SOURCES OF INFORMATION, LEVELS OF AWARENESS AND ADOPTION OF RENEWABLE ENERGY IN KEEKONYOKIE AND OLKERI WARDS, KAJIADO COUNTY

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DECLARATION

This is to declare that this research project is my original work and has not been presented for a degree in any other university for marking.

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This project has been submitted under my approval as the university supervisor

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ABSTRACT

This study explored the sources of information, levels of awareness and adoption of renewable energy in Keekonyokie and Olkeri wards in Kajiado County. The study sought to find out sources of information that can help guide provision of information on renewable energy to promote its uptake. The study was informed by the ecological model which describes the relationship between individuals and their environment at different levels of interaction. The results of this study showed that the level of information is more on the interpersonal level as the highest percentage of people become aware about these sources of energy through word of mouth. It was evident that there needs to be more effort in promoting awareness and enabling adoption on these types of energy at the institutional, community and policy levels. The study was also informed by the diffusion of innovations theory which explains how over time, an idea or product gains momentum and spreads through a specific population. A sequential exploratory design was used for the study where quantitative data was collected and analysed first, then the results used to inform the qualitative bit. Qualitative data was obtained using key informant interviews while quantitative data was obtained using surveys. A sample of 398 respondents was used for the study. This was arrived at by using Yamane's sample calculation formula. Cluster sampling was used to select respondents for quantitative data where the unit of analysis was households which were clustered according to sub-locations. For qualitative data, a sample of four respondents were chosen purposively. These respondents included two members of staff from Keekonyokie slaughter house and one from Ngong wind power station and one resident in Olkeri ward. During data analysis, qualitative data was recorded, transcribed and organised into themes then analysed descriptively. Quantitative data was processed by coding the closed ended questions and evaluating the information using the SPSS programme and the findings represented in frequency tables, percentages and graphs. This study focused on sources of information, levels of awareness and adoption of alternative forms of renewable energy including biogas, solar energy, briquettes and wind energy.It was found that word of mouth is the most shared source of information for renewable energy in Keekonyokie and Olkeri Wards. Television also ranked highly followed by formal education, social media and radio respectively. It was also found that that the level of awareness of renewable energy in the two wards increased with level of education. Elderly people aged sixty and above showed less awareness of renewable energy sources as compared to younger adults. It was also found that the most common form of renewable energy is biogas followed by solar power. People had very little awareness on wind energy and briquettes. The study also showed that availability and economic status were the main determining factors for the type of energy people chose to use. The study recommends that it is important to use interpersonal means to educate people about renewable energy as well as the mass media in order to reach a wider audience. To promote adoption of the renewable energy sources, the study recommends that relevant stakeholders should invest more in socio-economic activities involving these types of energy.

ACRONYMS AND ABBREVIATIONS

NGO	Non-Governmental Organization
LPG	Liquefied Petroleum Gas
GHGs	Green House Gases
WHO	World Health Organisation
KENDBIP	Kenya Domestic Biogas Program
KNBS	Kenya National Bureau of Statistics
MTOE	Million Tons of Oil Equivalent
FIT	Feed in Tariffs
SPSS	Statistical Package for the Social Sciences
KENGEN	Kenya Electricity Generating Company
CSR	Community Social Responsibility
SID	Society for International Development
BP	British Petroleum

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CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter presents a background research on renewable energy both globally and locally. The chapter also highlights data from the Kenya National Bureau of statistics which discusses the sources of energy for cooking and lighting in Kajiado County. Further, objectives have been highlighted and the problem of the study.

1.1 Background information

Renewable energy has presented opportunities for households in developing countries around the world. More than 1.5 billion people in third-world countries have not been connected to the electrical grid, therefore, depend on traditional fuels to carry out heating and cooking functions. Approximately 3 billion people depend on firewood and charcoal for cooking and heating purposes globally. (Langbein, 2017). While these fuels are readily accessible to households in rural locations, they are very harmful to the environment. For instance, the dependence on fuels such as firewood and charcoal leads to forest degradation as people have to cut down trees to make charcoal or process them into small branches or logs. Deforestation also causes climate change due to the lack of enough vegetation to absorb greenhouse gases such as carbon dioxide, nitrous oxide, and methane, which are present in our atmosphere. Breathing these compounds may cause breathing problems, cardiovascular illnesses, and cancer. The gases also pollute the air and compromise the quality of water in an area. Second, the increased use of traditional biomass fuels such as charcoal and firewood leads to deforestation as trees are cut down to produce logs and charcoal. The burning of these materials also generates indoor smoke, which causes respiratory problems such as bronchitis, pneumonia, lung cancer, and perinatal diseases. Smoke-induced illnesses result in more

than 4 million deaths globally every year (Langbein, 2017). The World Health Organisation (WHO) reports that this risk factor causes more deaths than tuberculosis or malaria (Langbein, 2017).

Besides, the use of traditional fuels such exposes families to the health hazards emanating from indoor air pollution. These negative effects and risks emphasise the importance of adopting and embracing green and inclusive energy technologies.

The concept of green or sustainable energy entails the supply and use of energy for the wellness of households with respect to conserving and regenerating scarce resources for future generations. While all forms of energy affect livelihoods and the environment, their extent varies. Renewable energy sources such as solar, wind, and biomass, for instance, are cleaner and friendlier to the environment as compared to energy from fossil fuels such as coal, diesel, and petroleum. Renewable energy is also advantageous because it reduces the costs that families would have incurred in healthcare by reducing harmful emissions in the air and enhancing water quality. Communities that adopt this form of energy will not face health risks such as breathing problems, different types of cancer and heart ailments, which are associated with fossil fuels. Third, renewable energy is beneficial as it reduces the overdependence of communities on imports such as oil. Generally, this form of energy is generated from naturally existing sources such as sunlight, biomass, water, and wind, which are usually readily available and inexpensive (Mohtasham, 2015). Locals can, therefore, access these sources easily.

Despite the opportunities that sustainable energy present, households in Kenya are yet to adopt them in mass. A majority of the population require electricity to heat, light, and cook. However, this form of energy is expensive and inaccessible as most rural areas are yet to be connected to the national grid. A report by Power Africa (2015)

established that only 20% of the populace had access to electricity as of July 2015. While the government has outlined plans to ensure that every Kenyan household has access to electricity by 2020, they have only focused on geothermal power production at the expense of other potential renewable energy sources such as biogas, briquettes, solar, and wind. In this regard, there is the need to marshal all stakeholders including citizens, policymakers, the government, and non-governmental organisations (NGOs) to enhance the access to relevant information concerning other sustainable energy forms such as wind energy, solar energy, briquettes and biogas. This study explores the different sources of information, levels of awareness and adoption of renewable energy in Keekonyokie and Olkeri Wards in Kajiado County.

The research uses Keekonyokie and Olkeri Wards in Kajiado County to explore different sources of information and how effective they are in enhancing uptake and use of green energy sources such as biomass, solar energy, and wind energy. The primary form of renewable energy for cooking in these two wards is biogas because dung, which is the main raw material used in the production of biogas, is readily available as the County is largely a pastoralist community. In addition, the fact that Kajiado County has an average annual temperature of about 19^{o}C and an annual rainfall of 500 millimeters makes its semi-arid conditions favorable for biogas digesters.

In an inequality report prepared by Ngugi (2013) and published by the Kenya National Bureau of Statistics and the Society for International Development – East Africa in 2013, it was shown that 1.1%, 1.1%, 0.0%, and 12.8% of residents in the county depend on electricity, biogas, solar, and liquefied petroleum gas (LPG) for cooking fuel respectively. In comparison, 18.5%, 25.2%, and 40.8% rely on paraffin, charcoal, and firewood for cooking and heating (Ngugi, 2013). In regard to lighting, 1%, 2.2%, 0.8%, and 0.4% of the residents depend on solar, fuelwood, pressure lamp,

and gas lamp for lighting. Lantern lamps, tin lamps, and electricity are the three dominant energy sources for lighting in the county with 18.9%, 35.7%, and 40% usage respectively. As expected in many counties in the country, the adoption of more 'advanced' energy sources in Kajiado County is gender-based. Most of the households headed by women in the county use 'less advanced' or 'traditional' methods. For instance, 53% of households headed by women use firewood for cooking while only 35% of homes headed by males use this cooking fuel (Ngugi, 2013). Similarly, more male-headed families (44%) use electricity for lighting as compared to female-headed households at 32%. This gender disparity is also characterized in aspects such as housing, access to water, income distribution, and access to health, education, and employment.

Levels of income in the county are unevenly distributed depending on the occupations held by households. For instance, approximately 33%, 14.4%, and 14.2% of residents are in work for pay employment, family business, and family agricultural holding respectively. (Ngugi, 2013). The distribution of individuals into work for pay and family business employment increases with a person's level of education with individuals with secondary or a higher level of education filling most of the positions. The pattern is reversed in family agricultural holding employment as people with no education or primary level of education occupying most of the positions.

This study will explore the sources of information that have been used to encourage households in the county to embrace sustainable energy sources in their day to day activities.

1.2 Statement of the problem

Despite the benefits presented by renewable energy, communities in Keekonyokie and Olkei are yet to adopt it in mass. Households in the area are still using

traditional techniques such as charcoal and firewood for cooking and heating purposes (KNBS, 2013). This is in spite of the fact that Kajiado County as a whole presents unique opportunities for effecting the use of renewable energy sources. For instance, given that communities living in the County are pastoralists, they can readily access dung, which is the primary raw material for the production of biogas, from their animals. The area's climate of approximately 19^{o}C temperature and 500 mm annual rainfall also provides semi-arid conditions favorable for operating biogas digesters, solar panels, and compressing and drying sawdust and coal dust to make briquettes.

Apart from a report published by the Kenya National Bureau of Statistics in 2013 that showed percentage distribution of households by source of energy for cooking and lighting, the researcher did not come across any studies that have been done in Kenya, to investigate sources of information, levels of awareness and levels of adoption of renewable energy. There is inadequate literature linked to sources of information and awareness levels on renewable energy. Scarcity of information on the subject of renewable energy could be a major causative for low levels of adoption and investment on renewable energy technologies. As shown by statistics from the KNBS, in 2013, adoption of these types of energy was still very low. We do not know if residents of Keekonyokie and Olkeri are aware about these types of energy, if so, what are their sources of information, and what is their level of awareness now?

Many problems will arise if this gap persists. First, communities will incur increased healthcare costs as they seek medical care, and the environment will continue to suffer the effects of deforestation and use of fossil fuels. Apart from exposing people and the environment to health hazards and degradation respectively, the persistence of the gap also causes communities to over-depend on oil and diesel, which are imported from foreign countries, at the expense of green energy, which can be generated from

raw materials and resources available in the locales. Enhancing communication with the public could increase public awareness on risk factors relating to the use of unclean energy as well as the benefits associated with the use and investment in renewable energy.

With the above acknowledgment, this study seeks to find out the sources of information, levels of awareness and levels of adoption of renewable energy in Keekonyokie and Olkeri Wards of Kajiado County, to help guide provision of information on different forms of renewable energy to promote their uptake.

1.3 Justification

Having access to information about green energy is critical to enabling citizens to more fully participate in discussions and activities aimed at increasing the supply of renewable energy and reduction of carbon intensive energy sources. This study will communication about green energy more efficient and effective. It will help in reducing the time spent on patient searching of information avenues that are most suitable for the provision of information on renewable energy in the area. The study will recommend sources most likely to yield desired outcome in the promotion of renewable energy.

1.4 Significance of the study

Theoretically, this study is of significance to communication scholars in terms of conceptualisation of communication techniques and strategies that would be effective in promoting the use of renewable energy.

1.5 Research objectives

The study is guided by the following objectives:

a) To examine the main sources of information on renewable energy in Keekonyokie and Olkeri Wards, of Kajiado County.

b) To investigate the level of awareness about renewable energy sources in Keekonyokie and Olkeri Wards, of Kajiado County.
c) To examine the levels of adoption of renewable energy in Keekonyokie and Olkeri Wards, of Kajiado County.

1.6 Research questions

The following research questions guided this study:

a) What are the main sources of information on renewable energy in Keekonyokie and Olkeri Wards of Kajiado County?
b) What is the level of awareness of renewable energy sources in Keekonyokie and Olkeri Wards of Kajiado County?
c) What is the level of adoption of renewable energy in Keekonyokie and Olkeri Wards of Kajiado County?

1.7 Scope and Limitations of the study

The research was conducted in Keekonyokie and Olkeri Wards, which are in Kajiado West and Kajiado North constituencies respectively. The study will be specifically focused on sources of information, levels of awareness and adoption of biogas, solar, briquettes and wind power in the two Wards.

Kajiado County has unique environmental and climatic conditions which are favorable for the production of biogas, solar and wind power. This study therefore cannot be replicated in other counties with different conditions. The study tested sources of information, levels of awareness and adoption of renewable energy in Keekonyokie and Olkeri wards of Kajiado County. The indicators that were tested include age and level of education. However, for future studies, it would be interesting to find out if other indicators like gender, location, and level of income, profession and

cultural background have any kind of influence on people's sources of information, level of awareness and adoption of renewable energy.

Operational definitions

Renewable energy	Energy generated from wind, solar, briquettes and biogas.
Wind energy	A form of energy produced by wind turbines.
Solar Energy	A form of energy obtained through panels designed to absorb the sun's rays as a source of energy for generating electricity or heating.
Briquettes	Blocks of compressed coal dust used for fuel.
Electricity	Power generated from the national electrical grid.

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter is a review the existing literature on renewable energy. The first section is a discussion of the theoretical framework and approach, which looks at the ecological model, the global energy movement and diffusion of innovations theory. The second section is a review of the global and local situation of renewable energy by discussing policy and legal frameworks, the cost of renewable energy, its implications on livelihoods, and the benefits they present to communities that use them. Lastly, it will look at how sources of information and levels of awareness influence adoption.

2.1 The ecological model

The ecological model describes the relationship between individuals and their environment. The environment influences individuals' behaviour and they impact their environment in turn. As discussed by McLeroy, K. R., Steckler, A. and Bibeau, D., (1988), the ecological model exists in five interconnected parts. The first one is the individual level. The individual facet of the ecological model concerns elements of the individual such as age, gender, attitudes, skills, beliefs and knowledge. For instance, an inequality report prepared by Ngugi, (2013) and published by the KNBS showed that the adoption of more 'advanced' energy sources is gender-based. Most of the households headed by women in Kajiado county use less advanced or traditional methods as compared to men who use more advanced methods. Other factors such as knowledge levels might also determine a person's choice of energy source. For instance, a person who is well informed about the health risks of using charcoal for example, may opt for cleaner sources of energy.

