higher education attainment is associated with less reliance on forest resources ([43]; [44]). This is so because education offers other alternative livelihood opportunities which may generate significant returns compared to forest extraction activities [45].

Household size is positively associated with forest dependency as well. Larger families have higher subsistence needs which necessitate them to depend more on forest resources [46]; [47]. On the other hand, age of household head is positively related with forest dependency, albeit with diminishing effect after reaching a peak of physical strength[48]. Nonetheless, older people might possess strong ecological knowledge about their proximate environment, a phenomenon which might increase their likelihood of being more dependent on forest resources. [49], also demonstrate that baseline characterization is important to measure project performance before making any changes to project processes. Their study

provided insight into the baseline characterization of watersheds with special reference to socio-economic aspects and proposed appropriate policy directions for enhancing productivity and sustainability in the semi-arid zone.

3. METHODOLOGY

Research design

In order to understand fully the phenomenon of this study, a mix of quantitative and qualitative approaches was used because from past studies ([50]; [51]) the approach is effective for livelihood investigations. The quantitative component of the study was used to collect quantitative data to understand household behaviour through household survey. The qualitative component of the survey measured variables that generally are inappropriate to determine using quantitative techniques [52] and [53]. Additional techniques were used to collect qualitative data in form of focus group discussions, key informant interviews and participant observation.

Study area location

Two sites were used in this study – Kieni East and Kieni West sub counties, in Nyeri County in Kenya. The two sites depict similar farming systems and socio-cultural settings. The study area comprises of four wards in each sub county i.e. Mweiga, Mwiyoyo/Endarasha, Mugunda and Gatarakwa wards of Kieni West; and Naromoru/Kiamathaga, Thegu River, Kabaru, and Gakawa wards of Kieni East Sub County. The area of study lies within the longitudes of 36°40" East to 37°20" East. The northernmost point of Kieni just touches the Equator (0°) and then extends to 0°30" South. The area is semi-arid as it is sandwiched between the leeward sides of two major water towers in Kenya i.e. Mt. Kenya and The Aberdares Ranges in Kieni East and Kieni West sub counties respectively. It is characterized by high temperatures in low altitude areas and low temperatures for areas adjustment to the two water towers. Kiganjo (1830m) is the lowest area, from where the land rises northwards to the Equator at Nanyuki (2300m), eastwards to Mt. Kenya (>4000m) and westwards to Nyandarua (>3000m) above sea level. These altitudes [54] are believed to affect the amounts of rainfall received in the locality, for example Kiganjo receives about 850mm per annum. This rises eastwards to 2300mm at Kabaru on the slopes of Mt. Kenya and westwards to 3100mm in the Abadare National Park. Therefore, the driest areas are Kiganjo and Narumoru that are within Agroclimatic zones (V) and (VI) respectively. Conversely the mountains (Kenya and The Aberdare Ranges) within zone (I) are the wettest.

Population

According to the 2009 population census [55], the population of Kieni, was estimated at 175,812 (51,304 households) over an area of 1,321Km². Populations are mainly immigrants from the higher potential areas of Nyeri County and surrounding counties in the Mt. Kenya region and The Aberdare Ranges. The study populations were all the 51,304 households. Ten sub locations for this study were randomly selected from a total 59 sub locations (clusters) in the eight wards(strata). The individual farm household was used as the unit of analysis.

Sample size

The sample size for the study was determined using this formula as proposed by [56] at 95% confidence level and P=0.5, i.e. $\boldsymbol{n = N/[1 + N(e)^2]}$; where: n = the desired sample size; N = population of study (51,304); and e = level of precision(sampling error), the range in which the true value of the population is estimated. In this study, the range was +_5%. Based on these values set for alpha, desired statistical power level, effect size, and anticipated number of predictors, a sample size (n) of 396 (≈ 400) households (200 households for each of the two sites) of study site was considered adequate to balance required level of reliability and cost. The number of ten sub locations was also considered to be sufficiently large for drawing valid statistical inferences and was also manageable to be surveyed with the available resources of finance and time.

