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Ministry of Energy
Republic of Kenya

FEASIBILITY STUDY
ON
SMALL HYDROPOWER PROJECT
FOR 12 SITES FOR TEA FACTORIES
IN KENYA

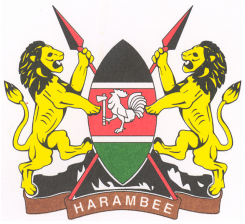
Final Report

Volume III.
Supporting Report (2)
(Social Impacts Assessment)

Nyamindi Kimunye

AUGUST 2009

Q-Energy
Que Energy Limited
Nairobi, Kenya



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This Report consists of

Executive Summary

Volume III Supporting Report (2)

(Social Impacts Assessment)

This Study was fully Supported by Government of Kenya in a 10 month Feasibility Assessment of some 12 sites for Tea Factories in Kenya.

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1.1 Introduction

1.1.1 Survey objective

The objective of this survey is to investigate the social and economic conditions of people living around tea factories so as to establish the impact of developing local small hydro power schemes to improve on their livelihoods

1.1.2 Methodology

The study used a semi - structured questionnaire to collect the primary data. The researcher managed to collect data from 164 respondents.

The survey targeted potential beneficiaries of Small hydro scheme with the sample comprising all the households within a 3km radius from the Kimunye Tea Factory, as well as those living along the area where the canal will be constructed.

Stratified sampling technique was used, where the sample was divided into four strata and random sampling done in each stratum with equal distribution. On this site, 164 households were randomly selected, which involved 124 households around the factory within a 3km radius and 40 households along the canal.

A structured questionnaire was developed, pre tested and reviewed. This was then used to collect primary data on the social and economic status of the respondents. These were administered face to face by the interviewers who were local residents of the area and also the potential beneficiaries.

Questionnaires were administered to each randomly selected household and responses recorded. It took an average of 30 minutes to gather the necessary information for each household.
The collected data was then coded, cleaned and entered into SPSS software to build a database that was subjected to data analysis. Descriptive statistics such as percentages, correlation analysis and graphs were used to describe, analyze and present the study findings as shown below. The research was carried out in various homesteads in the Gichugu and Mwea Divisions in Kirinyaga District.

Out of the 164 survey respondents 119 men (72.6%) and 45 women (27.4%)

1.1.3 Limitations and opportunities of the study

The study coincided with the rainy season which involves planting food crops and picking tea thus it took more time to locate the respondents as most of them were busy in their farms preparing land in readiness for planting and also picking tea.

The heavy rains mostly in the afternoon affected the interviewer's job and thus took more time than expected; the interviewers had to contend with rain and cold weather to collect the data.

Most respondents could not fill in the questionnaires by themselves because they could not understand it, while those who tried to fill were not exhaustive. They were therefore interviewed and their responses recorded on the questionnaire. This also enhanced probing for further information.

Most respondents could not understand the English language and the interviewers had to translate the questions to their mother tongue or Kiswahili language.

The interviewers had to convince the respondents to get the land register number which was impossible in most cases. There were also challenges getting information on the income levels and sources. Nevertheless, most of the information was obtained.

2.0 Summary of findings

Only 28 households (17.07%) use electricity for lighting. Majority of households comprising 70.73% use kerosene for lighting; followed by firewood (20.73%); solar – (10.98%); and generators (6.10%).

The majority of the population are farmers comprising 41.71 % of the sampled households while 28.12% are students. Other occupations include housekeepers (8.37%), casual workers (4.74%), teachers (2.84%), businesses people (2.69%), tailors (2.21%), and those in self-employed (1.9%).

The average acreage of land owned by each household is 2.6 acres, with the maximum of 18 acres and a minimum of 0.1 acres. Majority of households own between 1-2 acres of land. Tea is the dominant cash crop with 77% of the households cultivating. 27% of households cultivate coffee and only a small number cultivate rice.

The survey reveals that households have access to regular incomes from cash and food crops, livestock as well as off-farm economic activities. The average acreage of land under tea is 1.2 acres although majority cultivate 0.75 acres. Tea cultivation is a collective responsibility for both women and men (66.15%), while men alone cultivate (20.77%) and women alone (13.08%). Average acreage under coffee is 0.65 acres with majority of households comprising cultivate 0.25 acres. Coffee cultivation is also a collective responsibility involving both women and men with 53.66% with men only cultivating (7.32%) and women alone cultivate (39.02%).

Tea contributes an average of Kshs. 68,310/= per year for the sampled households and a minimum of Kshs. 3000/= per year. The highest earnings from tea are up to Kshs. 400,000/= per year. 7.56% of the households sampled earn above Kshs. 150,000/=annually; 2.52% earn between Kshs. 110,000/= and Kshs. 150,000/=; 18.49% earn between Kshs. 90,000/= and Kshs. 110,000/=; 10.92% earn between Kshs. 50,000/= and Kshs. 90,000/=; Majority (34.45%) earn between Kshs. 30,000/= and Kshs. 50,000/=; 11.76% earn between Kshs. 20,000/= and Kshs. 30,000/=; and 14.28% earn below Kshs. 20,000/=.

Coffee contributes an average of Kshs. 14,060/= per year to the households and a minimum of Kshs. 3000/= per year. The highest earnings from coffee are up to Kshs. 100,000/= per year. Only 3.03% earn between 90,000 and 110,000; 9.09% earn between 20,000 and 50,000; 12.12% earn between Kshs. 10,000/= and Kshs. 20.000/=. The majority (75.76%) earn below Kshs.

10,000/=. Decisions with regard spending income from cash crops are mostly made by both husband and wife (82.35%).

In most cases, food crops are grown for both subsistence and sale (50.89%). 49.11% of the crops are grown purely for subsistence. Average annual earnings for households growing maize is Kshs. 16,390/=; beans - Kshs. 9,000/=; bananas - Kshs. 14,571/=; cabbages - Kshs. 9,192/=; tomatoes - Kshs. 19,615/=.
Decisions on how income from food crops is spent are mainly made by both husband and wife comprising 72.12%. Wives alone make decisions more often than men alone (22.12% and 5.77% respectively.

Animal products are mainly used for both subsistence and sale (54.17%); subsistence only (36.67%), sale only (9.17%).

52.4% of the sampled households keep cattle with the main livestock products being milk (76.9%), manure (10.6%), and meat- (12.5%). The average number of cattle per household is 2 animals. 40.2% of the households rear chicken with the main products being eggs (51.4%), meat (45.7%), and manure (2.9%). The average number of poultry per household is 6 chickens. 22.0% of the households rear goats with the main products being milk (62.1%), meat (20.7%), and manure (17.2%). The average number of goats per household is 3. 17.7% of the households rear sheep with the main products being meat (50.0%), manure (26.7%), milk (13.3%) and wool (10.0%). The average number of sheep per household is 4 sheep.

The average annual earnings from cattle is Kshs. 13,100/=; poultry - Kshs 4,700/=; sheep- 3,500/=; goats - Kshs 7,400/=. Decisions on how income from livestock is spent are made by both husband and wife (81.25%); husband only (11.25%); wife only (7.50%).

Most members the households sampled engage in various other economic activities ranging from day casual labour (71.20%); formal employment (10.40%); running agricultural commodity businesses (8.00%); running retail businesses (6.40%); and remittances from relatives (4.00%).

Average annual earnings are Kshs. 28,876/=, with minimum of Kshs. 2000/= and a maximum of Kshs. 200,000/=. Majority of the households earn below Kshs. 10,000/= (30.48%); between Kshs.10,000/= and Kshs.20,000/= (19.05%); between Kshs.20,000/= and 30,000/= (13.33%); between Kshs. 30,000/= and 50,000/= (25.71%); above Kshs. 50,000/= (11.42%); More details can be seen in the graph below.

33.80% of the households earn an overall average annual income of between Kshs. 50,000/= and Kshs. 100,000/=; followed by 23.94% earning between Kshs. 100,000/= and Kshs. 150,000/=; 19.01% earn less than Kshs. 50,000/=; 13.38% earn between Kshs. 150,000/= and Kshs. 200,000/=; 9.85% earn Kshs. 150, 000/= and above.

The average number of houses per homestead is 3 houses with a minimum of 1 house and a maximum of 6 houses. The average number of rooms per household is 6 rooms with the lowest being 2 room and the highest being 17 rooms. Out of the 164 households interviewed, the walls are constructed with wood (144 households), stones (25 households), iron sheets (8 households),

and mud (15 households). 160 homesteads have houses that are roofed with iron sheets; 4 households have houses roofed with *makuti*/grass; 2 households have houses roofed with bricks.

The radio is the most common electrical appliance found in 79.88% of the households with the average of 1 radio per household. Although radios are bought by men in most households they are located in the sitting room in most of the households and used by all household members. 70.73% of the households own a torch with the average number being 2 torches; the minimum being 1 touch and the maximum being 6 torches.

45.73% of the households sampled own a radio cassette player. Purchasing is mainly done by men and boys, located in the living room and mainly used by all family members. 35.37% of the households own black and white TVs while 32.32% own a colour TV, and 21.95% own a video player. With regard to electrical appliances (video player, rechargeable batteries, TV black and white and coloured, light bulbs, electric iron), men are mostly involved in their purchase. However, women are also involved to a large extent in the purchase of the electric cookers. 33.54% of the sampled households own rechargeable batteries with an average of 2 batteries per household, a minimum of 1 and a maximum of 3. 15.24% of the sampled households own light bulbs (filament type) while 4.3% of own light bulb tube type (fluorescent).

3.04% of the households own an electric iron while 1.22% own an electric cooker /coil. With regard to use of electrical appliances, all family members mostly have access to and use of all appliances with the exception of the electric cooker/coil which is predominantly used by women. The average monthly expenditure on electricity for those using is Kshs. 611/= with the majority of households spending between Kshs. 300/= and Kshs 600/=. Average monthly expenditure on rechargeable batteries is Kshs. 100/= with majority of households spending between Kshs. 80/= and Kshs 100/=. Average expenditure on firewood is Kshs. 1572/= with majority of households spending between Kshs. 800/= and Kshs. 2000/=. Average monthly expenditure on kerosene is Kshs. 262/= with majority of households spending between Kshs. 200/= and Kshs. 500/=. Decisions on the type of energy to use for lighting are mainly made by both husband and wife (48.84%); husband alone (34.11%); wife alone (17.05%). The lighting is mainly located in the sitting room, bedroom and kitchen with 78.05%, 70.73% and 63.41% of households respectively. Only 3.05% of the households have outside security lights.

The main source of energy for cooking is fuel wood which is used by all the sampled households. Kerosene is used by 20.73% of the households. Decisions on energy type and appliances used for cooking are mainly made by both husband and wife (63.12%); wives (24.82%); husbands (12.06%).

The main source of energy for space warming and water heating is firewood used by all the households sampled; kerosene - 14.02%, electricity - 6.10% and solar thermal - 0.61%. Majority of respondents obtain wood fuel from trees in their own farms (55.15%); buying from the market (28.35%); gathering from nearby unused bushes (16.49%). Women and girls and children are mainly involved in collecting firewood (83.7%). The average time spent collecting firewood is 1.08 hrs.

For respondents who do not have access to electricity, the approximate average distance from the nearest electricity line is 0.68Km with majority (39.7%) of the respondents being 1km away.

Majority of households (72.88%) have noticed change in the type and volume of energy they consume in relation to their family needs, while 27.12% have not noticed any change. The main changes are: firewood and kerosene are very expensive (47.25%); high cost of energy sources (25.27%); demand for energy has increased in the household (12.09%); firewood is inadequate due to shortage of trees (7.69%); other energy sources are far (4.40%); electricity fee is cheap (2.20%); and cost of purchasing kerosene reduced drastically after purchasing a Solar Home System (1.10%).

82.99% of the respondents said they would like to change to a different form of energy while 17.01% said they are satisfied with the kind of energy they are using comprising those already using electricity and some with Solar Home Systems.

The main reasons why most households are not connected to electricity although they would like to are: because electricity connection fee is too high (45.71%); lack of electricity connection fees (15.24%); electricity is not accessible/ homes are far from the transformers (20.95%); high maintenance cost/very expensive (3.81%) and energy not enough (14.29%).

The average monthly expenditure on electricity is Kshs. 611/= with majority of households spending between Kshs. 300/= and Kshs 600/=. The average monthly expenditure on rechargeable batteries is Kshs. 100/= with the majority of households spend between Kshs. 80/= and Kshs 100/=. Average expenditure on firewood is Kshs. 1572/= with majority of households spending between Kshs. 800/= and Kshs. 2000/=. Average monthly expenditure on kerosene is Kshs. 262/= with majority of households spending between Kshs. 200/= and Kshs. 500/=. Expenditure on dry cells on the average is Kshs. 103/= with a minimum of Kshs. 40/ and a maximum of Kshs. 350/=. Majority spend between Kshs. 50/= and Kshs. 100/=. Average monthly expenditure on LPG is Kshs. 325/= with majority of households spending Kshs. 500/=. Average monthly expenditure on charcoal is Kshs. 509/= majority of households spending Kshs. 500/=; average monthly expenditure on candles is Kshs. 42/= majority of households spending Kshs. 40/=.

Expenditure on energy accounts for a high percentage of the household budget. While majority of households depend on fuelwood for cooking, lighting and warming they pay more for firewood than those using electricity. 82 households have bought rechargeable batteries the average number being 2. Majority pay between Kshs. 3001 and Kshs. 4000/= with most of the batteries purchased being new. This clearly demonstrates that community members would be ready to connect to electricity once availed nearby as this would even reduce expenditure on energy. Furthermore, they travel an average distance 3.5 km to the nearest battery charging facility.

With regard to access to financial facilities, 64.02% of respondents said they have access to merry go rounds and social networks while another 41.46% said they have access to cooperatives and 26.83% have access to credit from MFIs.