The second level of the ecological model is the interpersonal level. This level is concerned with the formal and informal social networks and social support systems,

including friendships, social groups, family, and work groups. For example, if one member of a family participates in a social group that discusses about renewable energy sources and their benefits, the individual could share this information with his/her family and therefore the whole family will benefit from this information that arose from the social group.

The third level of the ecological model is the institutional/organisational level. This comprises of social institutions and organisations. For example a school can be concerned for the wellbeing of children who have shown signs of health complications that arose from the use traditional energy sources at home. Because of this, they organise classes that will educate both the children and their parents about other cleaner energy sources for the families to implement at home. This is an example of the organisational level impacting families and individuals. The organisational level can include programmes, activities, policies and resources at a local level.

At the community level, which is the fourth level of the ecological model, are relationships between these organisations, as well as cultural norms and values. For example the same school that offers lessons about alternative sources of energy for the families, may be part of a coalition of community institutions that are trying to improve the health and quality of life of their community by using cleaner energy sources. Another factor on this level is to look at the pattern of community behaviour and thought. In the case of encouraging the use of renewable energy, this concerns the culture of the community in regard to the type of energy source. For example some communities have traditional ‘ovens’ made of stones and mud, and are sculpted in a very specific way to keep food warm throughout the day when they are out in the farm. These ovens use firewood. It might be difficult to convince locals in that community to change from this to biogas for example. This is because that will interfere with their social norm.

The public policy is at the highest level of the ecological model. They are laws and regulations that impact the masses. For example, Kajiado County government could enact polices that allocate funds or resources to social groups or individuals that have shown initiative towards investing in these types of energy to encourage the people to participate in economic activities involving renewable energy. Other policies could be those that restrict behaviour such as cutting down of trees.

2.2 Green energy movement: A global perspective

Renewable energy entails the use of renewable power such as solar, wind, hydroelectricity, geothermal and combustible renewables such as solid biomass and liquid biofuels. The primary objective of using renewable energy is to reduce the dependence on fossil fuels such as coal, petroleum, and diesel since their production and consumption leads to increased emission of greenhouse gases (GHGs) in the atmosphere. The World Bank has put great emphasis on sustainable energy because of its ability to foster economic growth and wider social development. Access to sustainable energy is crucial input for the attainment of multiple Millennium Development Goals (MDGs) including poverty and hunger eradication, promoting gender equality and women empowerment, combating diseases and child mortality, and promoting environmental sustainability (World Bank, 2013). The World Bank also recognises that gaining access to reliable power sources such as electricity improves the quality of life of both adults and children. Introducing modern heating and cooking solutions such as biogas and briquettes can transform the livelihoods of millions of livelihoods in developing countries as it eradicates cardiovascular and respiratory illnesses, which are triggered by the pollution associated with solid fuels such as firewood and charcoal. Developed and developing countries have adopted renewable energy in many processes including electricity generation. Statistics from British

Petroleum's (BP) website indicate that renewable energy sources, excluding hydroelectric energy, was responsible for about 8% of the total electricity generated around the world in 2016 (BP, 2016). Nevertheless, global power generation increased by about 40% as a result of renewable energy. Among the countries that lead in renewable energy consumption include the United States, India, China, Germany, Brazil, Spain, and the United Kingdom.

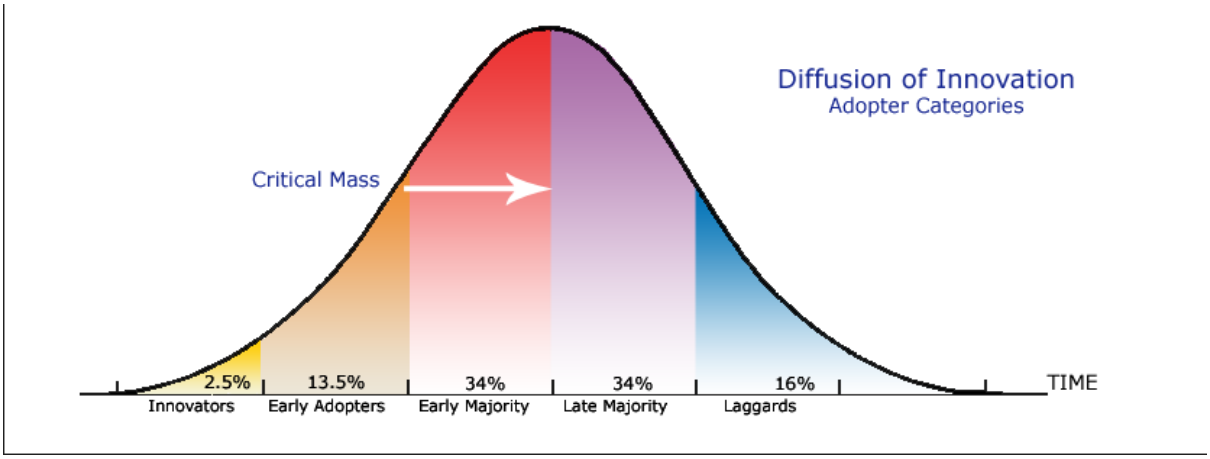
2.3 The Diffusion of Innovations theory

The diffusion of Innovations theory was first discussed in 1903 by French sociologist Gabriel Tarde (Toews, 2003) who contrived the S-shaped diffusion curve, followed by Ryan and Gross (1943) who introduced the adopter categories that were later used in the current theory promoted by Everett Rogers. The theory explains how an idea or product gains momentum and spreads through a definite social system or population, over time. Katz (1957) is also credited for his introduction of the notion of opinion leaders and opinion followers and how the media interrelates to influence these two groups. The Diffusion of Innovation theory is every so often regarded as a valuable change model for guiding technological innovation where the innovation itself is modified and presented in ways that meet the needs of people across all levels of the adopter categories. Apart from this, the theory stresses the importance of communication and peer networking within the adoption process.

In summary, diffusion of innovation is simply the process that occurs as people adopt a new way of life, product or idea. Rogers charted out this process, underlining that in most cases, an initial few are open to the new idea and adopt its use. As these early innovators 'spread the word' more and more people become open to it which leads to the development of a bigger group of people. Over time, the innovative idea or product becomes diffused amongst the populace until a saturation point is achieved.

Rogers distinguished five categories of adopters of an innovation: innovators, early adopters, early majority, late majority, and laggards. For the case of renewable energy for instance, the first individuals who adopt these energy sources are the innovators. These would be very first individuals to try out renewable energy technologies like for example briquettes which have only recently gained some popularity as the best alternative to charcoal and firewood especially for people in rural areas. Early adopters are those who try out new things and are not afraid to invest in new products. This group is considerably larger than the 'innovators' group and often they already know much about the product. Because of this knowledge, they play an important role in word of mouth advertising with respect to the new product. The early majority group are those that prefer to wait and see before making a purchase. The product is bought in large numbers by this group of people causing a landslide in demand. The late majority lags behind and will only buy the product after many other people have bought it and its popularity is already lessening. The last group, the laggards, are the group that does not like innovation or change. This group has to be very sure that they are not making a bad buy. The product is also sold less often in this 'late majority' stage. The original five categories are demonstrated in the bell-shaped curve image below. Rogers estimated the percentage of each category. These percentages are very similar to the proportions found in a normal bell-curve.

Figure 2. 1: Diffusion of innovation adopter categories



Source: Everett Rogers, (1962)

2.4 Renewable energy in Kenya

Despite Kenya's commitment towards adopting renewable energy, the country still lags behind in terms of overall capacity consumption. The three primary energy sources in the country are biomass (75%), petroleum (19%), and electricity (6%). In their study, Kiplagat, Wang, and Li, (2011) established that the total primary energy consumption in the country was approximately 3.6 MTOE (Million Tons of Oil Equivalent) as of 2007. Like in most developing countries, non-commercial biomass fuels such as charcoal and firewood were mainly consumed in the domestic sector by households, while the consumption of electricity and petroleum fuels was prevalent in the commercial, transport, industrial, and agricultural sectors. Despite having only 2% forest cover, nearly three-quarters of the Kenyan populace rely on biomass in the form of charcoal and wood fuel for cooking and heating. A report by Kamfor Company Ltd (2002) revealed that the demand for wood fuel in the country was increasing at about 3% per year while it could only maintain a sustainable supply of 0.6% annually.

Nevertheless, the government of Kenya, through the Ministry of Energy, and other for-profit and not-for-profit organisations like Hivos are encouraging households

to adopt renewable energy technologies to reduce the dependence on fossil fuels and traditional biomass fuels such as charcoal and wood, which are unclean, inefficient, and destructive to the environment. Biogas is one example of renewable energy technologies that have been adopted by households in Kenya. A biogas system derives energy from the anaerobic fermentation of solid wastes such as dung. During and after fermentation, the system yields methane, which can be used to produce electrical or heat power for households. In Kenya, the Kenya National Domestic Biogas Program (KENDBIP) aims at promoting the use of small-scale biogas systems by households. The initiative anticipates that encouraging the adoption of this innovation, families will reduce their dependence on firewood, charcoal, and kerosene (Porras, Vorley, & Amrein, 2015). According to estimates, Kenya has a biogas potential of serving about 1.25 million households (Kiplagat, Wang, & Li, 2011). This statistic is determined according to households that have the capability of accessing sufficient dung and water.

The other example of renewable energy with a great potential in Kenya is briquettes. Briquettes is a sustainable fuel produced by solidifying or compacting biomass waste from materials such as sawdust, maize cobs, wheat straws, paper, and coffee husks. These materials are mixed with a binding material like clay and compacted using a machine (GVEP International, 2010). The resultant material is then carbonised to eliminate a considerable quantity of smoke, which can pose health hazards to humans and animals during combustion in indoor settings. The carbonisation process functions by eliminating volatile compounds to achieve less pure carbon.

2.5 Policy and legal framework

While Kenya has quite a large share of renewable energy power production (above 60%), it heavily depends on hydro sources to generate its electricity. This trend has posed numerous challenges in terms of facilitating the provision of secure and

reliable energy services. For instance, Kenyan households have faced constant power rationing during drought seasons as most of the dams do not have enough water for power generation. Even though the country has not set an official target for renewable energy, it has outlined several legal and policy frameworks under the Sessional Paper No. 4 on Energy (2004), the Energy Act of 2006, and the Vision 2030 plan to steer its populace towards the production and consumption of sustainable energy (Federal Ministry for Economic Cooperation and Development, 2012). The Energy Act and the Sessional Paper emphasise the importance of renewable energy sources in facilitating independent and stable power supply in the country. The Act instructs the Minister of energy to advocate for the use solar, wind, biogas, and municipal waste among others. Through the Act, the Ministry of Energy in 2008 and 2010 issued a renewable energy feed-in tariff policy that would ensure that the Kenya Power Company, the country sole electricity buyer and distributor, will connect at least 0.3 GW (gigawatts) of wind energy, 0.2 GW of biomass energy, 0.1 GW of solar energy, 0.1 GW of biogas energy, and 0.5 GW of geothermal energy into the national grid system by 2028.

In a draft report by the Ministry of Energy and Petroleum (2015) and published on the Energy Regulatory Commission's website, the ministry outlined policies in regard to renewable geothermal, solar and wind energy. The government will continue to fund and support the development of geothermal power. It will also to promote research and development in geothermal power production and streamline licensing to attract investors in the projects. In addition, the government shall enforce compliance by setting up regulatory requirement to ensure the best technologies are used to develop geothermal power.

The government shall also promote research and development of biogas technologies by supporting domestic and community-based programmes that promote

the development of biogas systems. It will also oversee the rolling out of biogas programmes in public institution such as schools, hospitals, and prisons.

In regards to solar energy, the government will oversee awareness programmes that aim at promoting the use of solar energy in communities. It will also enforce regulation aimed at building codes on using solar systems to heat water and light electrical equipment in homes. In addition, the government will promote research and development on solar technologies in learning institutions. It will also enhance and enforce penalties for vandalism and theft of solar systems.

The government also oversee the development of institutional capacity for the use of wind technologies. It will provide organisations with incentives for the development of wind technologies. It will also invest in transmission lines to facilitate the linkage of wind energy to the national grid.

2.6 The cost of renewable energy

As stated earlier, the policy and legal frameworks of renewable energy in Kenya is guided by the Session Paper No. 4 of 2004 and the Energy Act of 2006 respectively. The government, through the Ministry of Energy, has formulated a feed-in-tariffs (FIT) policy to improve the generation of renewable energy. The policy outlines the rates to be charged for every unit of power produced through renewable means. According to a report by the Energy Regulatory Commission (ERC), Kenya has a wind potential of about 346 watts per square meter in some areas of Rift Valley, Coast, Nairobi, North Eastern, and Eastern provinces. Despite this potential, the country has only managed to harness a capacity of about 5 megawatts in the Ngong Hills wind plants. To mitigate this situation and enhance the exploitation of wind energy, the Ministry of Energy's feed-in-tariff policy charges 12 US cents for every kilowatt-hour (kWh) of electrical energy supplied and connected to the national grid (Energy Regulatory Commission,

2011). This duty applies to wind farms or plants with an effective generation capacity of between 0.5 MW and 100 MW. In regard to solar photovoltaic cells, the government allows private organisations a fixed tariff of 20 US cents per kilowatt-hour to supply solar power. Individual producers are allowed a rate of 10 US cents per kilowatt-hour for electricity supplied to the national grid. The FIT tariff also allows power suppliers to supply biomass energy to the national grid at a cost of 8 US cents per kilowatt-hour (Energy Regulatory Commission, 2011). In regard to geothermal energy, the Ministry of Energy charges a tariff of 8.5 US cents per kilowatt-hour of electricity for up to 70 megawatts of geothermal power supplied to the national grid. The average cost of electricity for a single moderate sized household is between ksh 1,000-2,500 per month.

The cost of solar on the other hand is fairly high in the installation stage because a part from investing on a professional expert, a solar power system consists of several units including the panel, the battery, a charge controller and an inverter. Depending on the load, which is the electrical component or portion of a circuit that consumes active electrical power, the number of batteries, panels and the size of inverter may vary. The minimal cost of a simple solar power system for a two bedroom house with no electrical equipment apart from TV and lighting is an average of Ksh 30,000.

According to report by the daily nation on September 8th 2018, to set up a biogas system, one needs to have a qualified biogas digester designer and equipment. Financial capability and manure-power consumption rate greatly determines the size of biogas and therefore, what one can invest. Waste from two cows would produce 12m^3 of biogas which is sufficient an average sized household with two burners for cooking at an average three hours daily .This would cost an average of Ksh 150,000. The cost of a briquette compressing machine is about ksh 70,000.