Sampling Techniques

In order to represent the population with sufficient accuracy and to infer the sample results to the population, the target sample households were selected in a random two stage sampling process. In the first stage, the study sub locations were randomly selected using proportionate stratified random sampling technique (PSRST) to determine the number of sample sub locations relative to sizes of each stratum(ward) in the population. This resulted in the selection of 10 sub locations out of 59; see Table I., each with 40 households according to their respective population strengths. Accordingly, the probability of selecting each of the ten selected sub locations based on population size was determined and varied between

11.1% for Gakanga sub location, and 56.8% for Kamatongu sub location, see Table I. The probability of selecting each household in the selected sub locations based on the population was also determined, and varied from 1.4% for Kamatongu to 10.9% in Bondeni sub location (Table I.). The constant overall weight of 1.3 (see Table I) demonstrated that each household in the population had an equal chance of being selected for the household survey interview. In the second stage, using random sampling techniques, individual households units in the sampled sub locations were randomly selected in relation to population. Household lists provided by the local administrators (area Assistant Chiefs) of the sampled sub locations were used as sampling frame for selecting households. Accordingly, 400 households (40 households from each of the ten sub locations) were randomly selected for the study (Table I).

Instruments and Data Collection Procedures

A survey using structured questionnaire was the primary method of investigation employed for this study. However, focus group interviews, key informant interviews, and direct personal observations were also used in order to enrich the investigation with relevant qualitative information. A common questionnaire was developed for both study sites. The questionnaire [57] (Kothari, 2004), was found to be ideal instrument because it helped to gather descriptive information from a large sample in a fairly short time. The questionnaire was administered in Kikuyu, the local language which households of both sites speak between April and July, 2017. A team of 5 enumerators was recruited and trained for each study site to collect the data from the sampled households. Two separate focus group discussions were conducted for each study site, with male and female household members. The focus group discussions were conducted in June 2017 after some preliminary findings from the questionnaire survey data were investigated. The focus groups composed of between 6 and 9 members of households in both sites. The participants were identified in purposeful selection among the survey samples that were thought to express their views actively in consultation with the enumerators. Village and major town markets in the area were visited to gather information on prices of major traded agricultural, livestock and forest products, including off farm activities. Farm field observation was conducted on some household farms to observe livelihood activities, management practices, and spatial locations in the farmers' land holding.

Data organisation and analysis

Tables II and III show variables used in the empirical analysis of this study and descriptive statistics of the surveyed households in Kieni East and Kieni West sub counties, and the pooled data from the two sites. The seven variables (Table II) are used to describe socioeconomic profile of study respondents. Table III shows additional socio demographic variables used to describe characteristics of respondents. The analysis also involved comparison of Kieni East and Kieni West households on some selected variables that were included in the analysis (Table II). The independent sample t-tests were used to ascertain if there was any significant difference on household status at the two study sites. According to [58], t-test helped in ascertaining whether the difference between means of two groups is brought about by the independent variable or the difference is simply due to chance. The t-test formula (Equation 1) used was as follows:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{N_1} + \frac{s_2^2}{N_2}}} \quad \text{.........(1)}$$

Where:

N_1=sample size of Kieni East (Sample 1)

N_2 = sample size of Kieini West (Sample 2)

S^2_1 = Sample Variance of Sample 1

S^2_2 = Sample Variance of Sample 2

Percentages or proportions test for equality was done using Chi Square. The tests showed significant differences between mean values of households of Kieni East and Kieni West in many of the socioeconomic characteristic variables (indicated with asterisks in Table II).

4. RESULTS AND DICUSSION

Tables II and III show results of variables used to describe the socio-economic profile of the household respondents interviewed during the survey. They provide data for the description of the context of livelihoods in the study area, including gender of household heads, their age and farming experience, and family size and labour. Other factors are level of education for household heads and members, and their occupations.