Average distance travelled to the nearest hospital is 13.8Km with majority (24.5%) of households travelling 6Km; average distance to the nearest Maternity facility is 13.1Km, with majority (24.8%) of households travelling 6Km. Access to electricity by health facilities (including Health Centres/Dispensaries) facilities would improve the quality of services and bring services closer to people.

The majority (34.0%) of households travel 1 Km to the nearest grain mill; 0.5Km to the nearest Primary School; 2Km to the nearest Secondary school and 2 Km to the nearest Church. Majority of households have access to piped water comprising 39.1%; rain water (33.0%), rivers (25.2%), boreholes/wells (2.6%). Over 70% of respondents pay for water with an average monthly expenditure of Kshs. 213/=, a minimum of Kshs. 100/= and a maximum of Kshs.500/=. Electricity could be used to pump water to peoples homes in order to reduce the drudgery for those who fetch from the river.

Majority of respondents said that the local Dispensaries and Health Centres are not well equipped to handle cases of complicated conditions and maternal deliveries because of lack of proper structures, equipment and facilities; lack of trained personnel to handle the cases; and shortage of staff. A smaller proportion of households said that the health facilities are able to handle complicated cases because they use electrical equipment for testing disease have and have experienced Doctors and Nurses.

Local Secondary Schools mainly use electricity (93.20%); solar energy (2.72%); with 4.08% of Secondary Schools not using any energy type. The main source of energy mostly used by local primary Schools is electricity according to 87.76% of the respondents, while the rest 12.24% do not use any energy type. Those without access to electricity would greatly benefit from electrification. Local churches use both electricity and generators and those using generators as well as those with no access would benefit from the electrification project. Improved lighting in schools without electricity will result in better performance from increased study time.

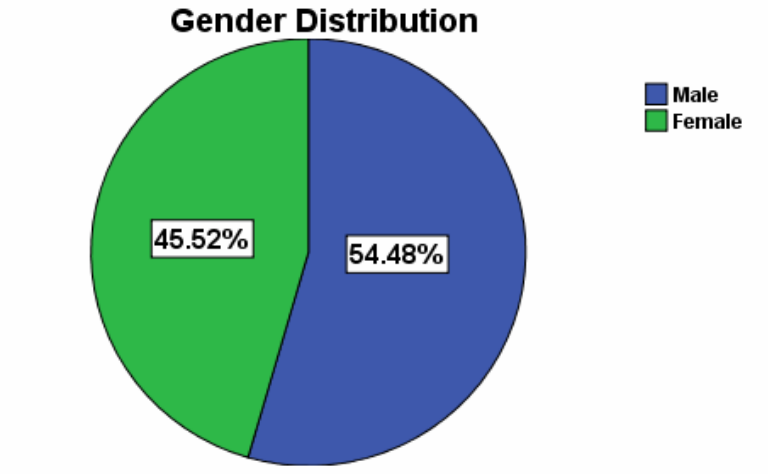
The main businesses operated by women are groceries (23.2%), general shops (16.5%), salons (14.4%), hotels (14.1%), clubs/pubs/bars (10.0%) tailoring (9.1%), health centres and chemists (1.4%) and grain milling (1.0%). Main businesses operated by men include general shops (15.5%), butcheries (14.8%), clubs/bars/pubs (13.2%), barber shops (10.1%), hotels (9.9%), carpentry (7.8%), tailoring (5.4%), welding and panel beating (5.2%), shoe repair (3.7%), groceries (3.5%), grain milling (2.1%), electronic repair (1.0%), health centres and chemists (0.8%). Provision of electricity in market centres will lead to an improvement in the existing businesses as well as support establishment of new ones.

Most respondents are very aware of the benefits that electricity can bring to the community, Major benefits mentioned include improvement of livelihoods; creation of employment opportunities (30.4%); improved security in homes and market centres (19.4%); increased business opportunities (18.0%); improved lighting in homes (9.7%); improved livestock rearing (8.3%); improvement of agriculture (7.4%); more enlightened people e.g. by buying TV and Computers (2.3%); Reduces cost, time and energy spent on such services (1.8%); Reducing crime rate by opening business opportunities for the youth (1.8%), and making work easier since most will be done by machines (0.9%).

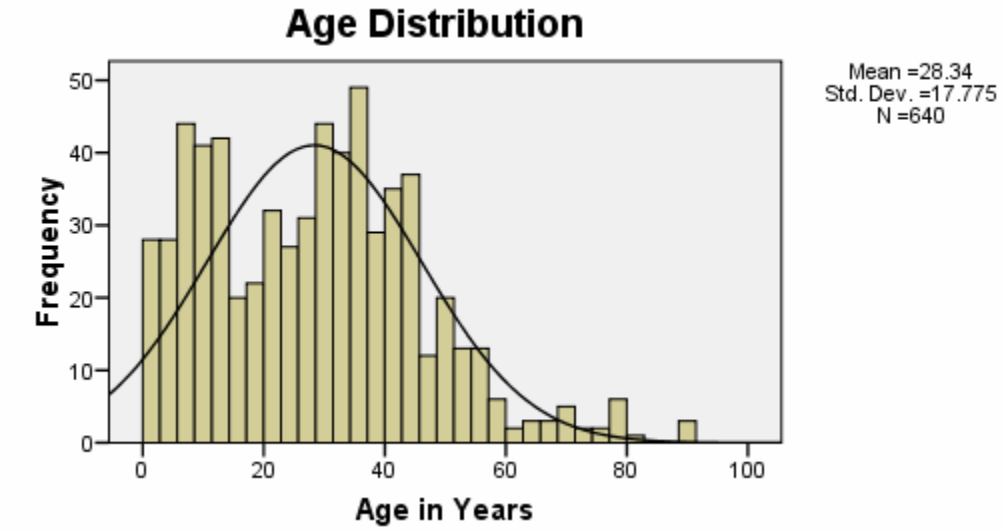
3.0 Survey findings

3.1.1 Household characteristics

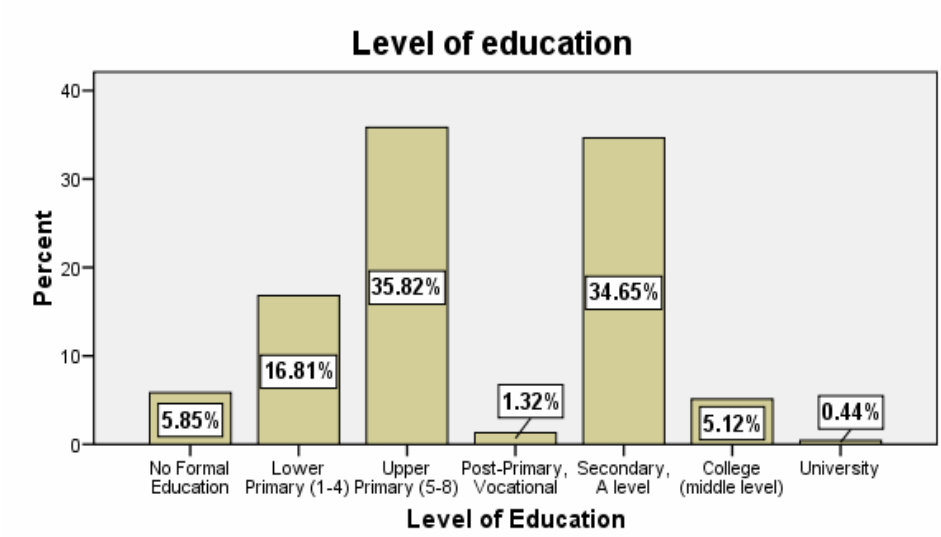
The mean household size is 5 people per household with an equal gender distribution of males and females with 54.48% and 45.52% respectively.



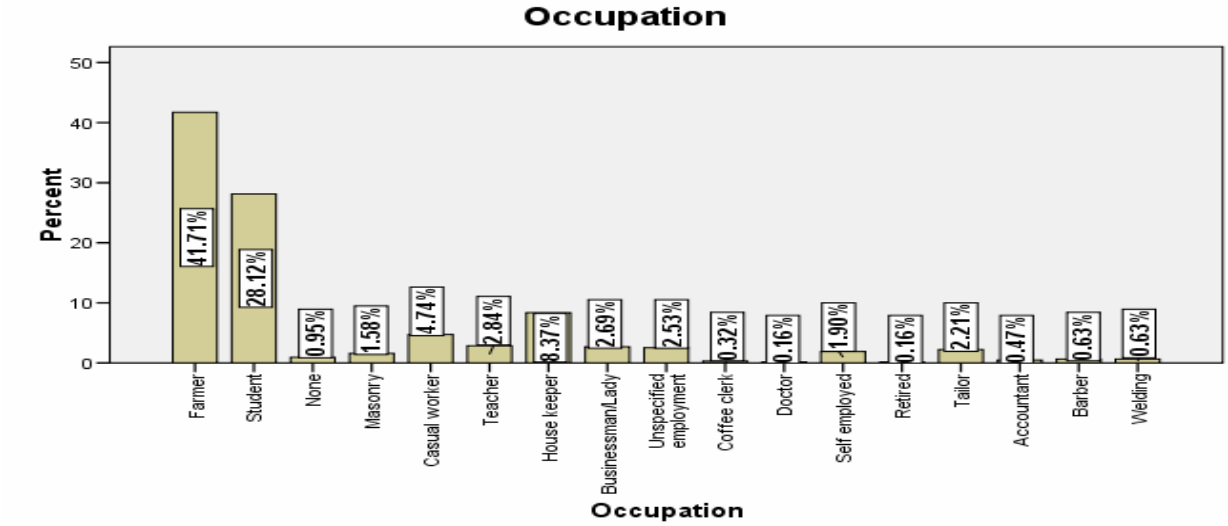
The average age of the population in the target area is 28 years with the majority being between 18 and 53 years, followed by those aged between 2 and 15 years. The elderly aged from 55 to 90 years make up a small part of the population; this is shown in the histogram below



The current education level of the majority of the people in the community is Upper Primary (35.82%) followed by secondary and A-Level (34.65%), lower primary (16.81%), College (5.12%), Post primary (1.32%) and only 0.44% have university education. About 5.85% of the population have no formal education.

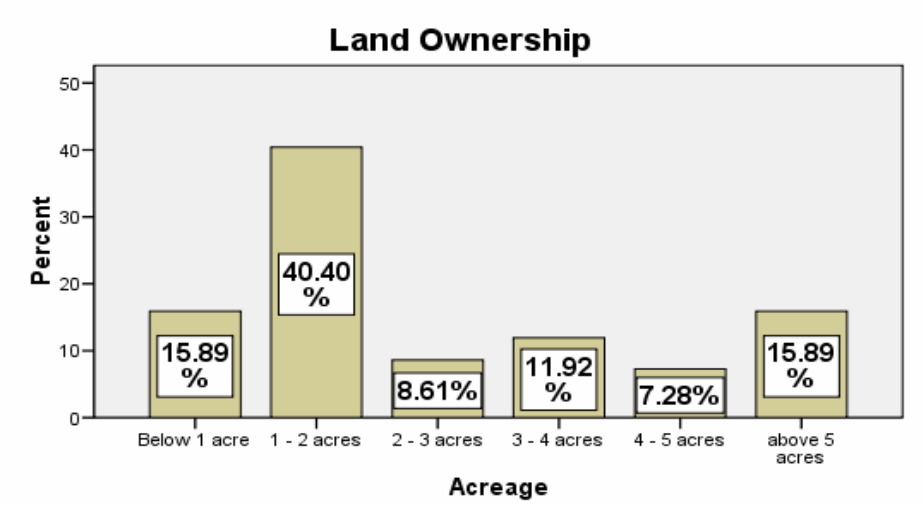


The majority of the population are farmers comprising 41.71 % of the sampled households while 28.12% are students. Other occupations include housekeepers (8.37%), casual workers (4.74%), teachers (2.84%), businesses people (2.69%), tailors (2.21%), self-employed (1.9%), masonry (1.58%). Others include barbers, welders, accountants, doctors, coffee clerks, and the retired while 0.95% is unemployed. About 2.53% did not specify their employment status.

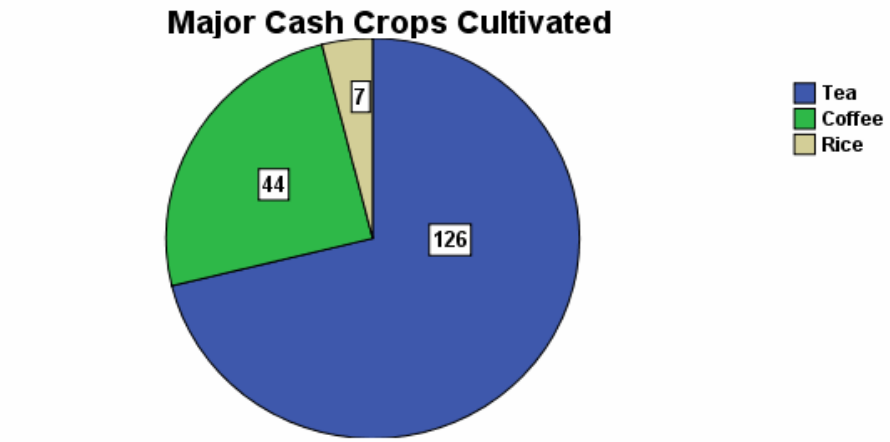


3.1.2 Household income/assets

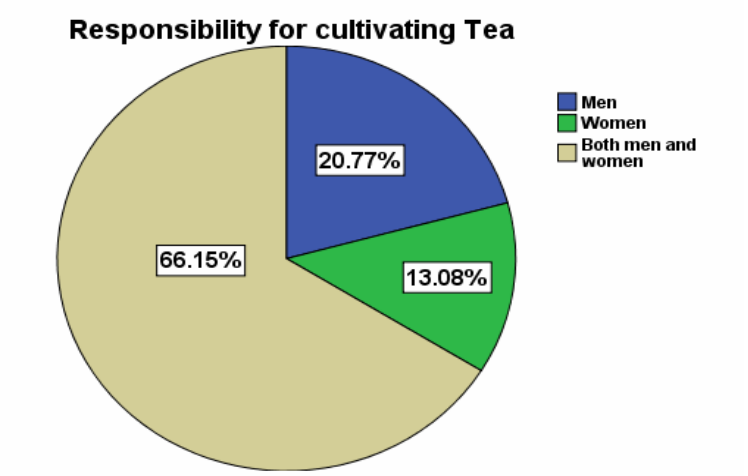
The average acreage of land owned by each household is 2.6 acres, with the maximum of 18 acres and a minimum of 0.1 acres. 15.89% of the households sampled own less than 1 acre of land; 40.40% own between 1-2 acres; 8.61% own between 2-3 acres; 11.92% own 3-4 acres; 7.28% own 4-5 acres and 15.89% own above 5 acres.