2.7 Renewable energy and livelihoods

Renewable energy presents several opportunities to households. For instance, it has the potential of improving the livelihood of women through economic and social empowerment. For instance, the prevalent use of briquettes for cooking and heating has presented an opportunity for women to turn it into an item of trade. Households in rural and urban areas use briquettes for various domestic purposes including heating and cooking. In the industrial setting, women who make briquettes can supply them to poultry farmers who need them to produce warm conditions for their chickens. Briquettes can also be sold to institutions such as schools and prisons that cook in mass as a replacement for unclean wood fuel. Households that manufacture briquettes can also export them to western countries for home heating during winters.

The use of sustainable energy also empowers women socially. For instance, the use of biogas improves the self-esteem of households as it gives them the feeling that they are leading healthy and positive lifestyles. Unlike wood fuel and charcoal, which pollute indoor cooking environments, women who use biogas spend less amount of time heating water and cooking meals for their families. They can, therefore, spend the spared time attending to other chores or social activities such as school functions, church, and women groups. They also do not have to worry about the spiraling costs of liquefied petroleum gas (LPG) and kerosene as biogas is relatively cheaper.

2.8 Benefits of renewable energy

Renewable energy has presented many benefits to Kenyans. For instance, it has led to the creation of employment opportunities for people who were previously jobless. As discussed earlier, individuals and organisations have ventured into the briquette business to generate income. In their report, Cohen and Marega, (2013) found that the briquette business in Kenya employs between 9 and 80 people per enterprise. Evidently,

this business presents individuals with an opportunity to earn income as laborers, distributors, brokers, or owners. Second, renewable energy benefits households as it gives them an opportunity to diversify their energy supplies. As discussed earlier, about 75% of Kenyans depend on biomass (wood fuel and charcoal), petroleum (19%), and electricity (6%) as their energy sources. New renewable energy technologies such as briquettes, biogas, and solar power allow them to reduce their overdependence on these sources. For instance, the installation of biogas systems in homes can provide households with alternatives for heating and cooking in case kerosene prices rise or weather conditions make charcoal or wood fuel inaccessible. Solar power might also help small-scale households in lighting in places where electricity is inaccessible. As documented earlier, only one-fifth of Kenyan are connected to the national grid. Third, renewable energy improves the health of households. Renewable energy technologies such as biogas, solar, wind, and briquettes are cleaner than charcoal, wood fuel, and kerosene. Thus, communities that use them are likely to avert cancer, respiratory, and other smoke-induced illnesses. Fourth, renewable energy reduces carbon emissions and environmental degradation. As discussed earlier, while Kenya has a forest cover of only 2%, nearly three-quarters of its population rely on wood and charcoal fuel as the primary source of energy. Naturally, the reliance on these archaic fuels results in the depletion of forests, thus, causes environmental degradation. Therefore, adopting renewable energy technologies will ensure our environment is protected for future generations.

2.9 Sources of information and levels of awareness for renewable energy

Few studies have been done targeting information sources and levels of awareness on renewable energy, however there are a few studies that have been done relating to sources of information and levels of awareness in different sectors. A study

done by Scholars at the University of South Africa and University of Zululand, sought to establish sources and channels of information access and use in the information and knowledge society; a case of informal sector women entrepreneurs. The study found that, although informal sector entrepreneurs possessed some information and communication technologies, their location, demographic composition, poor education, low economic status and occupation, negatively affect their ability to benefit fully from the information and knowledge society. (Veli, J. Janneke, M. Mabel, M & Dennis. O, 2012). From this study, it is clear that information technologies play a vital role in facilitating the creation, distribution, use, integration and manipulation of information at a rapid speed, making it easier to choose from different sources presented by this era. Another study done by Abdul Azeez O. Emmanuel and Fulorusho M. Ajide, (2015) investigated the levels of awareness and prevailing attitudes of the people of Oshodi, Nigeria towards biofuel energy. The study showed that 75% of the residents were aware about biofuel energy while a further 65% were willing to use the technology if it becomes available and an even greater number of respondents were willing to pay extra for their household to have biofuel energy.

2.10 Word of mouth as a source of information

A few studies have also been conducted to evaluate different sources of information. Jagdish N Sheth discusses three areas of research which provide a bulk of evidence to support the powerful role that word of mouth plays in the diffusion of innovations though an individual becomes aware of an innovation mostly from mass media, it is the word of mouth sources that are mostly utilised by the buyer at the critical stage of evaluating the innovation (Rodgers, 1962).

The second area of research is the hypothesis of the two step flow of communication which asserts that the mass media influences a small group of

individuals called opinion leaders, who in turn influence the masses (already aware of the innovation) to adopt the innovation (Katz ,1957). This finding provides evidence that community leaders have a lot of influence in driving change among in communities. In the case of Olkeri and Keekonyokie wards, local leaders can be very important in encouraging adoption of innovations on renewable energy.

The third area of research is discusses the influence of reference groups in the acquisition of products and services including innovation (Brooks & Bourne, 1957).

CHAPTER THREE

METHODOLOGY

3.0 Overview

This chapter focuses on the methodological approach of the study. The researcher discusses the study design, the location of the study, the research approach, data types and sources, population and sample, data collection tools and validity of the instruments used. This study is useful for researchers looking to analyse quality and quantity of information regarding renewable energy in Keekonyokie and Olkeri Wards in Kajiado County.

3.1 Study design

The design of a study refers to the way a researcher guards against, and tries to rule out, alternative interpretations of results (Punch, 2005). This study utilises sequential explorative design. The researcher collected and analysed the quantitative (numeric) data first. This was obtained by the use of questionnaires. The quantitative data explores the sources of information and levels of awareness of renewable energy in relation to the demographics of the participants.

The qualitative data was collected in the second phase to help explain or elaborate on the quantitative results obtained in the first phase. The second, qualitative phase builds on the first quantitative phase and the two phases are connected in the intermediate stage in the study. The rationale for this approach is that the quantitative data and their subsequent analyses provide general information about sources of information for renewable energy in the two wards and the qualitative data and their analyses refine and explain those statistical results by exploring participant's views in more depth through key informant interviews.

3.2 Study site and population

The study took place in Keekonyokie and Olkeri Wards in Kajiado County. Keekonyokie is located in Kajiado West Constituency while Olkeri ward is located in Kajiado North Constituency. The unit of analysis for quantitative data is households. Keekonyokie ward has approximately 9,328 households while Olkeri ward has 11,049 households. Questionnaires were administered to a sample of this population in order to obtain quantitative data. For qualitative data, key informant interviews were carried out on a selected sample of four individuals.

3.3 Research approach

The mixed method approach was used in this research. As Creswell and Plano Clark (2007) state: "The term 'mixed methods' refers to a methodology of research that advances the systematic integration, or 'mixing,' of quantitative and qualitative data within a single investigation or sustained program of inquiry. The basic premise of this methodology is that such integration permits a more complete and synergistic utilisation of data than using either quantitative or qualitative data collection or analysis individually".

There are many advantages to using a mixed method approach, one being that it helps to provide a more in-depth understanding of the problem as well as provide rich datasets. It also assists to increase the reliability and credibility of findings through triangulation. Triangulation in research is the use of more than one approach to researching a question, (Cohen & Manion, 2000). The objective is to increase validity in the findings through the validation of a proposition using more than one measure. The combination of findings from two or more rigorous approaches provides a more comprehensive picture of the results than either approach could do alone.

3.3.1 Quantitative data

Quantitative data was obtained by carrying out a survey. This quantitative approach was mainly targeted at quantifying frequencies on information sources, levels of awareness and levels of adoption of renewable energy in relation to the demographics of the public. The quantitative data was used to convey facts and reveal patterns in this research by producing results that generalise results from a larger sample population, compare and summarise.

Questionnaires were the instruments of data collection. These questionnaires were distributed to individuals in homesteads which were sampled according to sub locations. Each sub location was represented by 44 households. Each individual who received the questionnaires represented a single household. The questionnaires had four sections. The first section (A) contains biographical information which included name, age, and area of residence and level of education. The second section (B) contains information about levels of awareness and information sources. The third section (C) contains information about sources of energy for daily needs while the last section (D) contains information about factors influencing choice of energy for daily needs.

3.3.2 Qualitative data

Qualitative data was obtained from key informant interviews and was designed to provide responses to questions that arise from findings obtained from quantitative data. It was also designed to gather expert opinion about sources of information, awareness levels and levels of adoption of renewable energy in the area. The researcher will use an interview guide to collect qualitative data. The information derived from the interviewees were aimed at revealing expert opinion on the different sources of information, levels of adoption and factors influencing this adoption. The interviews also sought to find out if there are any communication campaigns in the area that have

been used by stakeholders to encourage the use of renewable energy. In addition to this, the interview also sought to find out, from the key informant interviews, if there are any organisations that are actively involved in the promotion of renewable energy in the area. Apart from this, the study also sought to find out from the key informant interviews if there are any socio -economic activities associated with renewable energy and finally, their expert opinion on what can be done to improve awareness and ultimately, adoption of renewable energy.

The researcher used an interview guide (See Appendix II) to help her ask specific questions relating to the research objectives. After a prior arrangement on phone, the researcher met with participants at an agreed venue and time for the key informant interviews. An audio recorder was used to record the interviews which were later transcribed. The interviews took place in three different locations. The first one was at the Ngong Hills wind power station. There, the researcher interviewed a member of staff of Ken-Gen who is an operations manager. The second interview took place at the Keekonyokie slaughter house where two administrators were interviewed. The third respondent was a resident in Olkeri Sub location who makes briquettes out of charcoal dust and uses the briquettes for his chick farming business.

3.4 Research method

Research methods can be in the form of experiments, action research, surveys, ethnography, archival methods, grounded theory and case study. This research used the case study method. A case study is a tool employed to study a selected social phenomenon. It has been frequently used in explanatory and exploratory research (Saunders, Lewis and Thornhill, 2009). Case studies can collect data using single methods or mixed methods (Eriksson, and Kovalainen, 2008). The aim of this research

was to have data that would unearth sources of information, levels of awareness and levels of adoption of renewable energy in Keekonyokie and Olkeri Wards.

3.5 Data types and sources

Both surveys and key informant interviews provided primary data. Quantitative data was obtained from the use of questionnaires. These questionnaires were filled by individuals aged 15-65 and who were sampled by households and gender. Qualitative data was obtained from key informant interviews. Participants for key informant interviews were members of staff at the Ngong Hills Power station and Keekonyokie slaughter house which hosts the Keeko –Bio project. One resident in Olkeri ward was also interviewed. He is involved with the production of briquettes.

3.6 Sample size and sampling procedure and data collection

Sampling is the process of selecting a few (a sample) from a bigger group (the sampling population) to become the basis for estimating or predicting the prevalence of an unknown piece of information, situation or outcome regarding a bigger group. (Kumar, 2005).

3.6.1 Sample size

Olkeri Ward has a total of 11,049 households while Keekonyokie Ward has 9,328 households. The total population for the two wards is 20,377 households.

The sample size for the two wards was calculated collectively using Yamane's sample calculation formula.

Therefore:

$$\boldsymbol{n = \frac{N}{1 + N(e)^2}}$$

Where $\boldsymbol{n = corrected\ sample\ size, N = Population\ size}$ $\boldsymbol{and\ e = margin\ of\ error(M.o.E) = 0.05\ based\ on\ the\ reserch\ conditions.}$

$$\frac{20,377}{1 + 20,377(0.05^2)}$$

$$n = 398$$

3.6.2 Sampling procedure

The study used purposive sampling for qualitative data while cluster sampling, which is a probability sampling technique, was used for quantitative data. 'For a sampling design to be called a random or probability sample, it is imperative that each element in the population has an equal and independent chance of selection in the sample.'(Kumar, 2005). A sample of 398 households was used for the survey. These households were clustered according to the sub-locations within the two wards.

3.6.2.1 Cluster sampling

Cluster sampling involves dividing a sample population into groups. In this study, the sample population which is 398 household units were be divided according to sub-locations within the two wards. According to information obtained from soft Kenya website, Olkeri ward has a total of six sub-locations namely Matasia, lower Matasia, Nkoroi, Olosurutia, Kahuho and Olkeri. While Keekonyokie has three sub locations namely Keekonyokie, Oloikarere and Olosharo. 44 respondents were picked purposively for each cluster. Each cluster was represented by 44 households. Each household was represented by one respondent aged 18-64.

3.6.2.2 Purposive sampling

Purposive sampling was used to select respondents for qualitative data. Four respondents were chosen for key informant interviews. Two of these respondents were from Keekonyokie slaughter house which is host to the Keeko biogas project. One was from Ngong Hills wind power station, and the final respondent was a resident of Olkeri ward.

3.6.3 Data collection

The researcher started by collecting quantitative data from 398 respondents in the two wards. This sample population was divided into clusters. Each of the clusters, was represented by a single sub location. Both Keekonyokie and Olkeri are peri-urban areas and some areas, especially around the shopping centres, are very populated with the main housing units being rental houses. The researcher excluded rental apartments and single room units that were within the shopping centres and concentrated on free hold homesteads in the surrounding areas. This is because there is a higher probability of integrating these sources of energy in free hold homesteads rather than rental housing units where the main sources of energy is electricity for lighting and LPG gas for cooking. This ensured that the information obtained from the respondents was not homogeneous.

The researcher also excluded respondents that were younger than 18 years of age, where necessary, the researcher and her four research assistants would help respondents understand the questions by explaining or translating the questions. This was especially for respondents who were poor in English. It was however noted that a majority of the respondents were able to communicate in these two languages.

The researcher and her assistants accessed respondents by going door to door. They would knock on the gates or doors of residents and started by introducing themselves and the purpose of the visit. If the respondents agreed to it they would proceed to give them questionnaires. Where respondents did not meet criteria for selection, for instance when they found children the researcher and her assistants would ask if there is any adult around, if not, they would leave. The survey started from Keekonyokie sub location which is known for Keeko Biogas project at the Keekonyokie slaughter house. The Keekonyokie slaughter house is located in a

somewhat populated shopping centre with many housing units being business premises and rental houses. Although the Keekonyokie slaughter house is the main centre of activity, the researcher did not focus here, instead she sought respondents in the surrounding, less populated areas. The researcher then proceeded to Kahuho and Nkoroi sub locations which are located along Magadi Road. (See appendix IV: Line transect of Keekonyokie and Olkeri wards).The other sub locations which are located along Forest line Road followed. These were Oloosurutia,lower Matasia Upper Matasia and Olkeri. Lastly, the researcher concluded with Olosharo and Oloikarere Sub-locations which were more remote. For qualitative data, the researcher pre-arranged the key informant interviews on phone after obtaining the respondents' phone numbers during a pre-visit. On the date of the interviews. The researcher communicated with the interviewees on phone and agreed on the venue and time of the interviews. The interviews were recorded on a mobile phone voice recorder.

3.7 Data collection tools

The main tools of data collections were questionnaires and interview guides. According to Wellington (2000), in carrying out a research, a researcher should use methods which provide high accuracy, generalisability and explanatory power with minimum management. The instruments supplement each other to close the gap which might be left if one instrument only is used. The researcher was guided by the study objectives when constructing these instruments.