Gender and marital status of household heads

Data associated with gender and marital status of the respondents is presented in the Tables II and III. Results show that out of the total respondents investigated for this study, a minority (22.8%) of them were female household heads whereas 77.2% majority was found to be males. Also results show that 65.5% of respondents were married and 35.5% single. There was no significant difference at the two sites. The female-headed households were mainly composed of divorcees, widowed, and unmarried women. Whereas this is not entirely surprising, the results imply that 22.8% of the respondents represent the proportion of the population who of the poor show higher level of poverty [59]. Past studies show that women make up more than 40 percent of the agriculture labor force, but only 3 - 20 percent are landholders in Africa [1]. In Kenya, women-owned enterprises make up as little as 10 percent of all businesses [59]. As a means of livelihood diversification, both men and women have to enter into non-agriculture labour activities. Some women engage in agriculture wage labour outside the home, especially on smallholder farms, horticulture and plant packings. The analysis thus reveals the dominance of male gender over the female in household leadership in the study area. The study consequently discloses a section of the population in the study area that is marginalized and vulnerable in form of female and single headed households.

Age and farming experience of household heads

It is evident from the Tables II and III that the average household head age of respondents was about 55 years with a standard deviation of about 15 years. It was however significantly different at the two sites. While in Kieni East average household head age was 55 years [SD=15 years], in Kieni West it was 56.5 years [SD=34] at $p<0.05$], see Table II. The average number of years(experience) household head had lived on their present land holdings was 28 years with standard deviation of 17 years, which was also different at the two sites in the study area at $p<0.01$. In Kieni East, it was 24 years[SD=15] and in Kieni West[35 years, SD=17]. Past studies have shown that farm experience and education of the household head are important characteristics that influence decisions made in livelihood diversification [31]. The range of the age was found to be interestingly wide i.e. starting from 22 to 90 years. These results demonstrate that in Kieni West settlement started much earlier than in Kieni East as corroborated by the group discussions and key informants. Furthermore, a high mean age for Kieni West household heads (56.5 years) may explain why there is more reliance on agriculture (88.5%) compared to Kieni East (64.5%). The results therefore show that the older age group of household heads in the study area rely more on farming activities for livelihood. Also about 6% of the household heads are aged 70 and above thus revealing another vulnerable group requiring specific attention for livelihood support.

Family size and labour

Family size exhibited a wide variation ranging between one and seven persons. Results (Table II) show that average family size was different at the two sites at $p<0.01$. It was 4.195[SD=.84] in Kieni East and 4.065[SD=0.82] in Kieni West at $p<0.01$]. The average family size in the study area was therefore 4 persons with standard deviation of 0.8 persons, which is below the national average of 6 members for poor families in Kenya [59]. About two-thirds of the households had a family size less than the average. The remaining one-third had household sizes above the average. The average number of males and females was 930 and 951 respectively, translating to a ratio of about 1:1.

As is often the case with rural economy, the household is the major source of the family labour supply supplemented to a limited extent by labour exchange and hiring of casual labour. The available labour force depends on the size, age structure, and gender composition of the household (Table III). Of the average family size indicated above, the adult labour force (19-59 years) was 56.5%. It therefore concluded that over 50% of the household members were in the adult labour force who provide labour within their farms/enterprises or outside to earn a livelihood.

Level of education for household heads and members

Table III shows that 11.1% of the household head respondents had no formal education, while the majority of the respondent respondents (48.1%) were educated up to primary level. About a quarter (24.5%) of respondent household heads was educated up to secondary school and fairly lesser number of respondents (16.1%) was educated up to tertiary level. Table III also indicates that only 6.2% of household members of respondents were illiterate, almost half proportion the proportion of household heads. Past studies have shown that higher education attainment is associated with less reliance on forest resources [41]; [42], since it offers other alternative livelihood opportunities which may generate significant returns compared to forest extraction activities [43]. Results thus show that the level of illiteracy is higher at the household head level than members of household, indicating that dependency for example on forest for livelihood is more for the older household heads than the younger generation. It is consequently concluded that the level of illiteracy at the household head level is higher than that of the members. Compared to the national illiteracy levels of 25% [60]), it is further concluded that the level of education in the area is above the national average.

Occupation

It is evident from Table III that over half of the total respondents (76.5%) engage in agricultural activities. Whereas a large portion of 60.5% of the respondents were off farm earners, the number of respondents who engage in forest activities was 48.5%, and 39.5% practice livestock farming. The finding demonstrates that households engage in diverse activities to earn a living in the area. For instance to emphasize the importance of livestock husbandry in the area for household income security, an FGD participant had these to say

……it helps us a lot. In this area.. “Livestock is our cash crop!”