The major cash crops cultivated by the members of the households sampled are tea, coffee and rice. Tea farming is the dominant cash crop with 126 out of the 164 households cultivating. 44 households cultivate coffee and only 7 households cultivate rice.



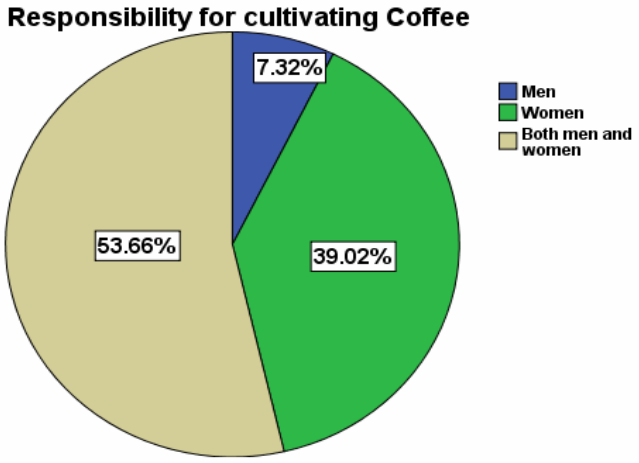
The average acreage of land under tea is 1.2 acres; the largest acreage under tea is 4 acres, while the minimum is 0.25 of an acre. The majority comprising 32.1% cultivates 0.75 acres. Tea cultivation is a collective responsibility for both women and men most of the times (66.15%), while men alone cultivate (20.77%) and women alone (13.08%).



Average acreage under major cash crops

	No of HHs	Minimum	Maximum	Mean
Tea acreage	81	0.25	4.00	1.1696
Coffee acreage	33	0.10	2.00	0.6533

The average acreage under coffee is 0.65 acres; the largest acreage is 2 acres while the minimum is 0.1 acres. The majority of the households comprising 48.5% cultivate 0.25 acres. Coffee cultivation is also a collective responsibility involving both women and men with 53.66% with men only cultivating (7.32%) and women alone cultivate (39.02%).



Rice cultivation in the area is negligible but done by both women and men.
In a nutshell, cash crop cultivation is mostly done by both women and men but more women are involved in coffee cultivation on their own.

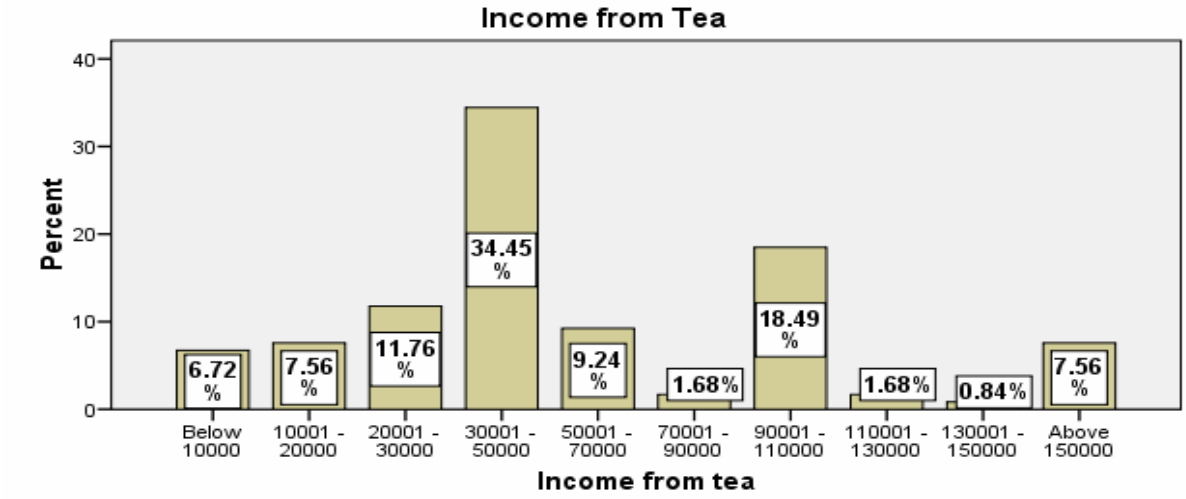
3.1.3 Cash crop income

Tea contributes an average of Kshs. 68,310/= per year for the sampled households and a minimum of Kshs. 3000/= per year. The highest earnings from tea are up to Kshs. 400,000/= per year.

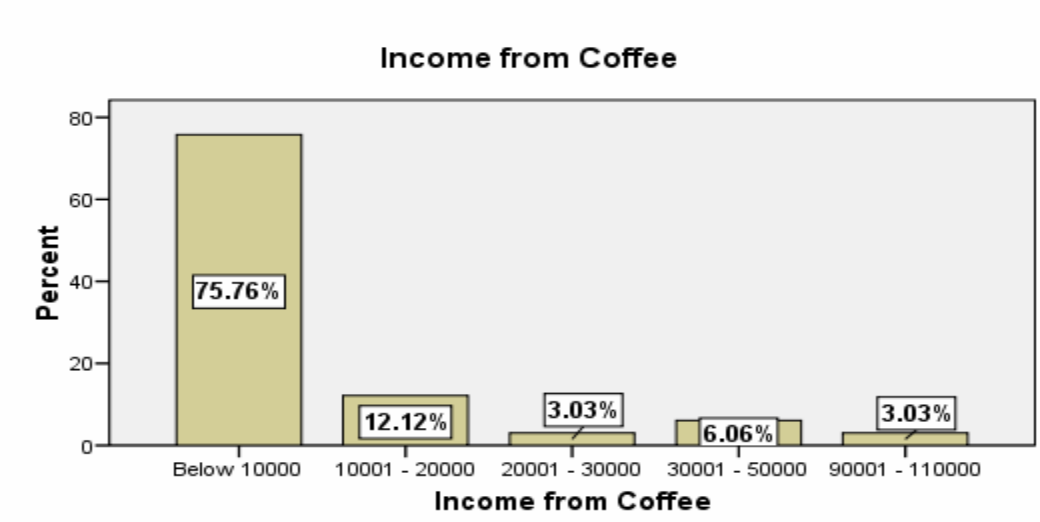
Average yearly income from cash crops

Cash crop	No. of HHs	Minimum Kshs	Maximum Kshs	Average Kshs
Average annual household income from Tea	119	3000	400000	68310.92
Average annual household income from Coffee	33	3000	100000	14060.61
Average annual household income from Rice	4	20000	50000	42500.00

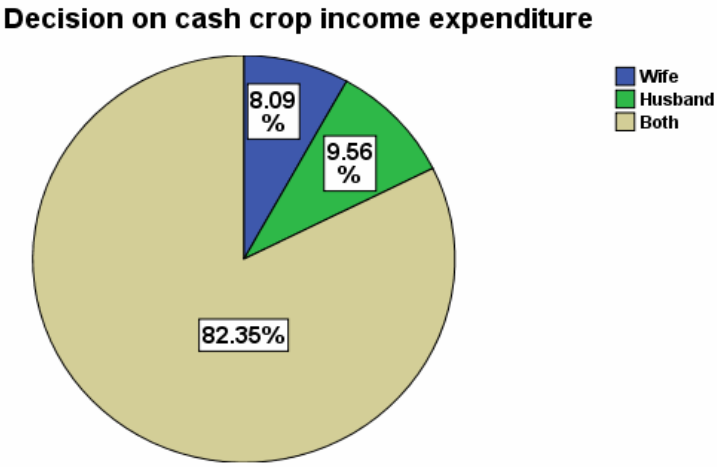
7.56% of the households sampled earn above Kshs. 150,000/=annually; 2.52% earn between Kshs. 110,000/= and Kshs. 150,000/=; 18.49% earn between Kshs. 90,000/= and Kshs. 110,000/=; 10.92% earn between Kshs. 50,000/= and Kshs. 90,000/=; 34.45% earn between Kshs. 30,000/= and Kshs. 50,000/=; 11.76% earn between Kshs. 20,000/= and Kshs. 30,000/=; and 14.28% earn below Kshs. 20,000/=.



Coffee contributes an average of Kshs. 14,060/= per year to the households sampled and a minimum of Kshs. 3000/= per year. The highest earnings from coffee are up to Kshs. 100,000/= per year. Only 3.03% earn between 90,000 and 110,000; 9.09% earn between 20,000 and 50,000; 12.12% earn between Kshs. 10,000/= and Kshs. 20.000/=. The majority (75.76%) earn below Kshs. 10,000.



Decision making on how to use income from cash crops is most of the times made by both husband and wife (82.35%). In 9.56% and 8.09% the decisions are made by husband and wife respectively.



3.1.4 Food crops

Major food crops cultivated by the members of the households sampled are maize, beans, bananas, cabbages, potatoes, *sukumawiki*, tomatoes, cassava, yams, carrots, arrowroots and sugarcane. Maize is the main cash crop cultivated by the majority of the respondents (124 households out of the total 164 sampled), followed closely by beans cultivated by 123 households, bananas 51 households and cabbages (23 households).

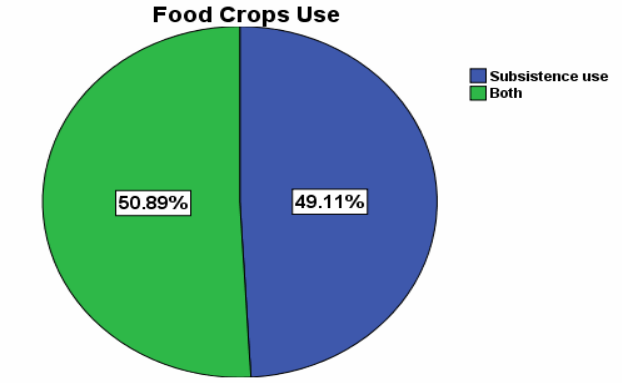
Men and women are jointly involved in cultivation of all food crops although a larger percentage of women cultivate food crops alone with the exception of yams and cabbages where men are more involved.

Food crops grown

Crop	Frequency	Total	Percent %

Maize	124	164	75.61
Bananas	51	164	31.10
Beans	123	164	75.00
Arrow roots	4	164	2.44
Potatoes	21	164	12.80
Sugarcanes	2	164	1.22
Yams	11	164	6.71
Cassava	12	164	7.32
Cabbages	23	164	14.02
Sukumawiki	17	164	10.37
Carrots	5	164	3.05
Tomatoes	15	164	9.15

In most cases, food crops are grown for both subsistence and sale (50.89%). 49.11% of the crops are grown purely for subsistence.



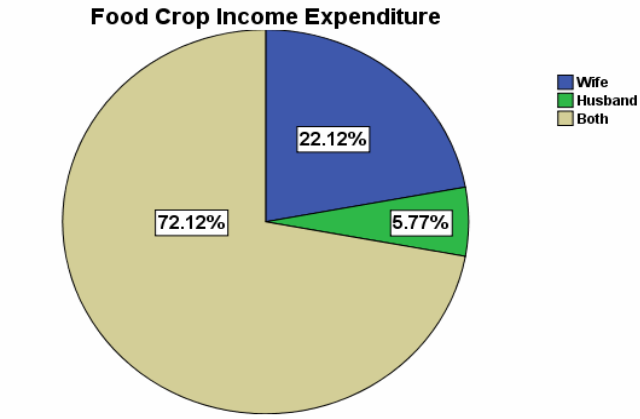
3.1.5 Incomes from major food crops

Average annual earnings for the 41 households who grow maize for sale or both sale and subsistence is Kshs. 16,390/=; 40 households who grow beans - Kshs. 9,000/=; 14 households growing bananas - Kshs. 14,571/=; 13 households growing cabbages - Kshs. 9,192/=; 13 households growing tomatoes - Kshs. 19,615/=. More details are provided in the table below.

Average annual household income from food crops (in Ksh.)

Food crop	No of HH	Minimum (Kshs)	Maximum (Kshs)	Average (Kshs)
Maize	41	2000	50000	16390.24
Bananas	14	2000	40000	14571.43
Beans	40	2000	20000	9000.00
Potatoes	7	1500	30000	16928.57
Yams	1	5000	5000	5000.00
Cassava	3	4000	4000	4000.00
Cabbages	13	1500	20000	9192.31
Sukumawiki	6	2000	20000	7833.33
Tomatoes	13	5000	50000	19615.38

Decisions on how income from food crops is spent are mainly made by both husband and wife comprising 72.12%. Wives alone however make decisions more often than men alone (22.12% and 5.77% respectively).



3.1.6 Livestock incomes

The major livestock types reared are cattle, poultry, goats, sheep and rabbits. 52.4% of the households sampled keep cattle. The main livestock products mentioned are milk (76.9%) manure (10.6%), and meat- (12.5%). The average number of cattle per household is 2 animals, with the highest being 6 animals and the lowest 1 animal.

Poultry rearing is practiced by 40.2% with the main products mentioned being eggs (51.4%), meat (45.7%), and manure (2.9%). The average number of poultry per household is 6 chickens with the maximum being 22 chickens and the minimum 2 chickens.