3.7.1 Structured questionnaires

This study utilised self-administered questionnaires. The questionnaire (See appendix I) contained close ended questions which were specifically designed to provide answers to the research questions. The questionnaires were evenly distributed according to gender and sub locations. Since the unit of analysis was households, each

questionnaire represented a single household. The researcher then collected the filled questionnaires immediately to avoid losing track of the respondents, and to save time.

3.7.2 Interview guide

For the key informant interview, the researcher used an interview guide (See appendix 2) to help her ask specific questions relating to the research objectives. After a prior arrangement on phone, the researcher met with participants at an agreed venue and time for the key informant interview. A mobile phone audio recorder was used to record the interviews which were later transcribed.

3.8 Validity and reliability of the instruments

Validity, within the context of mixed methods is the ability of the researcher to draw meaningful and accurate conclusion from all of the data in the study (John W Cresswell, 2007) in terms of measuring procedures, validity is the ability of an instrument to measure what it is designed to measure (Smith, 1991). In this study, validity of the instruments will be measured by establishing a rational link between the questions and the objectives of the study. Items and questions will be designed to cover the full range of the issue or attitude being measured. In addition, the researcher ensured that the coverage of each issue or attitude is balanced; that is, each aspect will had similar and adequate representation in the questions or items.

3.9 Data analysis

The analysis was done systematically as per the objectives of the study. Since it was a sequential analysis, quantitative data was analysed first then followed by qualitative data. Quantitative data collected using questionnaires was processed by coding the closed ended questions and entering the data into the computer. This was analysed using the SPSS program.Qualitative data was recorded, transcribed and organised into themes.

3.10 Data presentation

Qualitative data was presented descriptively while quantitative data was presented in frequency tables, graphs and charts. Quantitative data that were collected using questionnaires was processed by coding the closed ended questions and entering the data into the computer to run a descriptive analysis including frequencies, percentages and graphs. Finally, summary, conclusion and recommendations of the study is discussed in chapter 4 and 5.

3.11 Ethics

The importance of ethical considerations is that they provide guidelines for the researcher to abide by while conducting the study. Furthermore, they ensure that trust and accountability are assured for the participants of the research. This study was carried out within specific ethical guidelines. The aim of this study was communicated to participants prior to engaging them in the research. Participants were assured of their privacy and participation was purely voluntary. The participants were also well assured that confidentiality and privacy would be maintained. The questionnaire did not include the address of the participants and names were optional. They were requested to give their consent to participate.

Before commencing field work, the researcher obtained a dully signed and stamped Certificate Of Field work (Appendix V) from the School of Journalism before proceeding to the field for collection of data. After a successful completion and submission of the study, a declaration of Originality Certificate (Appendix VI) was also issued to the researcher after inspecting, verifying and approving the originality of the study. A Certificate Of Corrections (Appendix VII) was issued to the researcher from the School of Journalism and Mass communication upon successfully effecting

the recommendations as proposed by the University of Board of Examiners after the final study defence.

CHAPTER FOUR

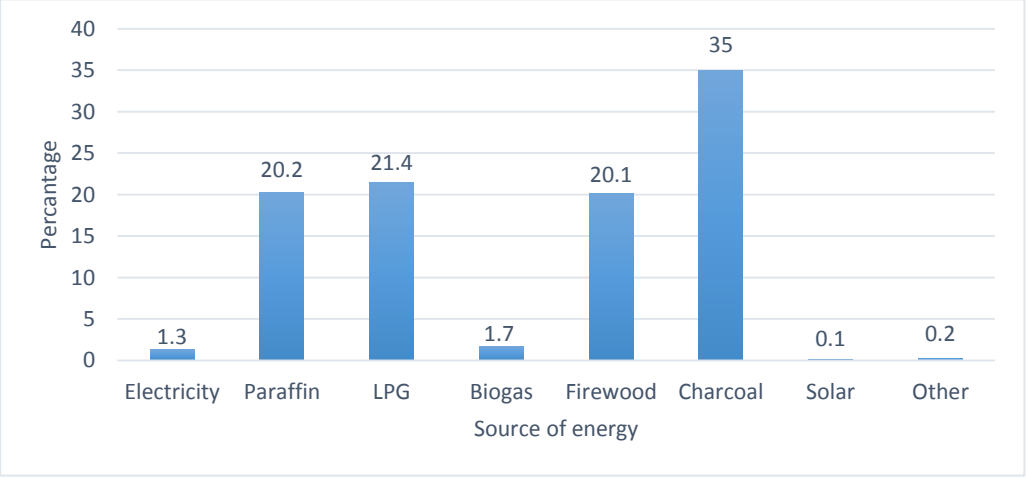
DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.0 Overview

This chapter discusses data representation, analysis and interpretation of sources of information, levels of awareness and levels of adoption of renewable energy in Keekonyokie and Olkeri Wards. While there are a wide variety of renewable energy sources, this study focuses on wind, solar, biogas and briquettes. The final product of wind and solar energy is electrical power but according to this study, electricity is defined as energy obtained from the national power grid, which could, in fact, include wind and solar energy. In this study though, wind and solar energy does not include that which is part of the national power grid; it is rather that which is generated in small scale by individuals.

A study by the Kenya National Bureau of Statistics (KNBS) in 2013 showed energy distribution for cooking and lighting in Olkeri and Keekonyokie wards. According to the findings, it is clear that adoption of renewable energy sources was still very low. Figures 4.1, 4.2, 4.3 and 4.4 illustrate this.

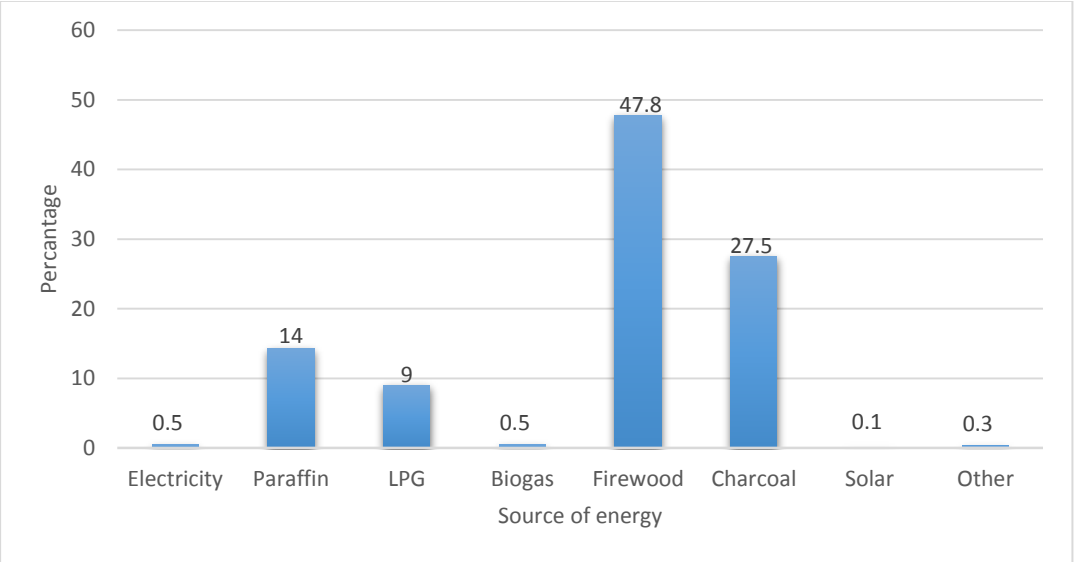
Figure 4. 1: Sources of cooking fuel in Olkeri Ward



Source: KNBS, (2013)

In Olkeri Ward, 35% of residents use charcoal as cooking fuel. 21% use LPG 20% use firewood while 20% use paraffin. The use of solar, biogas and electricity for cooking is very low.

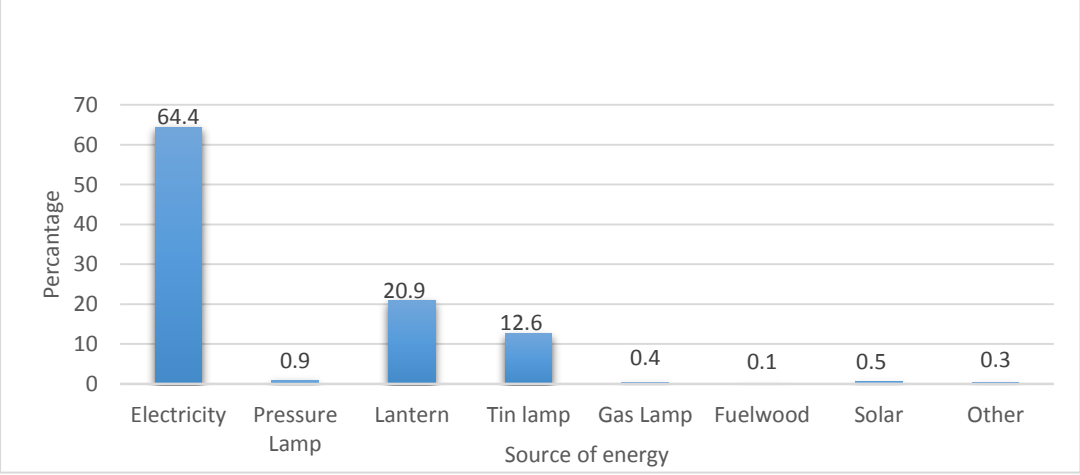
Figure 4. 2: Sources of cooking fuel in Keekonyokie Ward



Source: KNBS, (2013)

Similar to Olkeri, the most prominent source of cooking fuel in Keekonyokie is firewood at an average 48%. Charcoal follows at 28% paraffin at 14% and electricity and biogas at 0.5%.

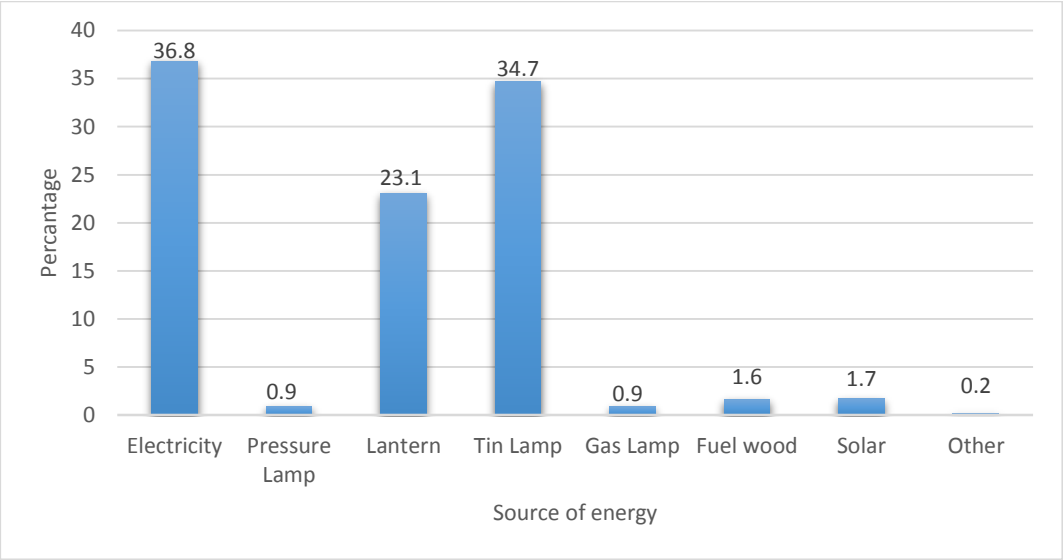
Figure 4. 3 : Source of lighting fuel in Olkeri Ward



Source: KNBS, (2013)

Electricity is the main source of lighting fuel in Olkeri Ward, leading at an average of 64%. Lantern follows at 21% and tin lamp at 13%.

Figure 4. 4 : Source of lighting fuel in Keekonyokie Wards



Source: KNBS, (2013)

From the graphs, it is clear that the use of solar and biogas, which are part of green energy sources on this study; were still very low as of 2013. It is also clear that although most residents have access to electricity, it is mainly used for lighting. Most people do not use electricity for cooking probably because of cost implications. They have opted for cheaper alternatives such as charcoal and firewood which are unclean and harmful to the environment.

According to the questionnaires (for individual households) and interview schedule (for key informants), the data was represented in four sections. The first section was the demographic characteristics of the respondents, this included age, and level of education. The second section looked at the levels of awareness and sources of information for renewable energy, the third section looked at sources of energy for daily needs while the fourth section will be a cross analysis. It is however important to note that electricity, which is the major source of lighting in the two regions, (KNBS, 2013)

was largely excluded in this study. This is because the study was focused on alternative sources of renewable energy that the locals can generate for themselves. LPG gas was also largely excluded in the study because it is neither unclean nor renewable. These sources of energy have however been mentioned in instances that show peoples energy preferences for purposes of comparison.

4.1 Sample size and response rate by place of residence

The study was conducted in two Wards, Keekonyokie and Olkeri. A total of 398 respondents filled questionnaires. A sample size of 216 respondents participated in the study in Olkeri and 182 represented Keekonyokie. Out of this, there was a total of 300 valid responses. 163 came from Olkeri and 137 were from Keekonyokie. Invalid responses came from unfilled questionnaires or questionnaires with missing information on age and level of education. Age and level of education was important for the researcher because she used these two indicators for the cross analysis. The total number of invalid questionnaires were 98. These were discarded.