(FGD participant, Bondeni Sub Location, Kieni West).

Previous studies have also shown that households get involved in diverse activities depending on several factors, amongst them education. In their study to measure the role of forest income in mitigating poverty and inequality in Nigeria, [42] reported that higher education was associated with less dependence on forest activities. This is because education offers alternative livelihood opportunities that may generate significant returns compared to forest activities [43]. It is consequently concluded that although households in the study area engage in an average of four activities to earn a living, the most preferred activity is farming, followed by off farm activities, forest and livestock activities respectively.

5. CONCLUSION

With regard to semi-arid characteristics, the study concludes that the study area households have unique characteristics that contextualise household asset endowment and livelihood choices. Some of the socioeconomic factors are similar, while others were different at the two sites. Whereas average proportion of female headed households, household head marital status, illiteracy levels, and household head choices had insignificant differences at the two sites; the difference for average family size, age of household head, and experience of household head age at present landholding was significant. These have implications for strategies that inform living standard improvements and environmental conservation mechanisms in the area.

Therefore policies and strategies that aim to improve the living standards in the two areas must take similarity and the dichotomy in consideration. To promote better quality of life in the area, policy makers should target their interventions in such way that they address factors currently prevalent in the area that may limit household access to assets/resources. One, in terms of gender and marital status of households, the female and single headed households identified in the area are uniquely vulnerable. Programmes to support these marginalised part of the population should be created by policy makers to assist them surmount challenges of access to assets. Two, a small and significant household heads group of the aged(70 and above) was also identified in the area. Policy makers should also target this vulnerable group to access government social fund programmes. FGD results showed that although respondents had heard about the government social fund programme, no one within their knowledge had benefited from the programme. Three, family labour force accounted for over fifty percent of the household members. This is a high proportion which policy makers should recognise by providing opportunities for formal or self-employment. The community should be sensitised on the government strategies to promote formal and self - employment, especially for the youth in the area. This may include provision of information on employment opportunities outside the study area. Compared to the national average, the area has a lower average

illiteracy rate, standing at less than 10%. Nevertheless, the findings show, due to the high unemployment rate, households engage in non-sustainable activities like dependency on forest resources. FGD finding indicated that due to lack of vocational training opportunities, the local educated youth lack skills for self-employment. Policy makers therefore should focus on the promotion of entrepreneurial skills among the youth. This will enhance local self-employment through vocational training as a way of dealing with the high unemployment rate among the youth. Therefore, creaction of employment opportunities through the strengthening of vocational training institutions like village polytechnics is important.

Fourthly, results show that of the four main livelihood choices practiced in the area, majority of households engage in cropping and off farm activities in that order. Therefore strategies that promote these two activities have potential for job creation that will directly fix the high unemployment rate problem. Rural extension service provision should therefore be improved through demand driven approaches to support sustainable agricultural activities and hence enhance employment opportunities. Moreover, entrepreneurship programmes should be targeted for promotion to assist in the initiation and expansion of SMEs through capacity building and credit programmes. Like agriculture, this will also open opportunities for employment/self-employment to benefit especially women and the youth.

APPENDIX

LIST OF TABLES:

Table I. Sub locations and number of households randomly selected for questionnaire survey