22.0% of the households are involved in goat rearing with the main products being milk (62.1%), meat (20.7%), and manure (17.2%). The average number of goats per household is 3 with the highest number being 6 goats and the lowest 1 goat.

Sheep rearing is practiced by 17.7% of the households sampled with the main products being meat (50.0%), manure (26.7%), milk (13.3%) and wool (10.0%). The average number of sheep per household is 4 sheep with the highest number being 10 and the lowest 1 sheep.

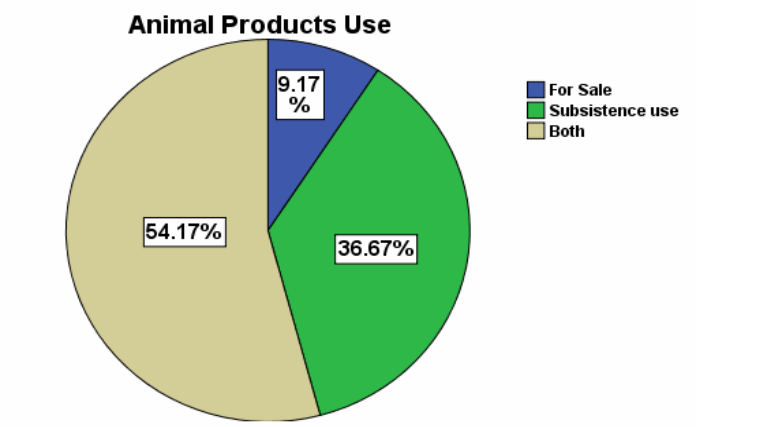
Only 5 households rear rabbits with 4 animals per household.

Average number of animals per household

Livestock type	No of HHs	Minimum No.	Maximum No.	Average No.
Cattle	86	1	6	1.66
Sheep	29	1	10	3.93
Goat	36	1	6	3.06
Poultry	66	2	22	6.47

Rabbits	5	4	4	4.00

Animal products are mainly used for both subsistence and sale (54.17%); subsistence only (36.67%), sale only (9.17%).

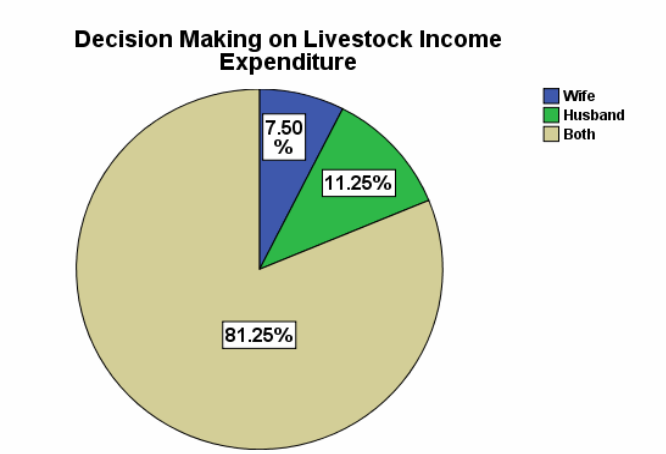


The average earnings for 67 households from cattle is Kshs. 13,100/=, the lowest being Kshs. 3000/= and the highest Kshs. 60,000/=. Average earnings for 39 households from poultry is Kshs 4,700/= with a minimum of Kshs. 1000/= and a maximum of Kshs.15, 000/=. 13 households earn an average of Kshs. 3,500/= from sheep with the minimum being Kshs. 1000/= and the maximum being Kshs. 5,000/=. Average earnings for 13 households from goats is Kshs 7,400/= with a minimum of Kshs. 1500/= and a maximum of Kshs.15, 000/=

Average Income from sale of livestock and products

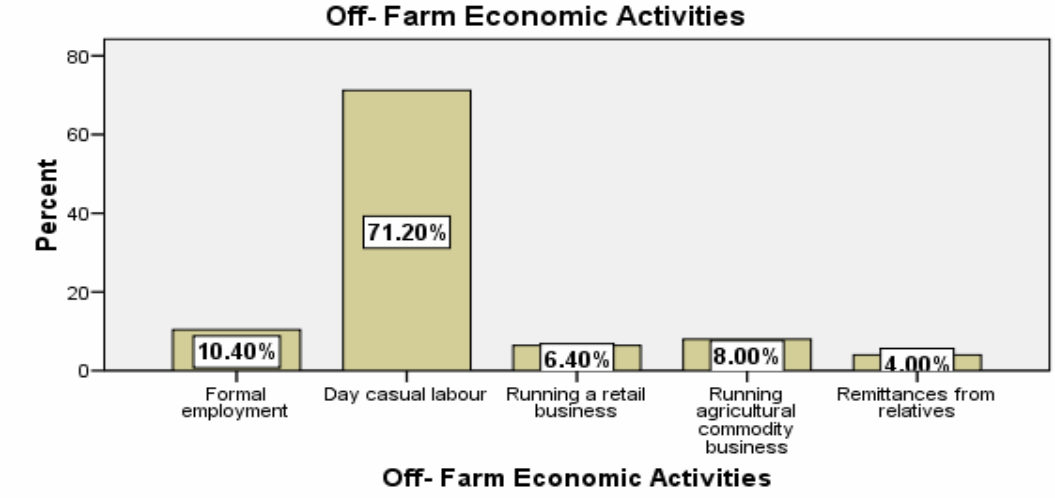
Livestock/products	No. of HHs	Minimum (Kshs)	Maximum (Kshs)	Average (Kshs)
Cattle/ products	67	3000	60000	13098.51
Sheep/ products	13	1000	5000	3538.46
Goats/ products	13	1500	15000	7423.08
Poultry/ products	39	1000	15000	4693.33

Decisions on how income from livestock is spent are made by both husband and wife (81.25%); husband only (11.25%); wife only (7.50%).



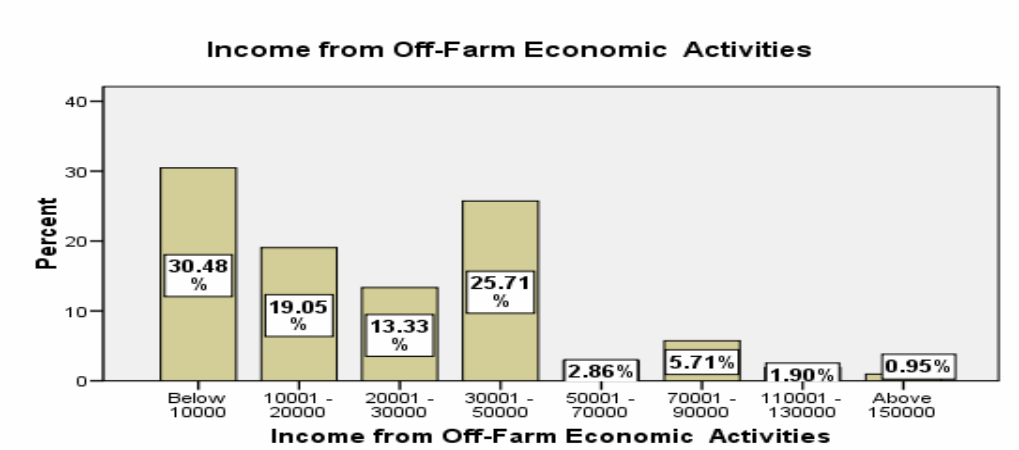
3.1.7 Off-farm economic activities

In addition to farming, most of the members the households sampled engage in various other economic activities ranging from day casual labour (71.20%); formal employment (10.40%); running agricultural commodity businesses (8.00%); running retail businesses (6.40%); and remittances from relatives (4.00%).



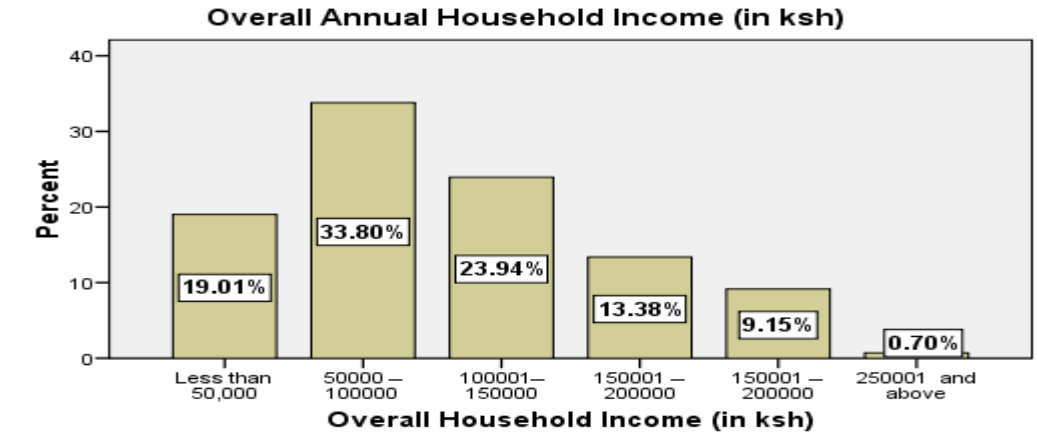
Average annual earnings are Kshs. 28,876/=, with minimum of Kshs. 2000/= and a maximum of Kshs. 200,000/=.

Majority of the households interviewed earn below Kshs. 10,000/= (30.48%); between Kshs.10,000/= and Kshs.20,000/= (19.05%); between Kshs.20,000/= and 30,000/= (13.33%); between Kshs. 30,000/= and 50,000/= (25.71%); above Kshs. 50,000/= (11.42%); More details can be seen in the graph below.



3.1.8 Overall Household Income

33.80% of the sampled households earn an average annual income of between Kshs. 50,000/= and Kshs. 100,000/=; followed by 23.94% earning between Kshs. 100,000/= and Kshs. 150,000/=; 19.01% earn less than Kshs. 50,000/=; 13.38% earn between Kshs. 150,000/= and Kshs. 200,000/=; 9.85% earn Kshs. 150, 000/= and above. More details are shown in the graph below.



3.1.9 Housing

The average number of houses per homestead of the sampled households is 3 houses with a minimum of 1 house and a maximum of 6 houses. The average number of rooms per household is 6 rooms with the lowest being 2 room and the highest being 17 rooms.

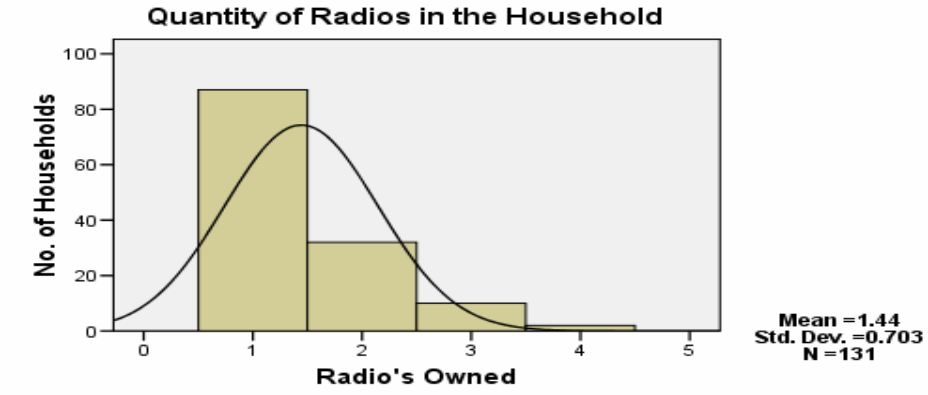
Out of the 164 households interviewed, the walls are constructed with wood (144 households), stones (25 households), iron sheets (8 households), and mud (15 households).

Out of the 164 households sampled 160 have houses that are roofed with iron sheets; 4 households have houses roofed with *makuti*/grass; 2 households have houses roofed with bricks.

3.1.10 Ownership of electrical equipment

The most commonly owned electrical appliance is a radio which was found in 79.88% of the households. The average number of radios per household is 1 radio, a minimum of 1 and a

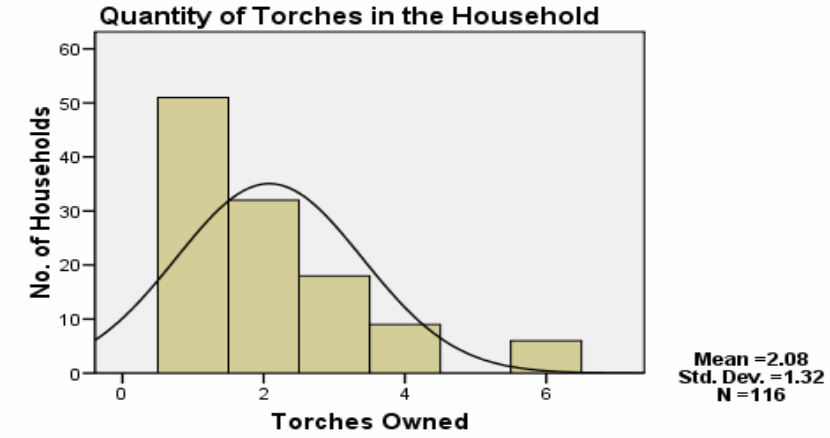
maximum of 4. In 85.0% of the households radios were bought by men; 6.3% of the households the radio was bought by boys; 5.5% of the households the radio was bought by women, while in 3.1% were bought jointly by husband and wife.



The radio is mostly used by all family members comprising 50.9% in the sampled households; men only-16.1%; men and women- 15.2%; boys alone- 8.0%; women alone - 2.7% and girls and boys – 7.1%.