Table 4. 1: Population distribution, sample size and response rate

Ward	Sample Size		Response rate	
	No.	Percent	No.	Percent
Olkeri	216	54.3	163	41.0
Keekonyokie	182	45.7	137	34.4
Total	398	100.0	300	75.4

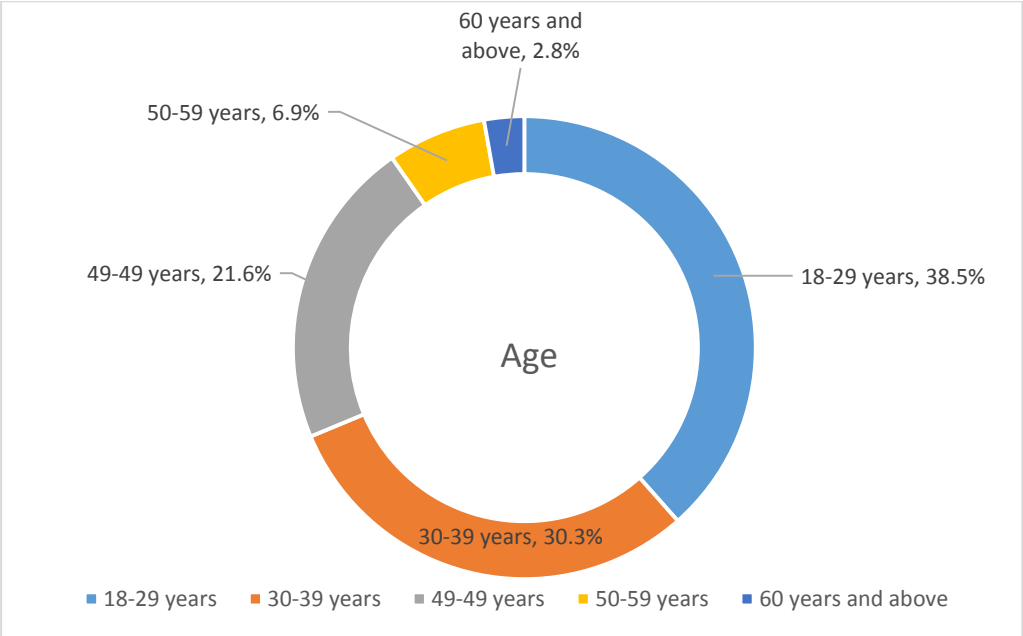
Source: Field survey, 2018

4.2 Age distribution by percentage

A majority of the population was 18-29 years. This was the highest majority which represented 38.5% of the entire population. Respondents aged 30-39 years followed at 30.3 % then 40-49 years at 21.6%. 50-59 years at 6.9 % and finally 60 and

above at only 2.8%. This is a collective representation of both Olkeri and Keekonyokie wards.

Figure 4. 5 : Age distribution by percentage

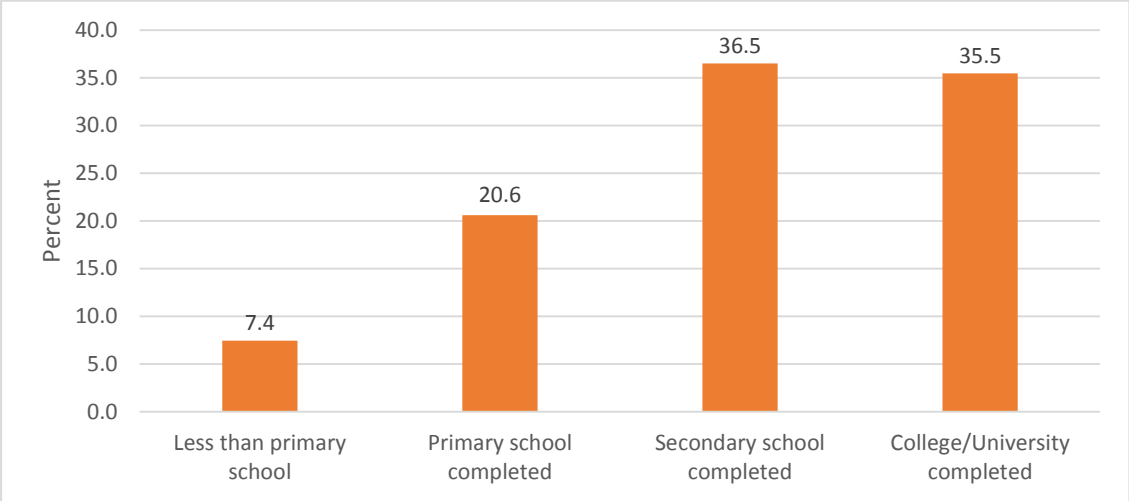


Source: Field survey, 2018

4.3 Level of Education

The level of education attained by the sampled respondents were categorised into pre-primary, primary, secondary and college/university. According to figure 4.6, a majority (36.5%) of Keekonyokie and Olkeri residents have completed secondary school. This is followed by 35.5% who have completed College or University. A further 20.6% have completed primary school while those who have less than primary level education stand at 7.4%. From this figures, it is clear that the level of education of residents in Keekonyokie and Olkeri is fairly high. The researcher wanted to find out if the level of education had any impact on levels of awareness, levels of adoption of renewable energy. The researcher also sought to find out how education levels determined a person's source of information and factors influencing their choice for these alternative sources of energy. (See 4.11.2, 4.11.4, 4.11.5 & 4.11.6).

Figure 4. 6 : Level of education of Keekonyokie and Olkeri residents



Source: Field survey, 2018

4.4 Level of awareness for wind, solar biogas and Briquettes.

The research sought to establish the levels of awareness of renewable energy in the area and information sources that enable this awareness. The main sources of information that were examined included word of mouth, TV, radio, social media, print media, professional source and formal learning**.**

Biogas was the most common form of renewable for the residents of Keekonyokie and Olkeri. At least 48% of residents stated that they are aware about biogas. For solar energy, 23.3 % of residents reported awareness about it. This was followed by wind at 18.2% and briquettes at 10.4%. The huge percentage of people who were aware about biogas, could be attributed to the fact Kajiado County as a whole is known to be a pastoralist community. Animal waste, which is the main raw material required for the production of biogas is readily available in the area. The results also showed that residents of Keekonyokie and Olkeri were fairly aware about solar energy, this was followed closely by wind energy. A very small percentage of residents had awareness about briquettes. (As Indicated in table 4.2).

Four key informants were interviewed. Two administrators at Keekonyokie slaughter house, the third respondent, is in charge of maintenance and daily operations at Ngong Hills wind power station and the fourth one is a resident in Olkeri, who produces briquettes for his chic farming business. The respondent from Ngong Hills wind power station stated that the media has been very instrumental in providing information about KENGENs efforts to diversify its energy mix to include wind power which currently contributes to about 10% of the total electric energy supply in the country. The respondent also added that KENGEN has a Corporate Social Responsibility (CSR) department whose main purpose is to educate the community about the importance of conserving the environment through the use of clean energy sources and the need by the government to achieve vision 2030 through generation of electricity. He further stated that although residents in the area may be aware of alternative clean sources of energy like wind and solar, they do not necessarily have an in depth understanding of these technologies and therefore awareness may not automatically lead to adoption. In the case of wind, solar, biogas and briquettes, the community around Olkeri and Keekonyokie would need interpersonal means of communication to enable physical demonstrations that may be critical in enabling a better understanding of these technologies. The informant however acknowledges that the level of awareness about green energy is also influenced by the level of education of individuals. This coincided with the results of the study (See discussion on 4.11.2).From the findings on level of education in figure 4.6, it was shown that more than 50 % of the residents in Keekonyokie and Olkeri have at least attained a secondary level education. This shows that the level of education in the Keekonyokie and Olkeri is fairly high. The question however, is whether level of education also is a major factor influencing people's choice of energy. (See discussion on 4.11.6)

Table 4. 2: I am aware about the following sources of renewable energy

Source of Energy	Frequency	Percent
Wind energy	79	18.2
Solar energy	101	23.3
Biogas	208	48.0
Briquettes	45	10.4
Total	**433**	**100.0**

Source: Field survey, 2018

The second respondent, a local who is involved with briquette production stated that people within Olkeri area do not have proper knowledge about green energy. In his neighbourhood for example, a few people have only recently begun to embrace this type of energy after he introduced it to them. He gained interest in briquette production after his chicks died from carbon monoxide poisoning. He had to seek an alternative source of energy and briquettes was the best option since it burns longer and does not produce smoke or carbon monoxide. He thinks that the media can be very instrumental in promoting these types of energy, although he has seen some advertisements on TV and social media, these were mainly by individuals and small business people. He thinks the Government has a greater capacity to scale up awareness through media promotion. He further suggested that the government can also, through relevant departments that are close to the people, organise market demonstrations to show the general public how briquettes are made and how they are used.

4.5 Main source of information for wind, solar biogas and briquettes

The results in this study show that word of mouth is the most common source of information for renewable energy as reported by 31.9% of the respondents, is word of mouth. This finding is in agreement with Jagdish N Sheth (1969) whose study on

‘Word of mouth in low risk innovations’ found three areas of research that provide a bulk of information to support the existence of the powerful role that word of mouth plays in the diffusion of innovations. The first area asserts that although people become aware of an innovation mostly from the mass media, it is word of mouth sources which are mostly utilised by the buyer at the critical stage of evaluating the innovation (Rogers, 1962). It will be noted that if all media channels in this study were to be combined, they would together have a considerably larger percentage as sources of information for renewable energy. It is therefore true that most people become aware about new innovations from the media, but few can agree on a specific media type; however, a very large percentage agree on word of mouth as being their main source of information for these innovations.

Other sources of information identified by respondents included the Tv, radio, social media, print media, professional source and formal learning. From the key informant interviews, one respondent who makes briquettes for his chic farming business stated that through his briquette business, neighbors have become aware about this type of energy through word of mouth. He has received positive feedback from neighbors who have tried his product. He also said that the media is an important source of awareness because of its capacity to reach a greater audience.

Another respondent from Keeko Biogas project noted that residents in the surrounding area are pretty conscious about biogas due to the frequent attention the slaughterhouse has received locally and beyond. Although he was not sure about levels of awareness beyond Keekonyokie, he noted that efforts have been made by various interest groups to educate the community within the area about biogas production and some have even provided resources to some residents for this objective. Regarding the media as a source of information, he had a rather controversial response. He stated that

Keeko biogas project has gained some media attention, different media personalities and stakeholders have visited the project site to get more insight about the project. Despite this publicity, they are yet to reap any benefits. First, researchers who have visited the site never bring back any feedback for the information they gather, media personalities also make news stories and documentaries about the project but instead of getting positive attention, they have accused the media of stealing their ideas and selling them to competitors. For this reason, they no longer allow the media in the premises. He further stated that many researchers have also visited the site for information about the project but none of them have ever given them any feedback. Because of this, he was reluctant to divulge information about the project itself and only mentioned that although have made steps towards commercialising the biogas, they have still not met prerequisite standards to package and sale**.** They are currently only using the biogas project as a waste management system and not a source of energy.

A key informant from Ngong Hills wind power station noted that KENGEN has a CSR programme whose main aim is to educate the public about green energy by organising gatherings with the local community leaders. This observation supports the second area of Jagdish N Sheth's research on which asserts that mass media influences a small group of people called opinion leaders who in turn influence the masses through word of mouth (Katz, 1757). This is also in agreement with the third area of research which found that reference groups can influence the acquisition of products and services including innovations. (Brooks 1957; Bourne 1957). Television was also ranked relatively high followed by formal learning social media, radio and print media respectively.

22% of participants reported that they got information about renewable energy on Tv, 10.4% on radio, 13.3% on social media, 5.5% on print media, 3.5% on professional source and 13.6% on formal learning.

Table 4. 3: Main source of information on renewable energy

	Responses		Percent of cases
	N	Percent	
Word of mouth	129	31.9%	50.4%
Television	89	22.0%	34.8%
Radio	42	10.4%	16.4%
Social media	54	13.3%	21.1%
Print media	22	5.4%	8.6%
Professional source	14	3.5%	5.5%
Formal learning	55	13.6%	21.5%
Total	405	100	158.3

Source: Field survey, 2018

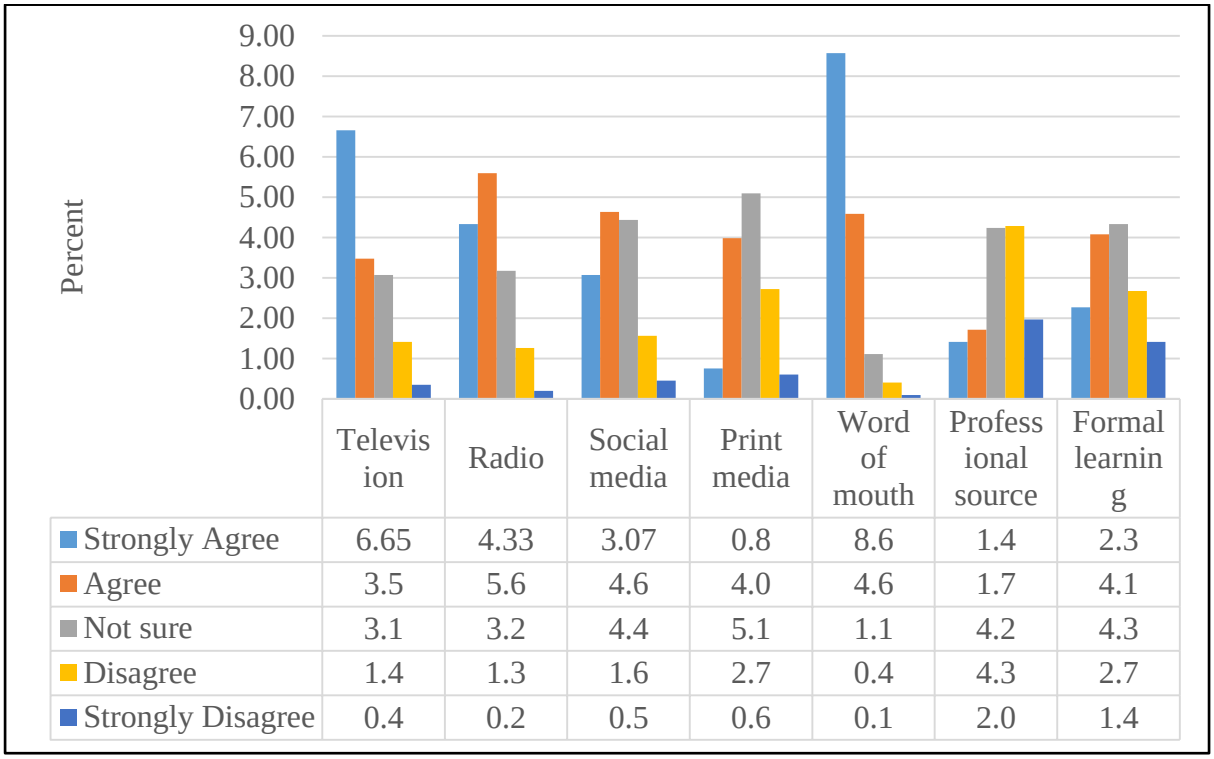
The ecological model (Look at 2.1) discusses the multifaceted and interactive effects of personal and environmental factors on people's sources of information, levels of awareness and adoption of renewable energy. From the findings, it is clear that a high percentage of people get information from word of mouth because a lot of interaction occurs at the interpersonal level. Because of this, adoption of renewable energy sources mostly occurs as a result of one on one interactions. Although word of mouth has influenced people's levels of awareness and adoption, there hasn't been much influence from the institution and community levels. For instance, only 13% of

residents reported awareness from formal learning, and 3.5% from professional sources.

4.6 Quality of information sources

Participants indicated their level of agreement in regards to the information sources being of high quality or low quality. According to table figure 4.7, majority of the respondents were in agreement that word of mouth is of high quality. Tv and radio also ranked highly as quality sources of information. This was followed by formal learning then professional source. Social media and print media ranked almost equally. The responses are indicated in figure 4.7.