	A	B	C	D	E	F	G	H
Strata/Ward	**Cluster/ Sub location**	**Sub Location Population Size**	**Cumulative Sum(a)**	**Clusters sample (d)**	**Probability 1**	**Households per Sub Location**	**Probability 2**	**Overall weight**
Naromoru/ Kiamathiga	Naromoru	1161	1661	1200	32.4%	40	2.4%	1.3
	Ndiriti	1094	2755					
	Gaturiri	1063	3818					
	Rongai	989	4807					
	Kamburaini	1813	6620	6330	35.3%	40	2.2%	1.3
	Thigithi	666	7286					
	Murichu	762	8048					
	Gikamba	1098	9146					
	Kabendera	830	9976					
Kabaru	Kirima	1505	11481	11460	29.3%	40	2.7%	1.3
	Ndaathi	1719	13200					
	Kimahuri	1961	15161					
	Munyu	1020	16181					
Thegu	Thungari	1811	17992	16590	35.3%	40	2.2%	1.3
	Lusoi	605	18597					
	Thirigitu	1446	20043					
	Maragima	872	20915					
Gakawa	Gathiuru	1609	22524	21720	31.4%	40	2.5%	1.3
	Githima	1363	23887					
	Kahurura	5125	29012					
Mweiga/ Mweiga	Bondeni	367	29379	26850	7.2%	40	10.9%	1.3
	Amboni	1194	30573					
	Njengu	784	31351					
	Kamatongu	2915	34272	31980	56.8%	40	1.4%	1.3
Gatarakwa	Watuka	1126	35398					
	Lamuria	1366	36764					
	Embaringo	1217	37981	37110	23.7%	40	3.3%	1.3
	Kamariki	1809	39790					
Endarasha/ Mwiyogo	Mitero	901	40691					
	Charity	1456	42147					
	Gakanga	569	42716	42240	11.1%	40	7.0%	1.3
	Endarasha	1907	44623					
	Kabati	701	45324					
	Muthuini	571	45895					
	Labura	1494	47389	47370	29.1%	40	2.7%	1.3
	Mwiyogo	471	47860					
Mugunda	Karemeno	538	48398					
	Ruirii	993	49391					
	Kamiruri	722	50113					
	Nairutia	1191	51304(b)					
TOTAL	10					400		

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Table II. Socioeconomic descriptive statistics of Kieni East, Kieni West, and Pooled Data (all surveyed households)

Variable Description	Kieni East (N= 200)		Kieni West (N= 200)		Pooled Data (N= 400)	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Age of household head**	54.83	15.09	56.50	33.67	54.57	15.00
% of female-headed households	24.3		21.4		22.8	
% of married household heads	63.1		67.9		65.5	
% of household male members	51.3		47.9		49.4	
% of household female members	48.7		52.1		50.6	
Household size (number) ***	4.20	.84	4.07	0.82	4.13	0.84
Number of years household head resided on present landholding***	23.53	15.149	34.69	16.799	28.0	17

Variables in which sample households of Kieni East have significant differences from those of Kieni West: *** = at 0.01 level of significance ** = at 0.05 level of significance, OR *** Significant at 1% level ** Significant at 5% level * Significant at 10% Level

Table III. Socio demographic characteristic of study participants

	Kieni East		Kieni West		Pooled Data	
	n	%	n	%	N	%
Female headed households	95	24.3	84	21.4	89	22.8
Married household heads	126	63.1	136	67.9	262	65.5
Age of household heads and members						
0-14	178	21.1	229	22.9	407	22.1
15-19	111	13.2	111	11.1	222	12.0
20-29	142	16.9	178	17.8	320	17.4
30-39	142	16.9	133	13.3	275	14.9
40-49	119	14.1	149	14.9	268	14.5
50-59	75	8.9	104	10.4	179	9.7
60-69	24	2.9	43	4.3	67	3.6
70-79	33	3.9	36	3.6	69	3.7
80≤	18	2.1	18	1.8	36	2.0
Education status of household head						
No formal education	22	11.8	21	10.5	43	11.1
Primary	89	47.6	97	48.5	186	48.1
Secondary	45	24.1	50	25.0	95	24.5
Tertiary	31	16.6	32	16.0	63	16.3
Education status of household members						
No formal education	113	6.1	117	6.3	115	6.2
Primary	873	47.4	839	45.8	859	46.6
Secondary	631	34.2	643	34.8	637	34.5
Tertiary	240	13.0	226	12.2	233	12.6
Occupation of respondents						
Forest activities	78	39.2	105	52.5	183	45.8
Farmers	129	64.5	177	88.5	306	76.5
Livestock keepers	94	47.0	65	32.5	159	39.8
Off farm activities	110	55.0	132	66.0	242	60.5

Note: Sample size (N)=400

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