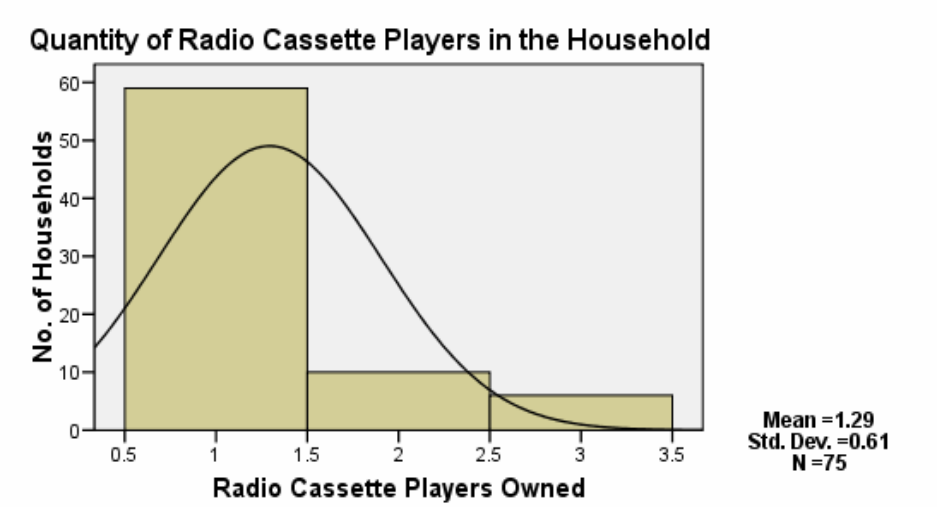
The radio is located in the sitting room in 80.6% of the households; in 14.5% of the households the radio is located in the bedroom and 4.8% in any room

70.73% of the households own a torch with the average number being 2 torches; the minimum being 1 touch and the maximum being 6 torches.



In most cases, torches are bought by men comprising 67.3%; in 24.0% all family members are involved; both husband and wife – 8.7%. Torches are located in all rooms in 42.6%; 41.5% - sitting room; 6.4% - kitchen; and only 9.6% in the bedroom. Torches are mostly used by all household members comprising 86.4% of the households; husbands and wives- 3.4%; boys alone- 3.4%, men alone-6.8%.

45.73% of the households sampled own a radio cassette player with the average number being 1 per household, the minimum -1 and maximum of 3 cassette players.

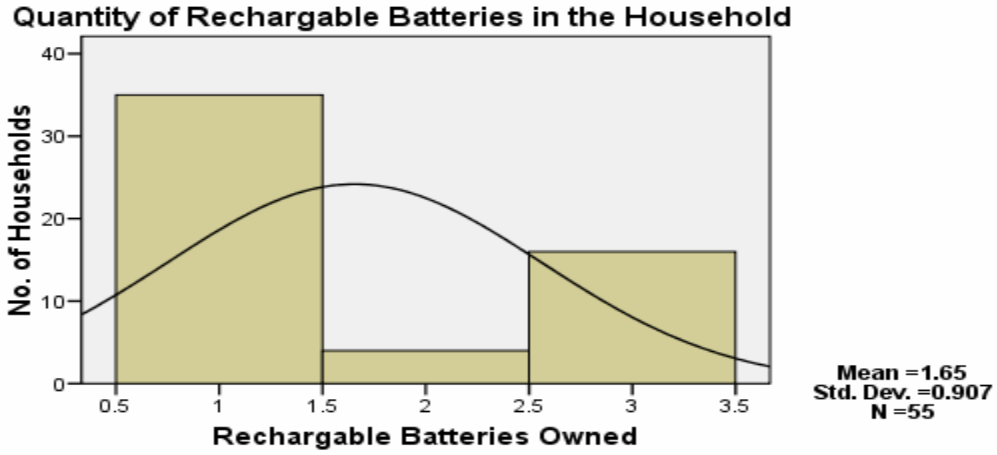


Radio cassette players are bought by men in most households comprising 91.8%; followed by boys alone- 5.5%; both husband and wife- 2.7%;

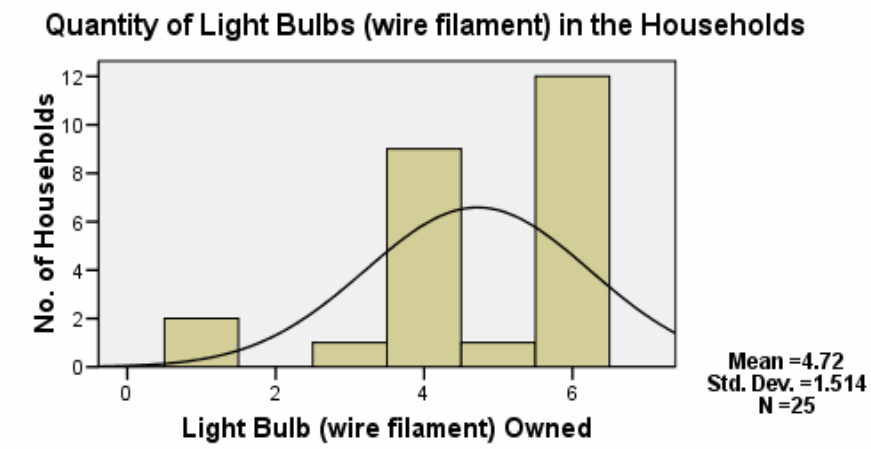
In majority of the households sampled, the radio cassette is used by all family members comprising 52.1%; followed by husbands and wives- 17.8%; men alone -15.1%; boys alone - 15.1%. The radio cassette player is mainly located in the sitting room in 94.7% of the sampled households; bedroom- 5.3%. 35.37% of the households own a black and white television.

With regard to other electrical appliances (video player, rechargeable batteries, TV black and white and coloured, light bulbs, electric iron and cookers), men are mostly involved in their purchase. However women are also involved to a large extent in the purchase of the electric cookers. 21.95% of households own one video player each.

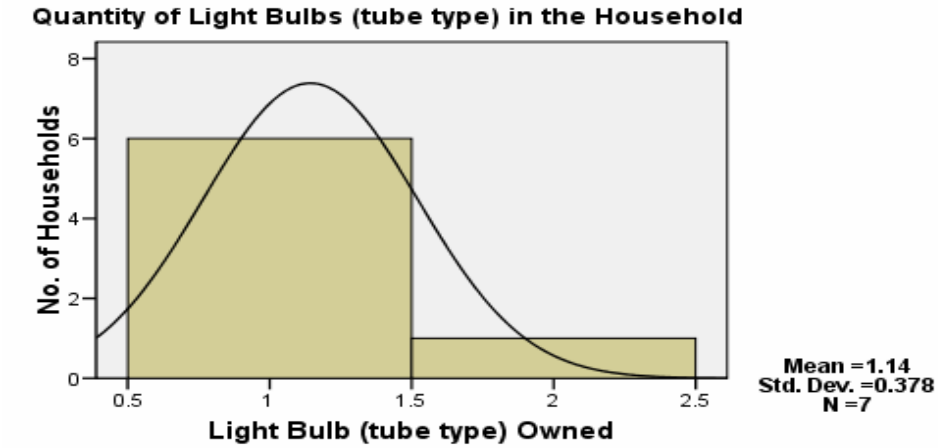
33.54% of the sampled households own rechargeable batteries with an average of 2 batteries per household, a minimum of 1 and a maximum of 3.



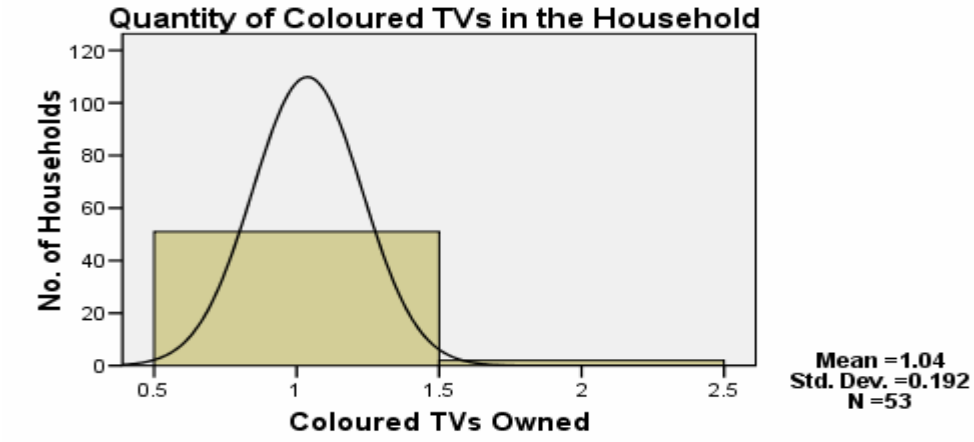
15.24% of the sampled households own light bulbs (filament type) with the average being 4, minimum of 1 and maximum of 6.



4.3% of the sampled households own light bulb tube type (fluorescent); the average being 1, minimum of 1 and maximum of 2.



32.32% of households own a colour TV, the average being 1 TV, minimum of 1 and a maximum of 2.



3.04% of the households own an electric iron with each household owning only one while 1.22% owns an electric cooker /coil.

With regard to use of electrical appliances, all family members mostly have access to and use of all appliances with the exception of the electric cooker/coil which is predominantly used by women alone and women and girls.

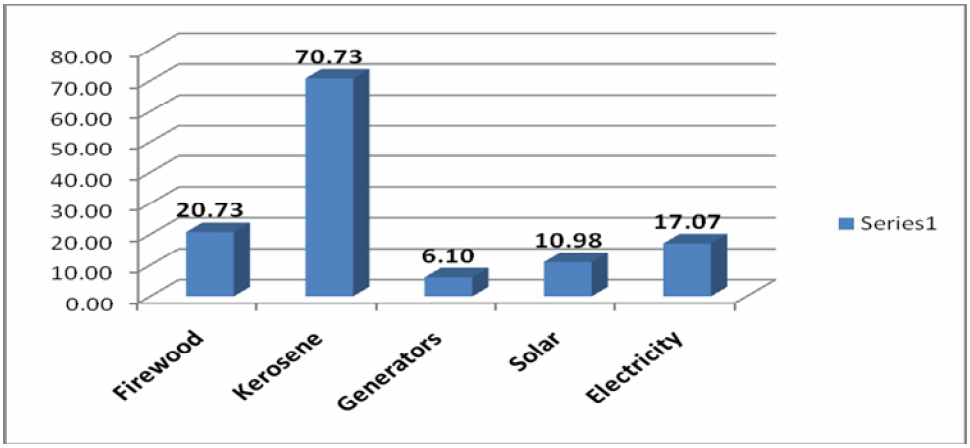
With regard to location of appliances, most are located in the sitting room in most households with the exception of the light bulbs which are mostly located in all the rooms and sometimes in the bedroom and sitting room the tube type light bulbs are also found in the kitchen. The electric cookers are also located in the kitchen.

3.1.11 Energy and energy services

The main sources of energy used for lighting in the sampled households are kerosene which is used by 116 households comprising (70.73%); firewood -34 households (20.73%); solar 18 households-(10.98%); generators –10 households (6.10%); electricity 28 households (17.07%).

Main sources of energy for lighting

Energy type	No. of HHs	Total HHs	Percent (%)
Firewood	34	164	20.73
Kerosene	116	164	70.73
Generators	10	164	6.10
Solar	18	164	10.98
Electricity	28	164	17.07



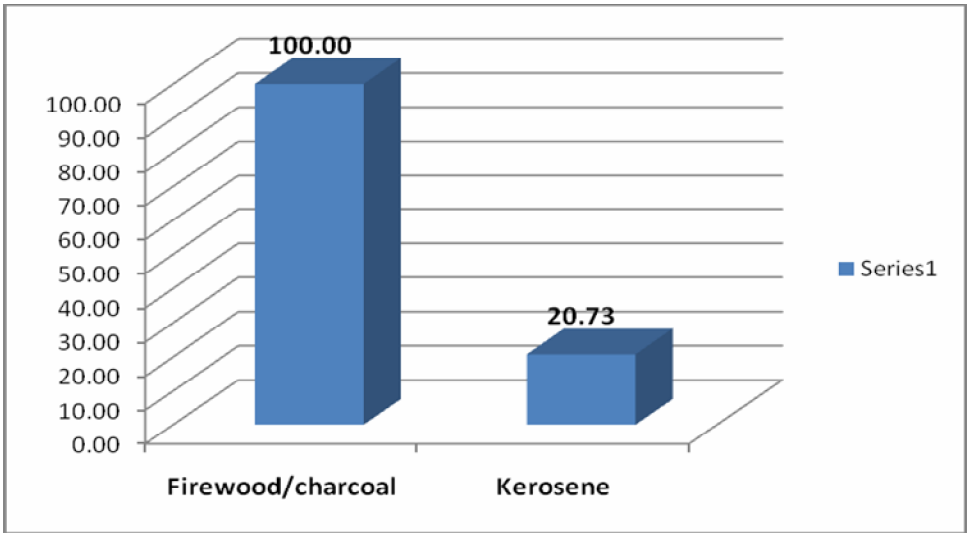
Decisions on the type of energy to use for lighting are mainly made by both husband and wife (48.84%); husband alone (34.11%); wife alone (17.05%).

The lighting is mainly located in the sitting room, bedroom and kitchen with 78.05%, 70.73% and 63.41% of households respectively. Only 3.05% of the households have outside security lights.

The main source of energy for cooking is fuel wood used by all the 164 households sampled; kerosene is only used by 20.73% of the households.