Figure 4. 7 : Quality of information sources



	Television	Radio	Social media	Print media	Word of mouth	Professional source	Formal learning
Strongly Agree	6.65	4.33	3.07	0.8	8.6	1.4	2.3
Agree	3.5	5.6	4.6	4.0	4.6	1.7	4.1
Not sure	3.1	3.2	4.4	5.1	1.1	4.2	4.3
Disagree	1.4	1.3	1.6	2.7	0.4	4.3	2.7
Strongly Disagree	0.4	0.2	0.5	0.6	0.1	2.0	1.4

Source: Field survey, 2018

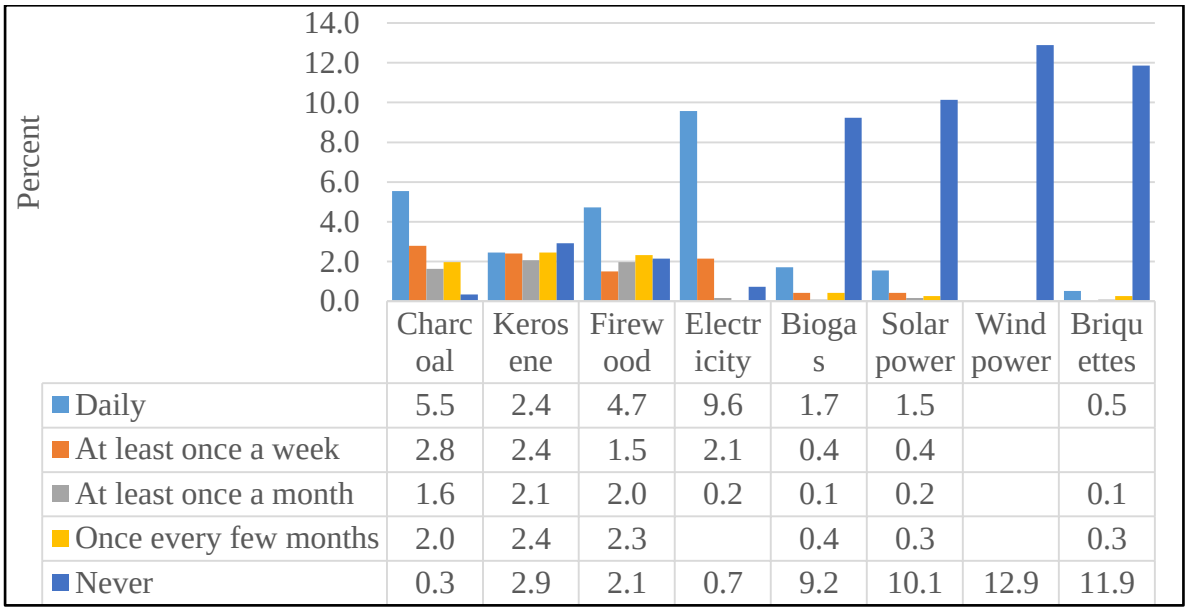
4.7: Sources of energy for daily needs

Participants were asked to indicate their source of energy for daily needs. Electricity was the most prominent source for lighting. This is because most areas in Keekonyokie and Olkeri have electricity lines connected to the national grid. Using electricity is easier and more convenient to most people in these areas. This is also because electricity for lighting is fairly affordable as compared to other sources such as solar power which require a substantial amount of capital for installation (look at 2.6).Charcoal on the other hand is the most prominent source of energy for cooking. This is because it is a cheaper alternative to electricity and more preferable to firewood which is smoky. It is however important to note that LPG gas which is a fairly common source of energy for cooking was not included in this question. This is because LPG gas is neither sustainable nor unclean and was not the main focus in this study. The results showed that biogas, solar power and briquettes had the least frequent usage. For instance 9.2% of respondents reported that they have never used biogas, 10.1% never used solar power, 12.9% never used wind power and 11.9% have never used briquettes. None of the respondents reported to have used wind power for their daily needs. It is clear that even though there is some awareness on the ground about these types of energy, adoption is still very low and in the case of wind energy, there is zero adoption.

A key informant from Ngong Hills wind power station stated that it is possible for individuals to have their own small wind turbines for electricity generation. The only important factor for consideration is that there should be no obstruction to wind. In regard to cost, he noted that the cost of setting up a wind turbine is not much different from solar. Briquettes accounted for less than 1% usage. This is a very small percentage given that briquettes are much cleaner than the alternative, charcoal, which 5.5% of the

population indicated that they use daily. Only 0.3 % of the population reported that they never use charcoal.

Figure 4. 8: Sources of energy for daily needs



	Charcoal	Kerosene	Firewood	Electricity	Biogas	Solar power	Wind power	Briquettes
Daily	5.5	2.4	4.7	9.6	1.7	1.5		0.5
At least once a week	2.8	2.4	1.5	2.1	0.4	0.4		
At least once a month	1.6	2.1	2.0	0.2	0.1	0.2		0.1
Once every few months	2.0	2.4	2.3		0.4	0.3		0.3
Never	0.3	2.9	2.1	0.7	9.2	10.1	12.9	11.9

Source: Field survey, 2018

4.8 Sources of energy preferred for cooking

A majority of respondents (30.9%) agreed that they would prefer electricity for cooking. This is a high contrast to the collective 11.9% who reported to use electricity either daily, one a week or once a month. From the results on source of energy for cooking and lighting, it was also shown that a majority of those who use electricity, use it for lighting. This could imply that although a fairly good percentage of people have access to electricity, a very high majority cannot afford to use it for both cooking and lighting. The results also show that 24.9% would prefer LPG followed by biogas at 22.5%. In the findings for sources of energy above, it was shown that only 2.6% of the respondents use biogas. This sharp contrast between individuals who use biogas and those who do not, but would like to do so, implies that there are other external factors that contribute to these findings. In table 4.4, participants were asked to indicate the

factors that influence their choice of energy, a majority of the respondents indicated that availability and economic status had the highest influences. Table 4.4 shows the distribution of preferred source of energy for cooking by percentage**.** Only 6% of respondents preferred charcoal for cooking while 6.8% preferred firewood while 4.6% prefer briquettes. It will be noted that only 10% reported that they were aware about briquettes. Out of this, 0.9 percent use it either daily, once a month, or every few months. By comparison, the 4.6% of those who would opt to use briquettes, still represent a good number of people; taking all factors into account. It is clear that a high number of people would prefer clean energy sources. This implies that although people are willing, adoption of these sources of energy is influenced by other factors which might be out of the people's control. (See 4.10).

Table 4. 4: Sources of energy preferred for cooking

If given a choice, which of the following sources of energy would you prefer for cooking?

Preference	Frequency	Percent
Charcoal	30	6.6
Firewood	31	6.8
Kerosene	17	3.7
Electricity	141	30.9
Biogas	103	22.5
Briquettes	21	4.6
LPG gas	114	24.9
Total	457	100.0

Source: Field survey, 2018

4.9 Sources of energy preferred for lighting

A majority of the respondents listed electricity as the most preferred source of energy for lighting at 59.6%. This was followed by solar at 30.7%. Kerosene and wind power were the least preferred sources at 5% and 4.7% respectively**.** The high percentage of people who prefer electricity for lighting could be attributed to its efficiency and availability. The fairly high percentage of solar power could be attributed to the findings on levels of awareness which indicated that people are more aware about solar energy than wind energy. The very low percentage of people who would prefer kerosene for lighting could be attributed to the obvious inconveniences of using kerosene lamps.

Table 4. 5: Preferred source of energy for lighting

If given a choice, which of the following sources of energy would you prefer for lighting?

Source of Energy	Frequency	Percent
Electricity	202	59.6
Kerosene	17	5.0
Solar power	104	30.7
Wind power	16	4.7
Total	339	100.0

Source: Field survey, 2018

4.10 Factors influencing choice of energy for cooking and lighting

Although a majority of the respondents reported to be influenced by more than one factor, availability and economic status are the two major factors that influence choice of energy for cooking and lighting. 37.6% of responses indicated that they are

influenced by availability while 34.5% indicated that they are influenced by economic status. A huge majority of people who cited availability as the main factor that influenced their choice of energy could be attributed to the fact that people do not actually have information about where to access the necessary equipment or professional services to embrace these types of energy. Regarding economic status as a major factor determining choice of energy, it was established that some of the equipment used could also be costly, (Look at 2.6) for example, the key informant who makes briquettes cited that the cost of buying a compressor machine for the briquettes is about ksh 70,000. Most individuals do not have the capacity to invest that amount of money on equipment and professional services. Effect on health influenced 11.4% of the population while effect on environment influenced 6.1%, education level at 4.3%, media and advertisement influenced 3.1% and finally peers 3.1 %.

Table 4. 6: Factors influencing choice of energy for cooking and lighting

Factors influencing choice of energy for cooking and lighting	Responses		
	N	Percent	Percent of cases
Media and advertisement	18	3%	6.2%
Peers	19	3.1%	6.5%
Economic status	209	34.5%	71.6%
Availability	228	37.6%	78.1%
Effect on environment	37	6.1%	12.7%
Education level	26	4.3%	8.9%
Effect on health	69	11.4%	23.6%
Total	606	100%	207.5%

Source: Field survey, 2018

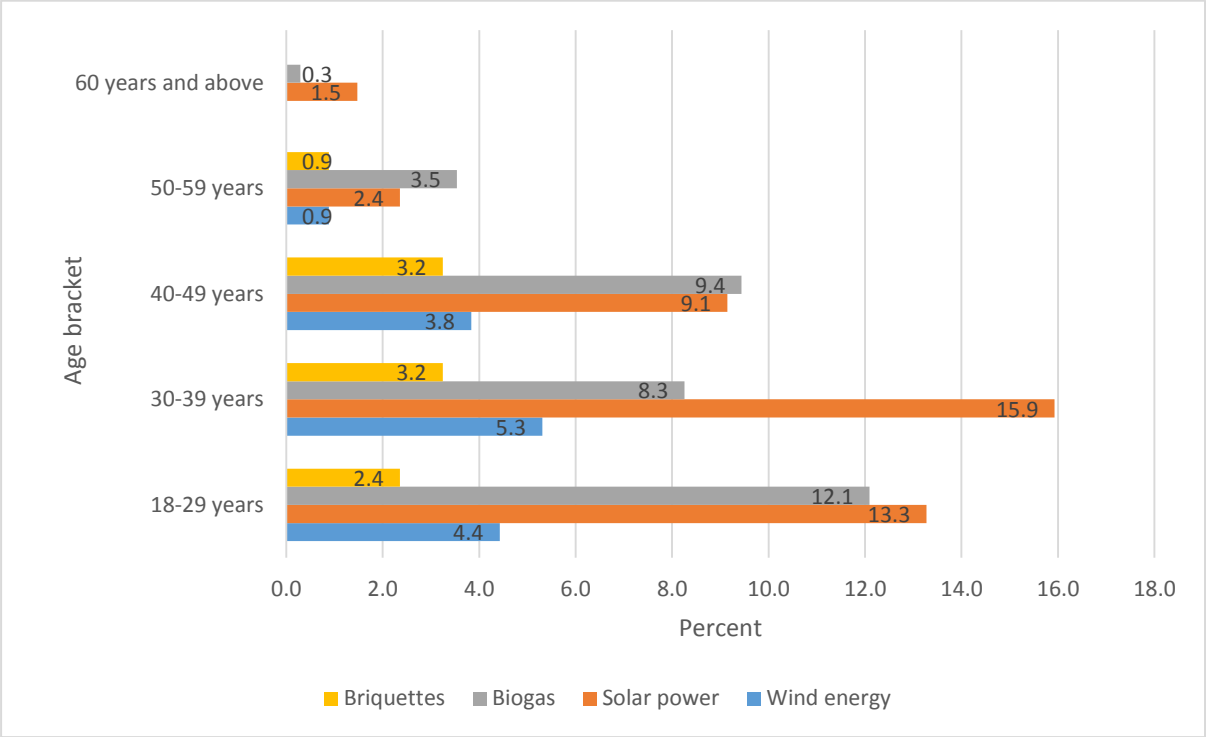
4.11 Multiple response questions

The research also sought to compare the sources of information in relation to age and level of education. In addition to this, factors influencing choices of energy for cooking and lighting were also compared to age and level of education. Finally, the level of awareness of renewable energy sources were compared to age and level of education.

4.11.1 Levels of awareness in relation to age

The findings showed that solar power is the most common form of renewable energy among residents of Keekonyokie and Olkeri. A good number of the respondents also showed awareness of biogas followed by wind and lastly, briquettes. By age distribution, 18-29 year olds are more aware about solar power and biogas 13.3% & 12.1 % respectively, as compared to wind and briquettes 4.4% &2.4% respectively. Similar trends are shown for 30-39 year olds who indicated 8.3% awareness for biogas, 15.9% for solar and 5.3% for wind energy. For 40-49 year olds, biogas comes first as the most popular form of renewable energy at 9.4%, this is followed closely by solar at 9.1%, wind at 3.8%, and briquettes at 8.3%. 50-59 year olds are also more aware about biogas at 3.5% than solar power which is at 2.4%. They also have equal levels of awareness for briquettes and wind energy which was at 0.9%. The least informed age group is 60 and above. They showed no awareness for wind energy and very little (1.5% &0.3%) awareness for solar and biogas respectively.