Main source of energy for cooking

Energy type	No. of HHs	Total HHs	Percent (%)
Firewood/charcoal	164	164	100.00
Kerosene	34	164	20.73

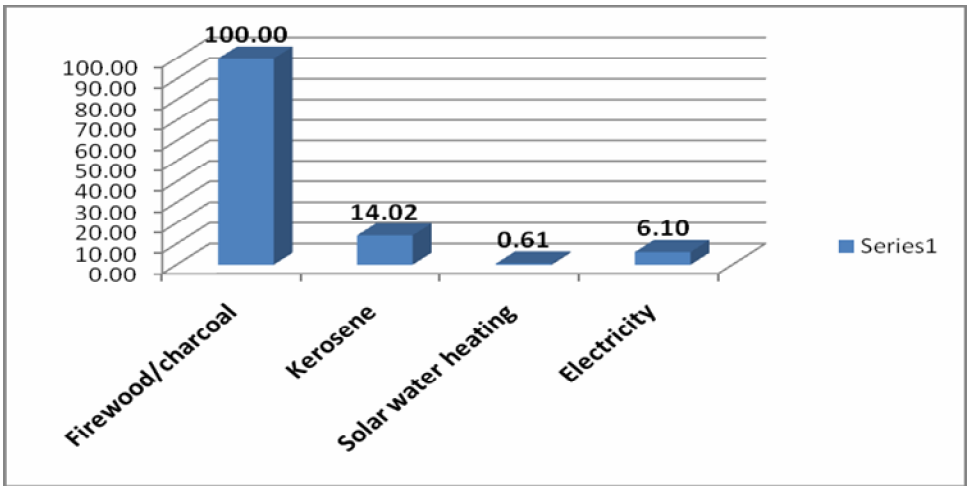


Decisions on appliances used for cooking are mainly made by both husband and wife (63.12%); wives (24.82%); husbands (12.06%).

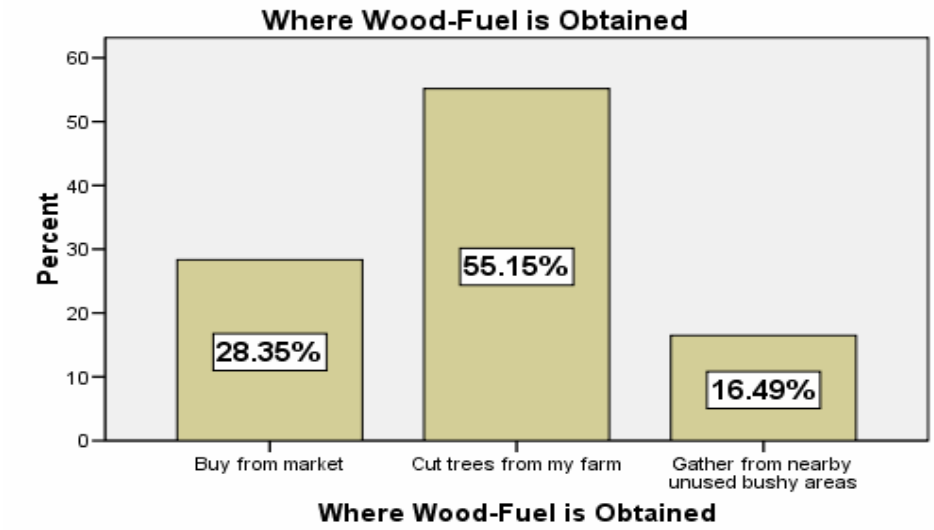
The main source of energy for space warming and water heating is firewood used by all the households sampled; kerosene (14.02%), 6.10% use electricity and 0.61% of respondents use solar thermal for heating water;

Main sources of energy for warming

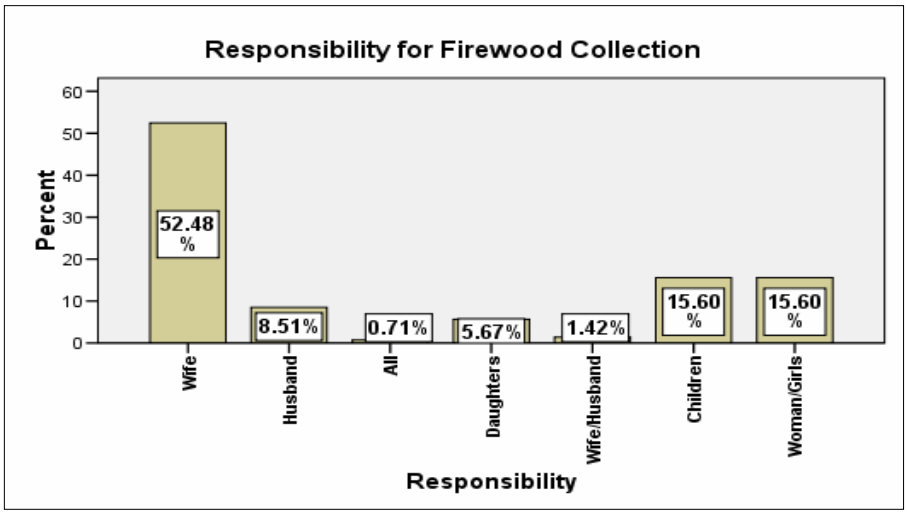
Sources of energy	Frequency	Total HHs	Percent (%)
Firewood/charcoal	164	164	100.00
Kerosene	23	164	14.02
Solar water heating	1	164	0.61
Electricity	10	164	6.10



Majority of respondents obtain wood fuel from trees in their own farms (55.15%); buying from the market (28.35%); gathering from nearby unused bushes (16.49%).



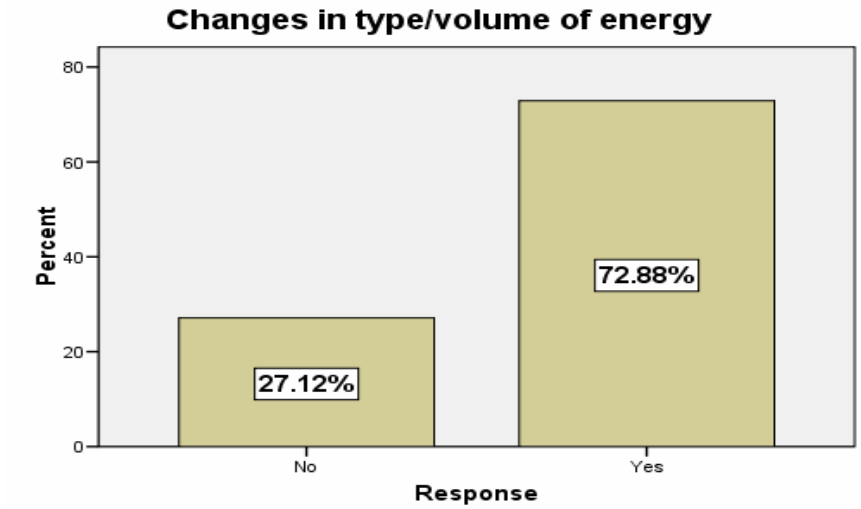
Women are mainly involved in collecting firewood (52.48%); followed by women and girls (15.60%); children (15.60%); men (8.51%); girls (5.67%); both wife and husband (1.42%); all family members (0.71%).



The average time spent collecting firewood is 1.08 hrs with a minimum of 0.5hrs and a maximum of 3hrs.

For respondents who do not have access to electricity, the approximate average distance from the nearest electricity line is 0.68km, with a minimum of 0.01km and a maximum of 8km. Majority 39.7% of the respondents are 1km from the electricity line.

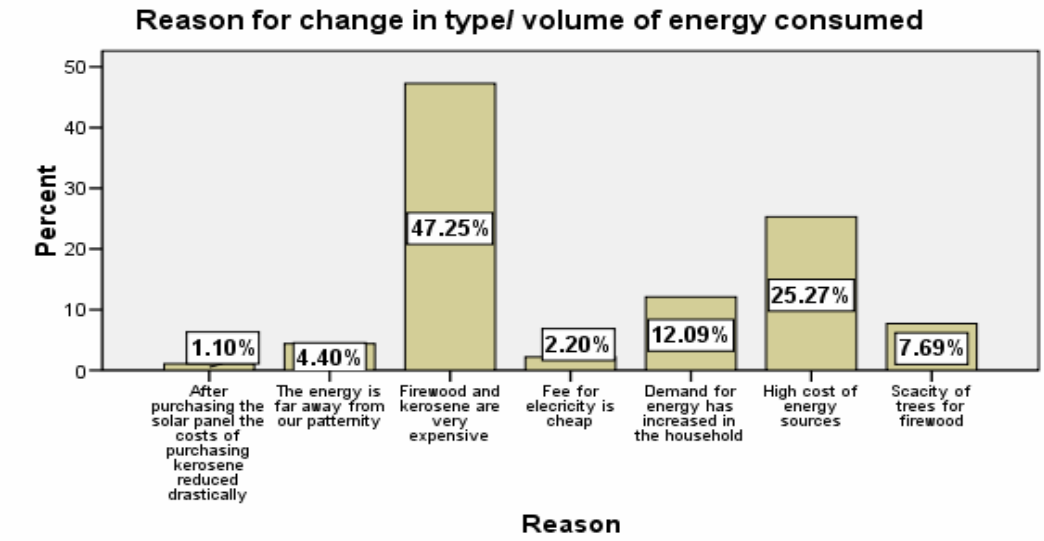
Majority of households (72.88%) have noticed change in the type and volume of energy they consume in relation to their family needs, while 27.12% have not noticed any change.



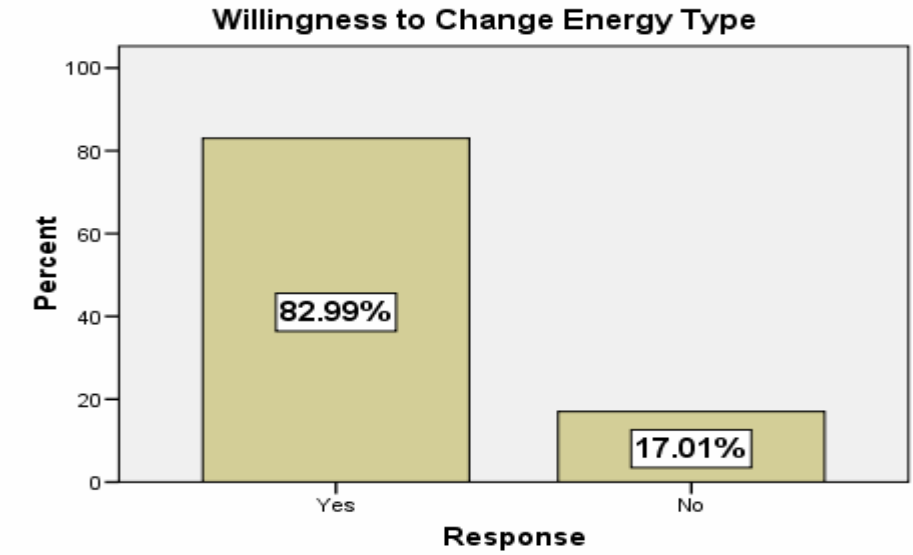
Reasons given for the change include:

- Firewood and kerosene are very expensive (47.25%)
- High cost of energy sources (25.27%)
- Demand for energy has increased in the household (12.09%)
- Firewood is inadequate due to shortage of trees (7.69%)
- Other energy sources are far away from our paternity (4.40%)
- Electricity fee is cheap (2.20%)

- Cost of purchasing kerosene reduced drastically after purchasing a Solar Home System (1.10%).

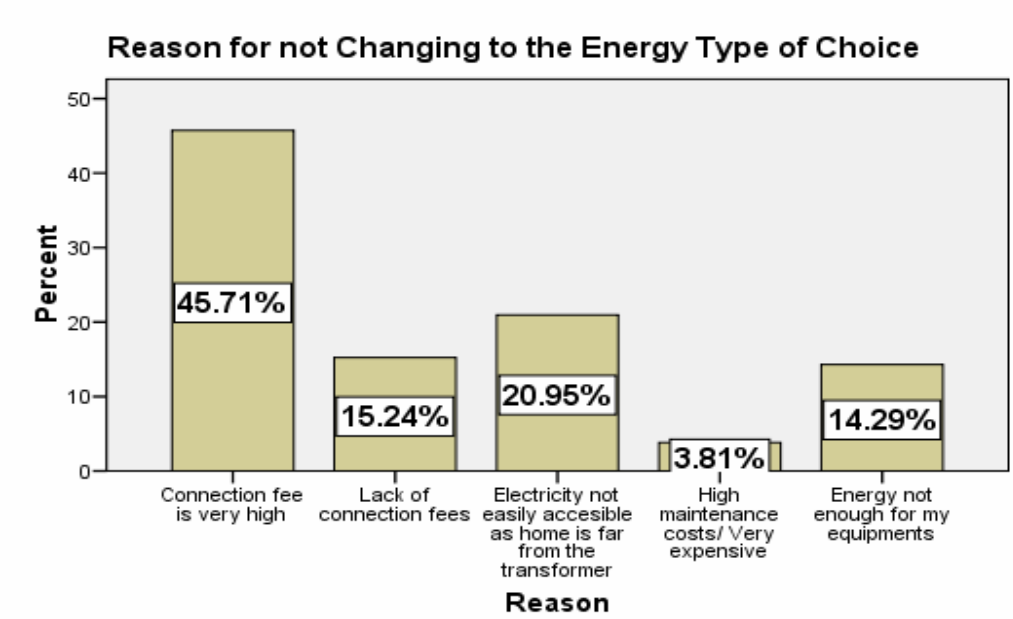


82.99% of the respondents said they would like to change to a different form of energy while 17.01% said they are satisfied with the kind of energy they are using comprising those already using electricity and some with Solar Home Systems.



Reasons given for not changing to energy type of choice are:

- Electricity connection fee is too high (45.71%)
- Lack of electricity connection fees (15.24%)
- Electricity is not accessible/ home is far from the transformers (20.95%)
- High maintenance cost/very expensive (3.81%)
- Energy not enough (14.29%)



3.1.12 Monthly household energy expenditure

The average monthly expenditure on electricity for those using is Kshs. 611/= with the minimum being Kshs. 100/= and the maximum Kshs. 1000/=. The majority of households spend Kshs. 300/= and Kshs 600/=.

The average monthly expenditure on rechargeable batteries for the households using is Kshs. 100/= with a minimum of Kshs. 50/= and a maximum of Kshs. 200/=. The majority of households spend between Kshs. 80/= and Kshs 100/=.

Expenditure on firewood for households using is Kshs. 1572/= with the minimum being Kshs. 100/= and the maximum being Kshs. 3500/=. Majority of households spend between Kshs. 800/= and Kshs. 2000/= on firewood.

Average monthly expenditure on kerosene is Kshs. 262/= with a minimum of Kshs. 50/= and a maximum of Kshs. 1000/=. Majority of households spend between Kshs. 200/= and Kshs. 500/=.

Household expenditure on energy

Energy type	No. of HHs	Minimum (Kshs)	Maximum (Kshs)	Average (Kshs)
Electricity	28	300	1000	610.71
Battery Charging	51	50	200	99.61
Firewood	111	100	3500	1572.07
Kerosene	137	50	1000	261.97
Dry cells	83	40	350	103.01
Gas	8	100	500	325.00
Charcoal	58	50	1000	509.48

Candle	11	20	70	41.82

Expenditure on dry cells on the average is Kshs. 103/= with a minimum of Kshs. 40/ and a maximum of Kshs. 350/=. Majority spend between Kshs. 50/= and Kshs. 100/=.

Average monthly expenditure on LPG is Kshs. 325/= with a minimum of Kshs. 100/= and a maximum of Kshs. 500/=. Majority of households spend Kshs. 500/=.

Average monthly expenditure on charcoal is Kshs. 509/= with a minimum of Kshs. 50/= and a maximum of Kshs. 1000/=. Majority of households spend Kshs. 500/=,

Average monthly expenditure on candles is Kshs. 42/= with a minimum of Kshs. 20/= and a maximum of Kshs. 70/=. Majority of households spend Kshs. 40/=.

The average number of rechargeable batteries bought by 82 households in the last five years is 2, with a minimum of 1 and a maximum of 5 batteries. The cost range was mainly between Kshs. 3001 to Kshs. 4000/= (34.94%); Kshs. 5000 and above (22.89%); Kshs. 4001 to Kshs. 5000/= (15.66%); Kshs. 2001 to Kshs.3000/= (13.25%); and only 13.25% costing Kshs. 2000/= and below.

Most of the batteries were purchased new (75.0%) with the second hand ones (11.9%), those who mixed old and new (13.1%). The average distance to the nearest battery charging facility is 1.24 km, with a minimum of 0.5km and a maximum of 3km.

3.1.13 Social and other amenities

The average distance travelled to the nearest market place is 1.4Km, the minimum being 0.4Km and the maximum 3Km. Majority (39.0%) of households travel 1Km to the nearest market place.

Average distance travelled to the nearest hospital is 13.8Km with the minimum of 1.3Km and a maximum of 25Km. Majority (24.5%) of households travel 6Km to the nearest hospital.
Average distance to the Maternity facility is 13.1Km, minimum of 1.3Km and a maximum of 25Km. Majority (24.8%) of households travel 6Km to the nearest Maternity facility.
The average distance to the nearest Shopping Centre is 1.4Km, with a minimum of 0.05Km and a maximum of 4Km. Majority (39.7%) of households travel 1Km to the nearest market.
The average distance to the nearest Health Centre/Dispensary is 2.1Km with a minimum of 0.4Km and a maximum of 4Km. Majority of households travel 1 Km (22.8%) and 4Km (24.8%) to the nearest Health Centre/ Dispensary.

Average distance in kilometres to the nearest social amenity

Social Amenity	No. of HH	Minimum (km)	Maximum (km)	Average (km)
Market place	154	.40	3.00	1.4
Hospital	155	1.30	25.00	13.8
Maternity facility	153	1.30	25.00	13.1
Shopping centre	151	.05	4.00	1.4

Health centre/ dispensary	145	.40	4.00	2.1
Water point	99	.005	2.000	.6
Grain mill	147	.03	7.00	1.3
Primary school	155	.10	3.00	1.6
Secondary school	153	.40	3.00	1.7
Church	135	.01	3.00	1.5

The average distance to the nearest water point is 0.6 Km with a minimum of 0.005Km a maximum of 2Km. Average distance travelled to the nearest hospital is 13.8Km with the minimum of 1.3Km and a maximum of 25Km. Majority (24.5%) of households travel 6Km to the nearest hospital.
Average distance to the Maternity facility is 13.1Km, minimum of 1.3Km and a maximum of 25Km. Majority (24.8%) of households travel 6Km to the nearest Maternity facility.
The average distance to the nearest Shopping Centre is 1.4Km, with a minimum of 0.05Km and a maximum of 4Km. Majority (39.7%) of households travel 1Km to the nearest market.
The average distance to the nearest Health Centre/Dispensary is 2.1Km with a minimum of 0.4Km and a maximum of 4Km. Majority of households travel 1 Km (22.8%) and 4Km (24.8%) to the nearest Health Centre/ Dispensary.

Average distance to the grain mill is 1.3Km with the minimum of 0.03Km and a maximum of 7Km. The majority (34.0%) of households travel 1 Km to the nearest grain mill.
The average distance to the nearest Primary School is 1.6Km with a minimum of 0.1Km and a maximum of 3Km. Majority of households travel 0.5Km (22.6%), 2Km (21.9%) and 3Km (19.4%) to the nearest Primary Schools.

The average distance to the nearest Secondary School is 1.7Km, with the minimum being 0.4Km and the maximum of 3Km. Majority of households travel 0.5Km (17.0%), 2Km (25.5) and 3Km (20.3%) to the nearest Secondary School. The average distance to the nearest church is 1.5Km with the minimum 0.01Km and a maximum of 3Km. Majority of households travel 2Km (32.6%) to the nearest Church.

Majority of households have access to piped water comprising 39.1%; rain water (33.0%), rivers (25.2%), boreholes/wells (2.6%). During the dry season majority of the respondents rely on rivers 61.9%, 17.0% of households still rely on piped water, boreholes/wells (13.5%), 6.7% rain water, and dams (0.9%). 115 respondents pay for water with an average monthly expenditure of Kshs. 213/=, a minimum of Kshs. 100/= and a maximum of Kshs.500/=.

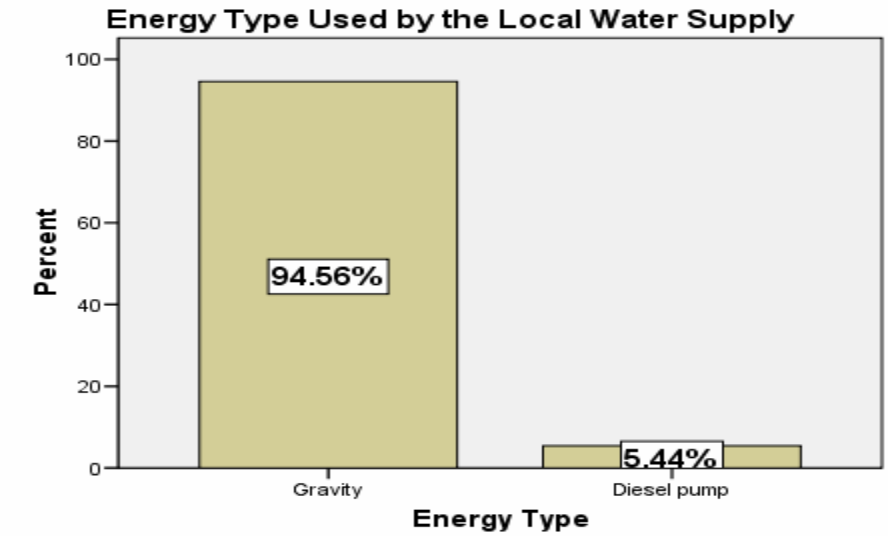
Responsibility for fetching water during the wet season falls on the women (38.8%), boys (23.0%), girls (21.1%) and father (17.0%). During the dry season, mothers fetch water most of the times (37.0%), followed by boys (25.2%), girls (24.6%), and men (13.2%).

Responsibility for fetching water during the wet and dry season

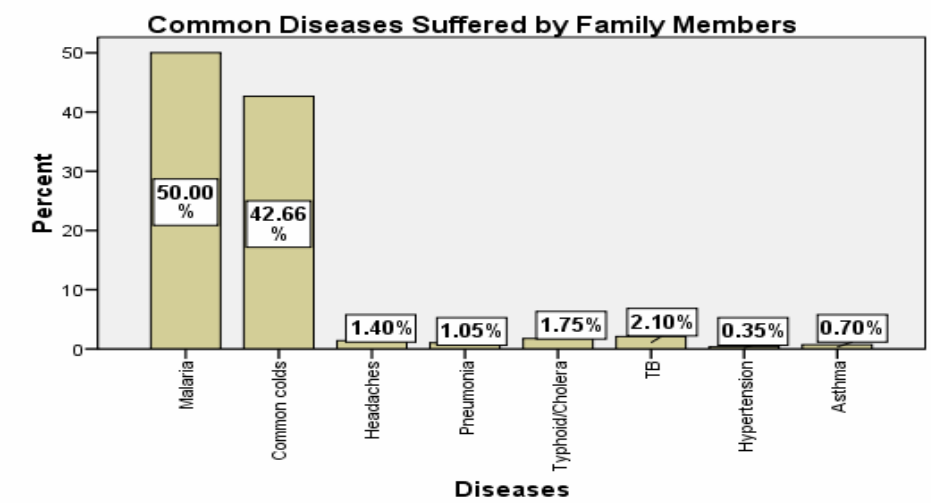
	Wet season		Dry season	
Responsible	Frequency	Percent	Frequency	Percent
Father	54	17.0	45	13.2

Mother	123	38.8	126	37.0
Boys	73	23.0	86	25.2
Girls	67	21.1	84	24.6

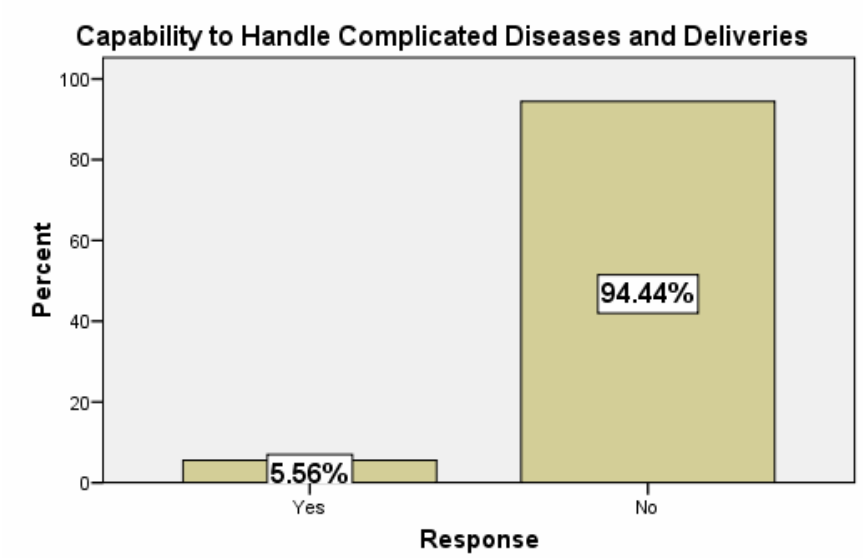
Water supply mainly runs by gravity (94.56%) and Diesel pump (5.44%).



The most common diseases suffered by family members are malaria (50.0%), common cold (42.66%), TB (2.10%), Typhoid and Cholera (1.75%). Others with negligible mentions include headaches, pneumonia, hypertension and asthma.



According to 94.44% of respondents, the local Dispensaries and health Centres are not well equipped to handle cases of complicated conditions and maternal deliveries. 5.56% of respondents said that the local Dispensaries and Health centres can handle complicated conditions and deliveries;



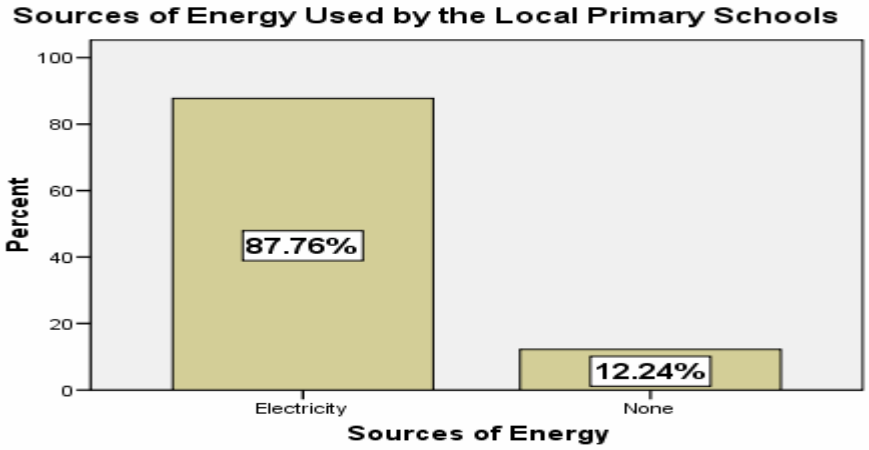
Reasons given to support inability of Dispensaries and Health Centres to handle complicated cases include:

- Not well equipped- lack of proper structures, equipment and facilities
- Lack of trained personnel to handle the cases
- Shortage of staff