Figure 4. 9: Levels of awareness in relation to age

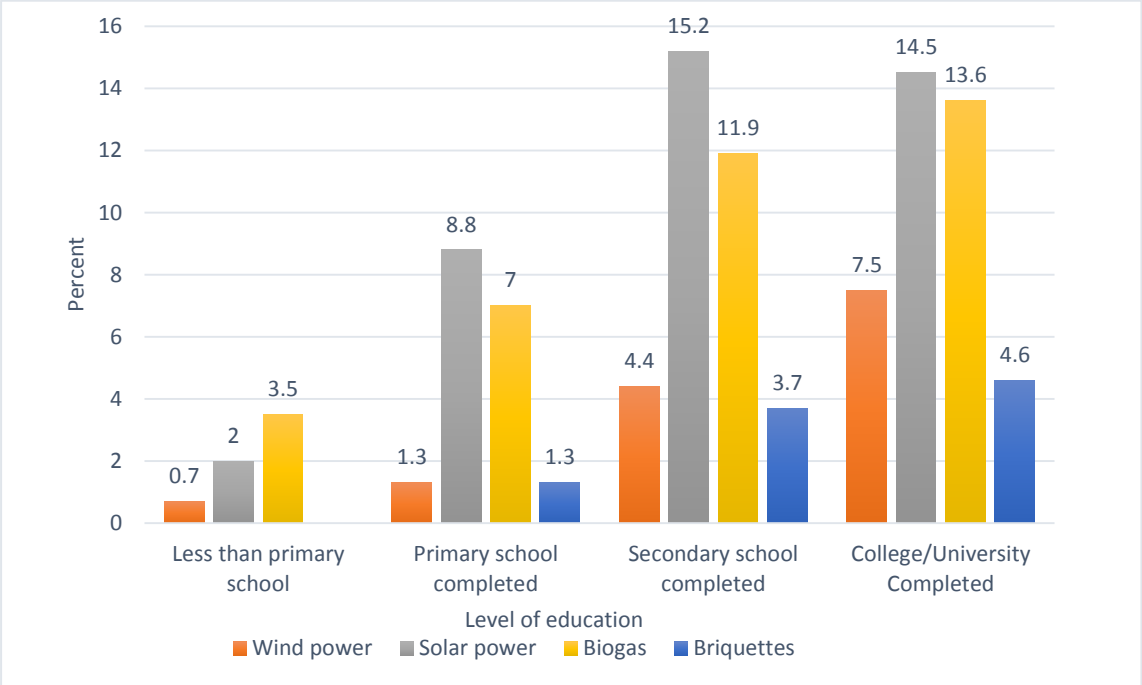


Source: Field survey, 2018

4.11.2 Level of awareness relation to level of education

It was found that the level of education influenced the level of awareness that Keekonyokie and Olkeri residents had about renewable energy sources. According to the figure below, those with secondary school education had more awareness (15.2%) about solar power than those who had college level education (14.5%). For biogas however, those with college level education showed more awareness (13.6%) than secondary school level (11.9%). For wind and briquettes, the level of awareness increases with level of education from pre-primary to college/university level. The results are indicated in figure 4.10.

Figure 4. 10: Level of education in relation to awareness



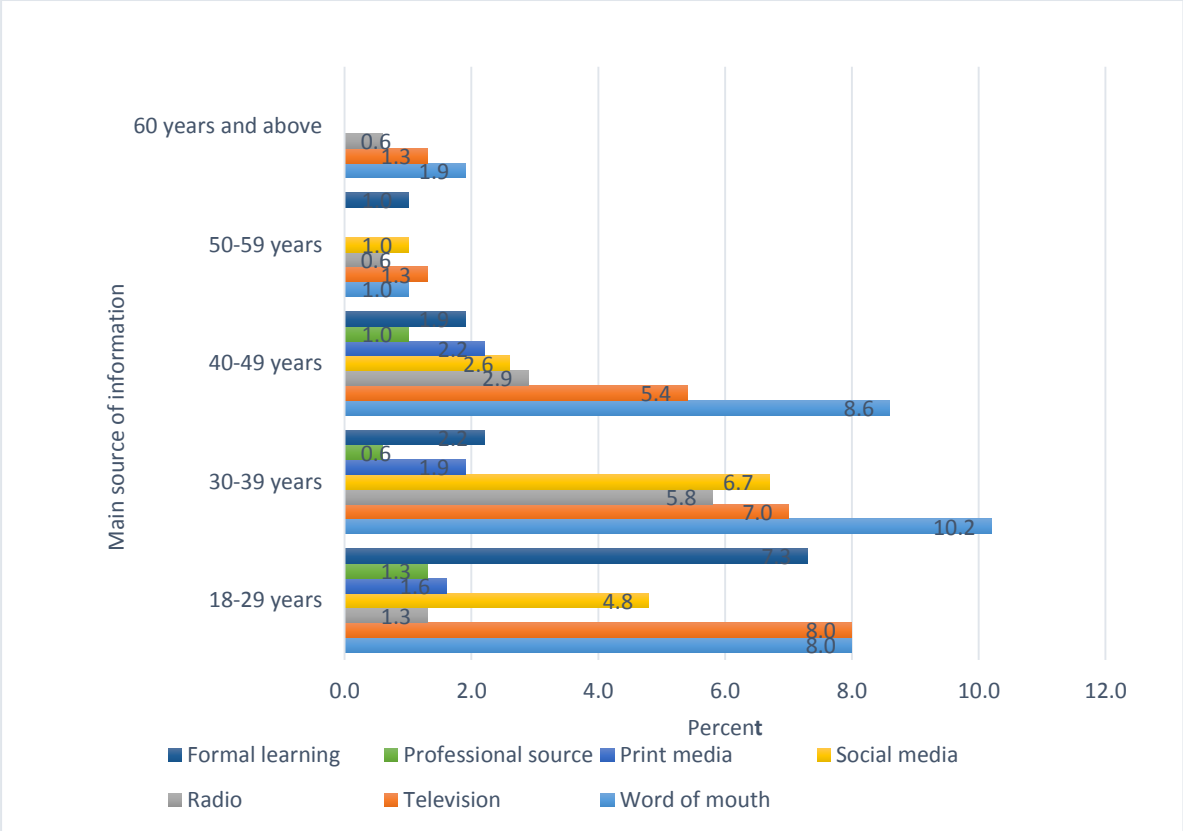
Source: Field survey, 2018

4.11.3 Sources of information in relation to age

The researcher sought to establish the main sources of information according to age. A majority of respondents indicated that word of mouth was their main source of information for renewable energy sources that they were aware of. The results showed that word of mouth was the main source of information for 28-29 year olds, 30-39 year olds and 40-49 year olds. Same results were reported for respondents who were 60 years and above. 50 -59 year olds reported that television was their main source of information. It should be noted that 60 year olds and beyond represented only 2% of the population while 50-59 year olds represented 6.9%. Television was the second most popular source of information for all age groups except for 50-59 year olds. The results also showed that a huge majority of 18-29 year olds did not get information about renewable energy on radio. Only 1.8% did. A fairly good number of 30-39 year olds did indicated that they get information from radio (5.8%). This percentage reduced with

increase in age. Only 2.6% was reported for 40-49 year olds and 0.6 percent for 50 year olds and beyond. For social media, 30-39 year were shown to have the largest percentage at 6.7% followed by 18-29 year olds at 4.8 %. These numbers reduced significantly with older age groups. 7.3% of 18-29 year olds stated that they heard about renewable energy from formal education. This was followed by 30-39 and 40-49 year olds at 2.2% each, 50-59 year olds at 1.9% and finally 60 year olds at 1 %. Professional sources was the least popular source of information across all age groups, with the highest being 18-29 year olds at 1.3%. Figure 4.11 illustrates this.

Figure 4. 11: Sources of information in relation to age



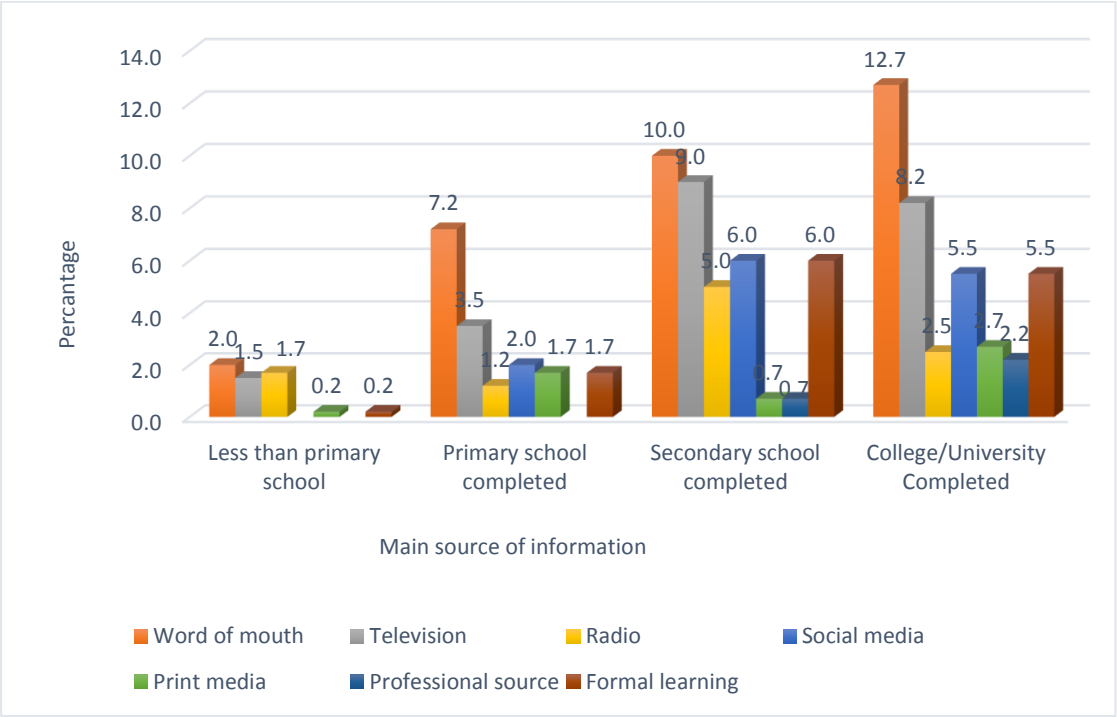
Source: Field survey, 2018

4.11.4 Sources of information according to level of education

The results showed that word of mouth was the most popular source of information across all levels of education. Print media was highest among those who

have completed college/university at 2.7% while social media was highest among those that have attained secondary school level education. Professional sources have the lowest influence. The highest being at only 2.2% of those that have completed college/university level education. Formal learning had the highest influence among those that have completed secondary school education at 6%. This was followed closely by those who completed college/ University education at 5.5 %.

Figure 4. 12: Sources of information in relation to level of education



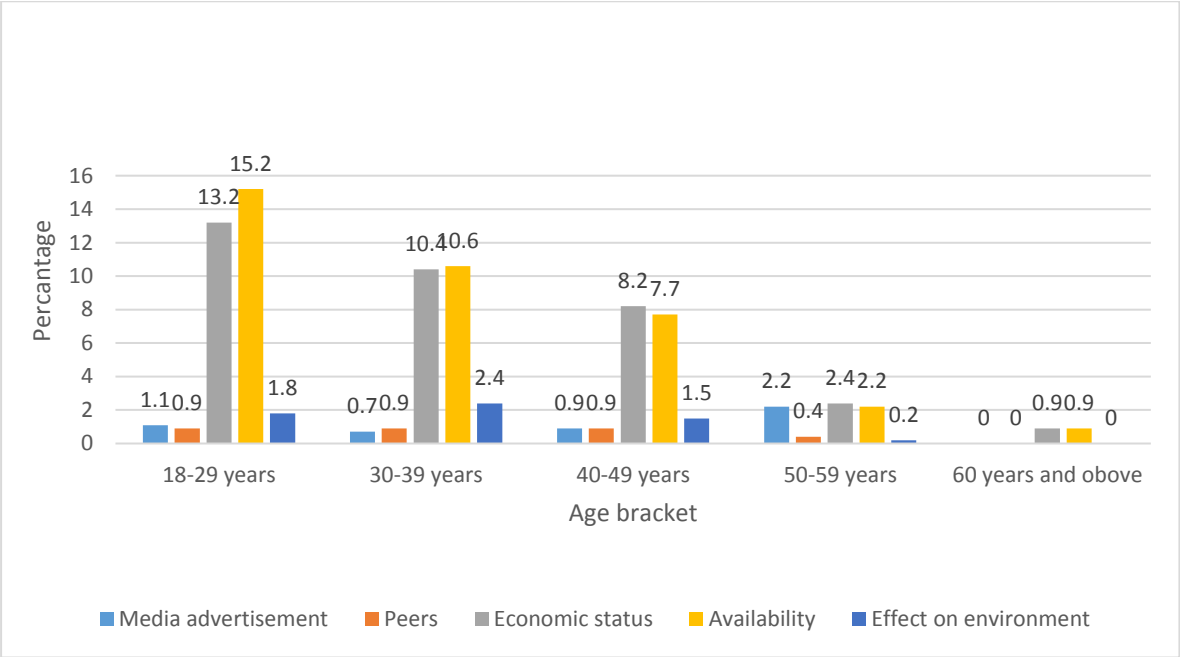
Source: Field survey, 2018

4.11.5 Age and factors influencing the choice of energy for cooking and lighting

Results showed that availability and economic status influenced most people's energy choices across all age groups. Effect on health and effect on environment had the least effect on individual's energy choice across all age groups. Education level had some influence on the choice of energy for cooking and lighting for 18-29 year olds at 1.8 % and 2.4 % for 30-39 year olds. This percentage reduces gradually for the older age groups. It was found that peers have little to no influence in the choice of energy

for cooking and lighting across all age groups. Effect on environment and media advertisements had very little influence as well.

Figure 4. 13: Age and factors influencing the choice of energy

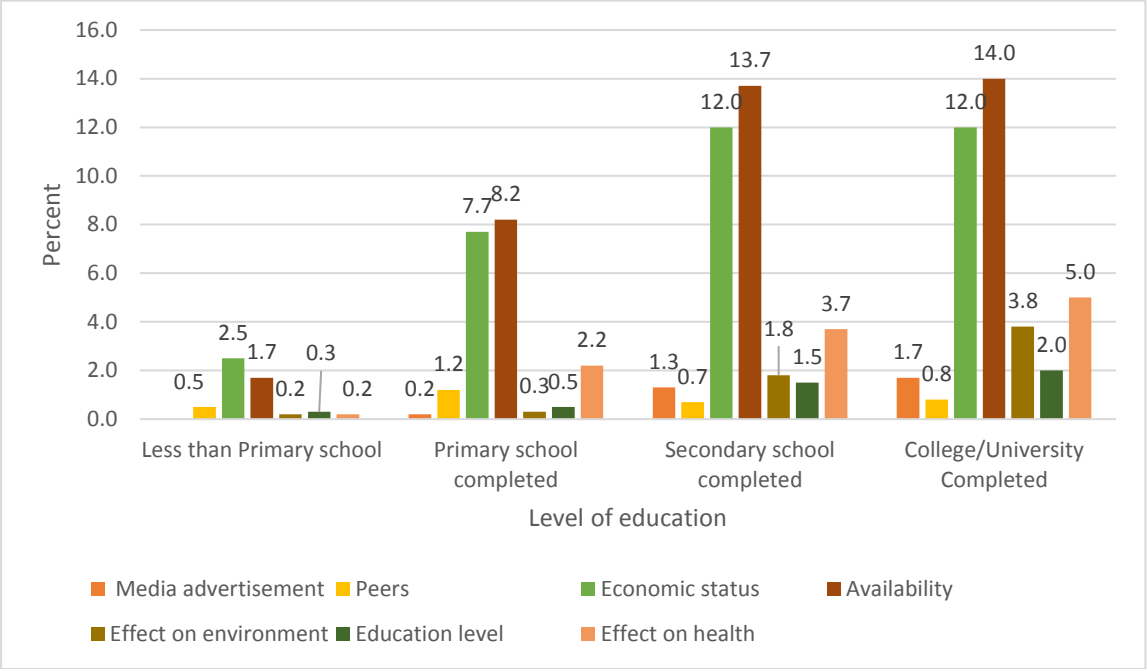


Source: Field survey, 2018

4.11.6 Level of education and factors influencing the choice of energy

Participant responses indicated that economic status and availability were the two major factors that determined choice of source of energy across all levels of education. This trend was a similar comparison in relation to findings for age (above). Effect on health had little influence on the choice of energy with the highest being 18-28 year olds at 1.1%. On the other hand, effect on environment had very little influence for college and university students with the highest being 2% for college and university students. These findings for factors influencing choice of energy showed similar trends across all classifications.