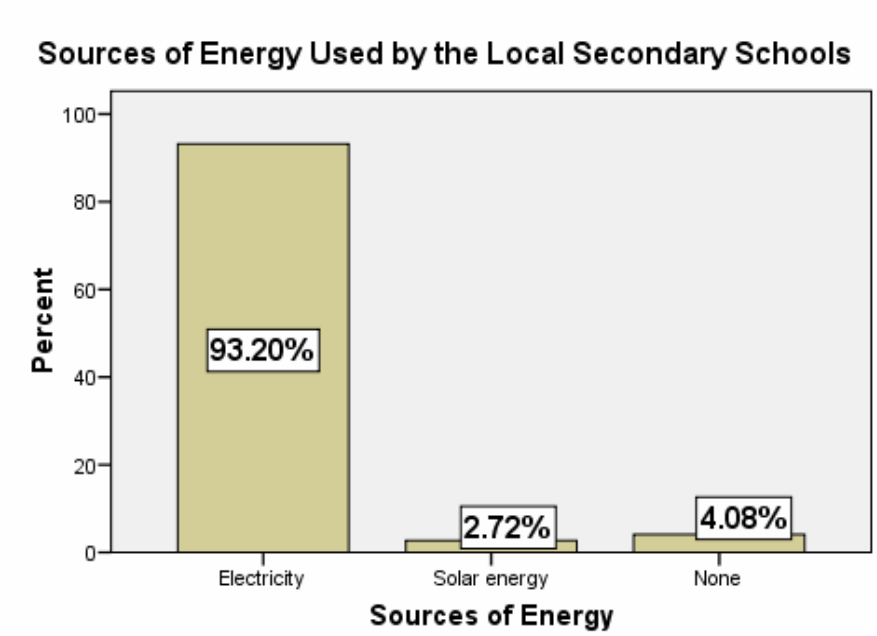
Reasons given to support ability of the facilities to handle complicated cases include:

- They use electrical equipment for testing diseases
- Experienced Doctors and Nurses available in case of complicated cases

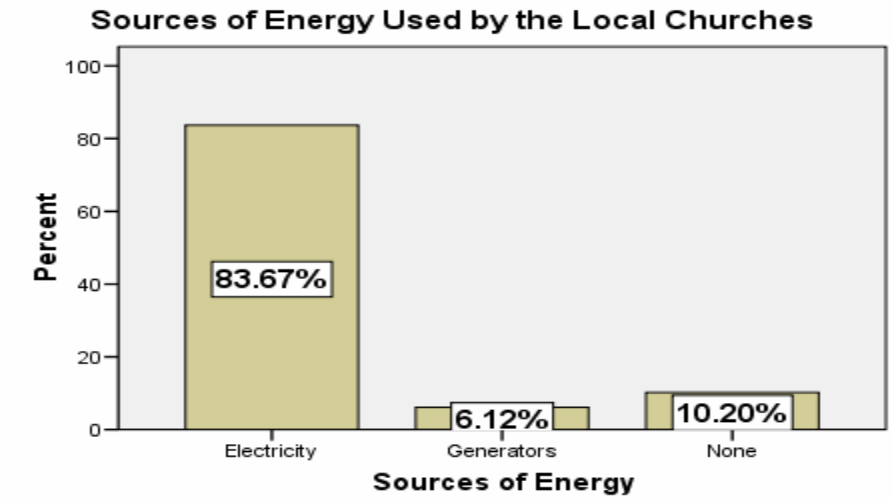
Source of energy mostly used by Local primary Schools is electricity according to 87.76% of the respondents, while the rest 12.24% do not use any energy type.



Local Secondary Schools mainly use electricity (93.20%); solar energy (2.72%); with 4.08% of Secondary Schools not using any energy type.



Sources of energy used by local churches include electricity (83.67%); generators (6.12%); with 10.20% of Churches do not use any energy type.



3.1.14. Businesses operated at market centres

The main businesses mentioned by respondents include general shops (23.5%), hotels (18.6%), clubs/bars/pubs (17.8%), butcheries (9.9%), hardware (6.5%), kiosks and canteens (4.9%), salons(3.2%), barber shops (3.0%), tailoring (2.7%), groceries (2.1%), health clinics and chemists (1.9%), Mpesa (1.3%), carpentry (1.1%), pool tables (0.9%), grain milling (0.8%), banks (0.8%), open air markets for clothes (0.6%), miraa dens (0.2%), and vehicle repairs (0.2%).

Female operated businesses/activities

Majority of respondents (23.2%) mentioned groceries as the main businesses run by women followed by general shops (16.5%), salons (14.4%), hotels (14.1%), clubs/pubs/bars (10.0%) tailoring (9.1%), Kiosks/ canteens (2.2%), Mpesa services (1.7%), wholesale shops (1.7%), open air market for clothes (1.4%), health centres and chemists(1.4%), grain milling (1.0%), selling maize and beans (0.7%).

Male operated Businesses/activities

Majority of respondents (15.5%) mentioned general shops as the main businesses run by men followed by butcheries (14.8%), clubs/bars/pubs (13.2%), barber shops (10.1%), hotels (9.9%), carpentry (7.8%), tailoring (5.4%), welding and panel beating (5.2%), shoe repair (3.7%), groceries (3.5%), grain milling (2.1%), pool tables (1.6%), garages/vehicle repairs (1.2%), kiosks/canteens (1.0%), electricity repair (1.0%), health centres and chemists(0.8%), driving cars (0.8%), miraa sale (0.6%), open air market for second hand clothes (0.4%), Mpesa (0.2%)and wholesale shops (0.2%).

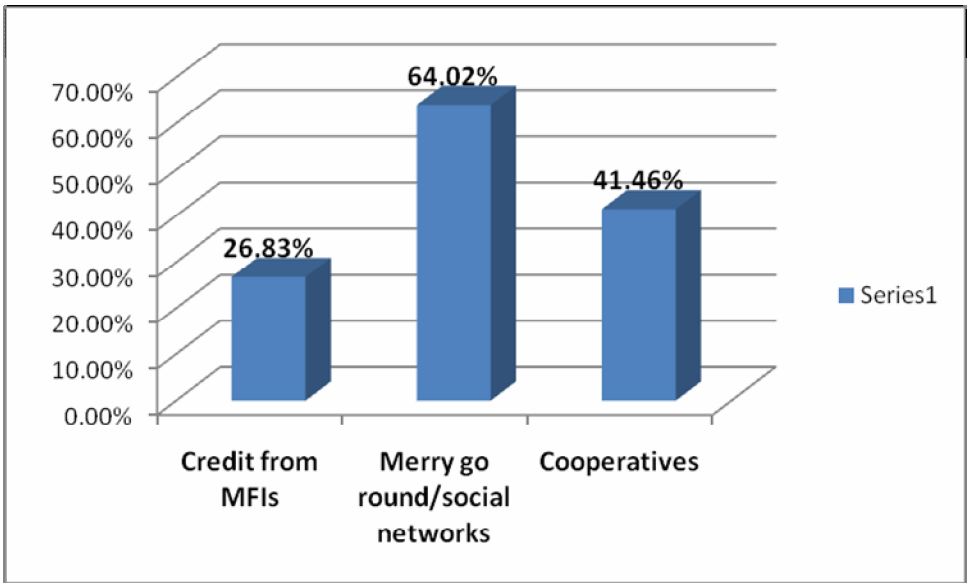
3.1.15 Value of electricity to improvement of livelihoods

The major ways that the respondent's think access to electricity will improve on the livelihoods of the people in their community include:

- Creating employment opportunities (30.4%)
- Improving security in homes and market centres (19.4%)
- Increasing business opportunities (18.0%)
- Improving lighting in homes (9.7%)
- Improving on livestock (8.3%)
- Improvement of agriculture (7.4%)
- Making people more enlightened e.g. by buying TV and Computers (2.3%)
- Reduces cost, time and energy spent on such services (1.8%)
- Reducing crime rate by opening business opportunities for the youth (1.8%)
- Making work easier since most will be done by machines (0.9%)

3.1.16 Access to financial facilities

64.02% of respondents said they have access to merry go rounds and social networks as a financial facility while another 41.46% said they have access to cooperatives and 26.83% have access to credit from MFIs.



4.0 Conclusions and recommendations

Only 28 households comprising 17.07% have access to electricity. Kerosene is the main type of energy used for lighting comprising 70.73% followed by firewood (20.73%); solar -10.98% and generators -6.10%. For residents without access to electricity, the approximate average distance from the nearest electricity line is 0.68km; with a minimum of 0.01km and a maximum of 8km. Majority of the respondents (39.7%) are 1km from the electricity line.
This means that majority of residents cannot be connected to mains electricity even if they wanted because of the distance. This is a need that the electrification project would address.

Majority of households (33.80%) earn an average annual income of between Kshs. 50,000/= and Kshs. 100,000/=; followed by 23.94% earning between Kshs. 100,000/= and Kshs. 150,000/=; 19.01% earn less than Kshs. 50,000/=; 13.38% earn between Kshs. 150,000/= and Kshs. 200,000/=; 9.85% earn Kshs. 150, 000/= and above. This indicates that majority of residents would be able to pay for electricity connection as well as for electricity once connected. In addition majority of residents belong to merry go rounds and cooperatives and are familiar with MFIs from where they can borrow money for connection. They also have very vibrant social networks that can support connections to their homes.

The most commonly owned electrical appliance is a radio which was found in 79.88% of the households and although mainly purchased by men, it is mostly used by all family members. Other appliances owned by households including TVs, Radio cassette players are also located in the sitting room most of the times in most of the households. All family members have access to and use of these appliances for information and entertainment most of the times. Access to electricity would encourage more households to purchase appliances which would result in increased access to information. Also since 70.73% of the households own torches access to electricity would reduce expenditure on dry cells for most households and this would also have a positive impact on the environment.

33.54% of the sampled households own rechargeable batteries. The average number of rechargeable batteries bought by the households over the last five years is 2. Most of the batteries were purchased new (75.0%) with majority of residents having invested substantial amounts of money to purchase and to charge. The average distance to the nearest battery charging facility is 1.24 km which is another cost. This demonstrates that there is demand for electricity and that people would be able to invest in connection as well as pay monthly bills as they are already investing substantial amounts in batteries and battery charging.

Decisions on the type of energy to use for lighting are mainly made by both husband and wife although sometimes either husband or wife makes the decision. It is therefore important that both women and men are involved during the implementation of the electrification project. Lighting is mainly located in all rooms including the kitchen and any electrification project should ensure that all rooms including the kitchen are lit to improve the working environment for women.

The main source of energy for cooking is fuel wood although a small proportion of residents also use kerosene. About a quarter of residents also use firewood for lighting. Majority of respondents obtain wood fuel from trees in their own farms, while others buy from the market or gather from nearby unused bushes. Women and girls are mainly involved in collecting firewood spending up to 3hrs. Considering that firewood is used for both cooking and lighting, access to electricity would reduce the time spent in collection for women and girls which would in turn leave free time for engaging in productive activities.

Majority of households have noticed change in the type and volume of energy they consume in relation to their family needs. The main changes are: firewood and kerosene are very expensive; high cost of energy sources; demand for energy has increased in the household; firewood is inadequate due to shortage of trees; other energy sources are far and not accessible; electricity fee is cheap; and expenditure on kerosene has reduced drastically after purchasing a Solar Home System. There is clear indication that once electricity is installed in households, expenditure on energy will reduce as it will replace kerosene for lighting.

82.99% of the residents would like to change to a different form of energy while 17.01% said they are satisfied with the kind of energy they are using comprising those already using electricity and some with Solar Home Systems. High electricity connection fee is cited as the main reason why most people are not connected. Others cited lack of electricity connection fees; lack of access to electricity / home is far from the transformers; high maintenance cost/very expensive and electricity not enough as the reasons they are not connected. This clearly demonstrates the large percentage of households who would be ready for connection electricity was available close to their homes. The project could consider financing mechanisms that would enable more households to connect to electricity, particularly those who are not connected because of lack of connection fees. There is also need to create awareness to residents on the savings that will be made by switching from kerosene and firewood to electricity for lighting in homes. Awareness and links to financing options mentioned earlier would increase the number of people benefiting from the electrification project.

The average monthly expenditure on electricity for those using is lower than expenditure on firewood. Combined expenditure on rechargeable batteries, kerosene, and firewood is much higher than expenditure on electricity. Switching to electricity would therefore result in savings on the energy budget. Further, reduction in fuelwood use would result in reduction of drudgery for women and girls as well as conservation of trees. Saved time can be used in other productive activities.

Residents travel long distances to amenities such as hospitals and maternities Access to electricity by health facilities (including Health Centres/Dispensaries) facilities would improve the quality of services and bring services closer to people. Majority of respondents said that the local Dispensaries and Health Centres are not well equipped to handle cases of complicated conditions and maternal deliveries because of lack of proper structures, equipment and facilities; lack of trained personnel to handle the cases; and shortage of staff. Access to electricity would result in improved facilities in Health Centres and Dispensaries hence easier access to good health services for residents. Electricity would also improve staffing facilities and attract qualified medical personnel.

Although majority of households have access to piped water, electricity could be used to pump water to people's homes in order to reduce the drudgery for those who fetch from the river. Majority of local Secondary Schools and Primary Schools use electricity but access would benefit those schools that are not connected. Those without access to electricity would greatly benefit from electrification. Local churches use both electricity and generators and those using generators as well as those with no access would benefit from the electrification project. Improved lighting in schools without electricity will result in better performance from increased study time.

Most residents are very aware of the benefits that electricity can bring to the community. Major benefits mentioned include improvement of livelihoods; creation of employment opportunities; improved security in homes and market centres; increased business opportunities; improved lighting in homes; improved livestock rearing; improvement of agriculture; more enlightened people e.g. by through watching TV and using computers. This will also reduce cost, time and energy spent on such services as well as contributing to reduced crime rate through creation of business opportunities for the youth.

There is a wide range of businesses operated at market centres that would greatly improve in terms of efficiency and profitability with access to electricity. Furthermore electrification would encourage setting up of new businesses and this would lead to increased jobs and improved livelihoods. The availability of power will trigger the demand for technical training especially in running machinery, welding, small business management etc. Residents are very aware of the benefits that access to electricity would bring to them and would need little convincing to get connected. In addition provision of electricity in market centres will lead to an improvement in the existing businesses as well as support establishment of new ones. The electrification project should also aim at creating awareness of these opportunities. The project could also consider collaboration with relevant ministries to support communities to establish and run such businesses.