Figure 4. 14: Level of education and factors influencing the choice of energy



Source: Field survey, 2018

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Overview

This chapter presents the summary of the findings, conclusion and recommendations. The summary of the findings is presented according to the objective of the study in three sections. The first section has sources of information on renewable energy, the second section has levels of awareness of renewable energy and the third section has levels of adoption of renewable energy.

5.1 Sources of information for renewable energy in the two wards

Word of mouth, TV, radio, social media, print media, professional source and formal learning were tested as sources of information for renewable energy in the two wards. The findings indicate that word of mouth is the leading source of information for renewable energy in the two wards. This shows that the level of interaction is more on the interpersonal level. Although information is higher on the interpersonal level, the scale of adoption is not as high. This is because there are other factors that influence people's choice of energy and also their levels of awareness about these types of energy. (Discussed in 5.3)

It was also shown that awareness generally increased with level of education. Levels of awareness also moderately high among people younger than 49 years old. This dropped as age went up. This implies that younger people have more access to information about renewable energy, and more so, younger people with higher level of education. Media sources such as TV, radio, print media and social media collectively contribute a significant percentage as information sources but individually, their contribution is relatively low. These media sources have the potential of reaching wider audiences than any other information source. It is therefore important that stakeholders look into ways that information about renewable energy can be packaged effectively in

order to realise the full potential of these media as sources of information for renewable energy.

5.2 Levels of awareness on renewable energy in Keekonyokie and Olkeri wards

The results showed that levels of awareness vary according to the source of renewable energy. Biogas for instance is the most common form of renewable energy followed by solar then wind and lastly briquettes. A majority of the respondents had knowledge of at least two sources of renewable energy. Despite this, this knowledge does not result in positive action when it comes to adoption of these sources. More than three quarters of the respondents sighted availability and economic status as major determinants of the type of energy they have adopted for cooking and lighting.

It was also established that individuals' level of awareness of renewable energy sources increased with their level of education. Individuals with high school level education or higher showed more awareness than those with primary level education or lower. Young adults (20-29) and middle aged (30-49) people showed more awareness on all forms of renewable energy as compared to older people (50 and above).

5.3 Levels of adoption of renewable energy in Keekonyokie and Olkeri wards

The levels of adoption of solar energy, biogas and briquettes were still very low. Less than one quarter of the respondents reported adoption of either of these sources of energy. None of the participants had adopted wind energy. It was however noted that adoption of biogas was higher than the rest of the energy sources. Solar energy followed closely then briquettes. Although adoption is very low, a good number of respondents showed willingness to adopt these kinds of energy especially solar and biogas. This willingness was however influenced by a number of factors, mainly availability and cost. In the case of briquettes for example, it would be cheaper and more easily available for the community, if more people had invested in briquette making as an economic

activity. Not everyone has the capacity to invest in briquette making equipment or other equipment needed for the production of biogas, solar energy or wind energy. There needs to be more investment on these types of energy so that they become cheaper and more accessible to the community. The results also showed that a majority of the population are not highly influenced by risk factors associated with the use of unclean sources. This finding implies that there needs to be more effort in the institutional level, to enable access to information about risk factors associated with the use of unclean energy sources renewable energy, and therefore promote adoption.

5.4 Conclusion

In conclusion, the results of this study show that word of mouth is the main source of information of renewable energy and that people are more aware of biogas as a source of renewable energy followed by solar and wind energy. Briquettes are the least popular source of renewable energy. It was also found that awareness is generally low among older people (60 and above) and those with low levels of education. Television also ranked high as a quality source of information. This was followed by social media which was ranked almost similar to formal learning then radio respectively. A majority of the respondents were unsure about print media and professional source as quality sources of information for renewable energy. Key informant interviewees reiterated that people would be more knowledgeable about these sources of energy through the media and interpersonal means.

Because adoption is still low, it implies that people within Olkeri and Keekonyokie wards continue to use unclean sources of energy even though the environmental conditions of these areas is favourable for renewable energy, furthermore, most of the residents of Keekonyokie and Olkeri keep cows, goats, sheep and other domestic animals. Animal waste is the only raw material required for the

production of biogas. If they do not utilise these resources, it means that they will continue to bear the negative effects of using unclean energy sources which are is harmful to both their health and to the environment. Furthermore, renewable energy could improve the socio-economic status of the residents and also promote inclusion of otherwise disadvantaged groups of people.

5.5 Recommendations

To promote cleaner sources of energy, residents of Keekonyokie and Olkeri need to access sufficient and easy to understand information about renewable energy, and relevant support from the community, institutional and policy levels. The government, through the ministry of energy through the department of renewable energy, could implement renewable energy projects that promote inclusivity among residents of Keekonyokie and Olkeri. For example, women groups or 'chamas' and youth groups in the area could be empowered by being given platforms where they can access loans or resources that would enable them to specifically invest in renewable energy. For example briquette making. A report by Cohen and Marega, (2013) found that the briquette business in Kenya employs between 9 and 80 people per enterprise. Such projects would not only encourage the use of clean energy sources, they would also alleviate poverty through provision of employment.

As the study has established, individuals who acquire information about new innovations from interpersonal sources have a greater influence both to themselves and others. Interpersonal sources can therefore serve the purpose of informing them in addition to influencing them. Community leaders should be at the forefront of identifying and reaching out to residents who have the capacity to uptake various kinds of renewable energy sources by organising or incorporating such discussions in community forums. Skilled professionals in the green energy sector should also be at

the forefront in reinforcing such initiatives. This will empower members of the public with adequate skills and adequate information that will enable them to embrace these alternative energy sources.

The media, being a source for information that can reach wide audiences, should package information in a way that the locals can relate to. For example, instead of merely reporting or projects that are ongoing in the area, such as the Keeko biogas project, they could organise documentary -like segments where they show the entire process of production. Television showed great potential as an effective source of information for the residents of Keekonyokie and Olkeri. Since a concern was raised about lack of feedback, media practitioners, researchers and other stakeholders who visit the area for matters regarding renewable energy should also follow up and provide feedback to the locals who worked with them or provided information about ongoing projects in the area.

The study also established that level of education has considerable influence on levels of awareness. Awareness campaigns could be used in formal education institutions, and the public to further increase levels of awareness. People with higher education will interpret campaign materials better that those with lower education. Awareness campaign publications should be short, simple and clear to be interpreted by majority of the public who can read and understand.

The government through departments that are involved with the people at grassroots level (such as the Ken Gen CSR campaign) could implement other campaigns at local market places where they demonstrate the how briquettes are made. Those who are already in the market can play a role in creating awareness at local levels. He suggested social media campaigns and sensitisation through word of mouth. The media can also play an important role in creating awareness as it has a wider reach.

More programmes and news article s about renewable energy can be contributory to promoting uptake of these types of energy.

At the policy level, stakeholders should also work to ensure that there is adequate investment on renewable energy in the area. This will promote adoption of these energy sources because there will be an increase in supply. Increase in supply also means that it will be cheaper for locals. The county Government of Kajiado could also enact policies that restrict the use of certain kinds of energy such as charcoal. This will force residents to look for alternative sources of energy.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE

Title: Sources of Information, levels of awareness and adoption of renewable energy in Keekonyokie and Olkeri Ward, Kajiado County.

Dear Respondent,

My name is Sheilah Ndiema, a student at the University of Nairobi pursuing a Master of Arts in communication Studies. As part of the requirement, I am undertaking a research study titled sources of Information, levels of awareness and adoption of Renewable Energy in Keekonyokie and Olkeri Wards of Kajiado County. Please assist me by completing the following questionnaires. All information provided will be treated with utmost confidentiality. Your contribution will be highly appreciated.

SECTION A: Personal Information

I. Name of Respondent (optional)……

II. Age a.(18-29) [ ] b.(30-39) [ ] c.(40-49) [ ] d.(50-59) [ ] e.(60 and above) [ ]

III. Place of residence (Sub Location)……..

IV. Level of Education

a). Less than primary School [ ]

b). Primary School Completed [ ]

c). Secondary School Completed [ ]

d). College/University Completed [ ]

SECTION B: Levels of awareness and sources of information for renewable energy

I. Which of the following sources of renewable energy are you aware about? (Tick as appropriate)

a). Wind power [ ] b). Solar Power [ ] c). Biogas [d).Briquettes [ ] e) None [ ]

II. What was your main source of information for the above sources? (Tick as appropriate)

a) Word of mouth [ ] b)Television [ ] c)Radio [ ] d)Social Media [ ] d)Print Media [ ] e) Professional source [ ] f) Formal learning [ ] g) Others [ ]

III. Which of the following sources of Information on Renewable energy has the strongest quality?

RE Sources	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
Television					
Radio					
Social Media					
Print media					
Word of mouth					
Professional source					
Formal Learning					

SECTION C: Sources of energy for daily needs

I. On a scale of 1-5 which of the following sources of Energy do you use for your daily needs? Tick as appropriate.

Energy Source	1. Daily	2. At least once a week	3. At least once a month	4. Once every few months	5. Never
Charcoal					
Kerosene					
Firewood					
Electricity					
Biogas					
Solar power					
Wind power					
Briquettes					
LPG gas					

II. If given a choice, which of the following sources of energy would you prefer for cooking

a) Charcoal [ ] b)Firewood [ ] c) Kerosene [ ] d)Electricity [ ] e)Biogas [ ]

f) Briquettes [ ] g) LPG gas [ ]

III. If given a choice, which of the following sources of energy would you prefer for lighting?

a) Electricity[ ] b)Kerosene[ ] c) Solar power[ ] d) Wind power[ ]

SECTION D

General questions (tick as appropriate)

I. What influences your choice of energy for cooking and lighting?

a) Media advertisements [ ] b) Peers[ ] c) Economic status [ ] d) Availability[ ]

e) Effect on environment [ ] f) Education level [ ] g) Effect on heath[ ] others[ ]

APPENDIX II. INTERVIEW GUIDE

Dear respondent,

My name is Sheilah Ndiema, a student at the University of Nairobi pursuing a Master of Arts in communication Studies. As part of the requirement, I am undertaking a research study titled sources of Information, levels of awareness and adoption of renewable Energy. This study will be conducted within Keekonyokie Ward, Kajiado County. Please assist me by completing the following questionnaires. All information provided will be treated with utmost confidentiality. Your contribution will be highly appreciated.

I. Sex Male [ ] Female [ ]

II. What is the name of the organisation that you are working for?

III. What is your role?

IV. What are the main sources of information regarding renewable Energy in Keekonyokie and Olkeri

V. Are there any Communication campaigns being used to encourage the use of alternative forms of Renewable energy in Keekonyokie and Olkeri

VI. If so, what are they?

VII. Which organisations are sponsoring these campaigns?

VIII. Do you think the Media has been instrumental in advocating for use of alternative sources of Renewable energy in Kajiado County?

IX. What can be done to improve awareness and understanding of issues regarding alternative forms of Renewable Energy in Kajiado County?

X. In your own opinion, what is the level of awareness of Renewable Energy among the residents ok Keekonyokie?

XI. What is the level of adoption of these sources?

XII. Which is the most popular source of clean energy in Keekonyokie? Why?

XIII. Which is the least popular/ why?

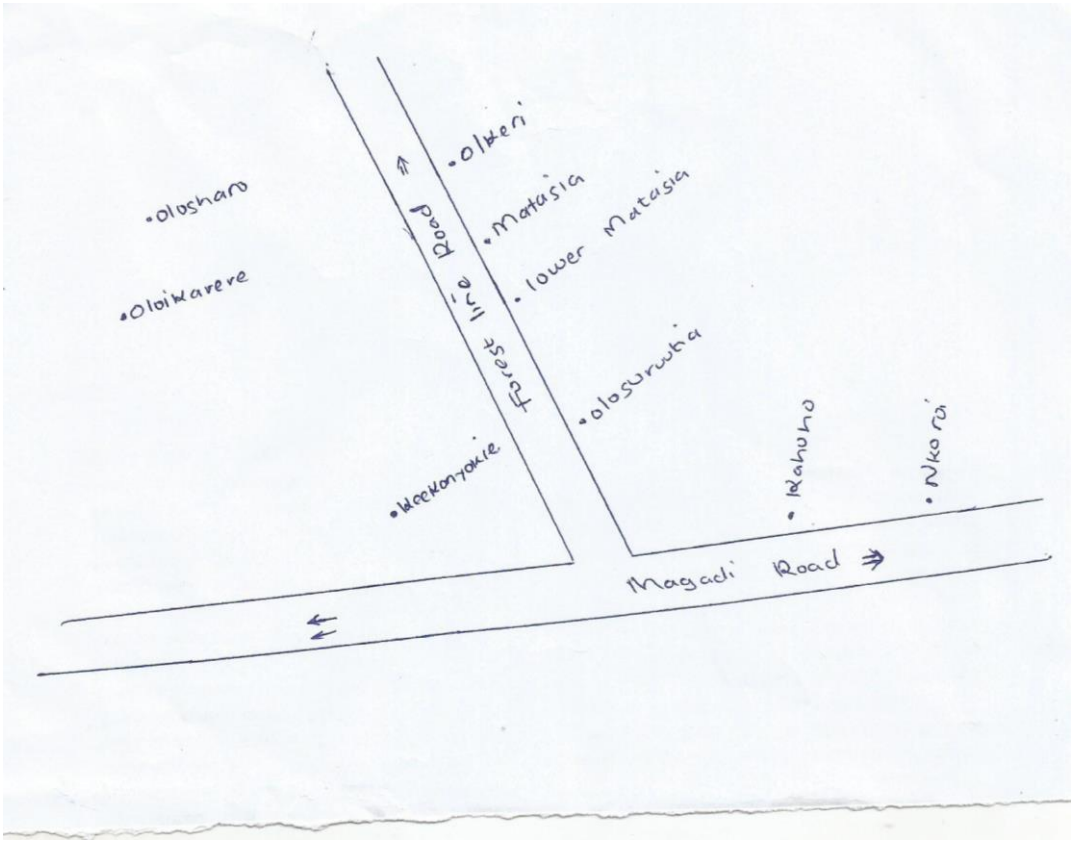
XIV. Do some of the residents of Keekonyokie produce/sell biomass materials and solar energy equipment as part of their socio Economic activities?

APPENDIX III. : CASE SUMMARY

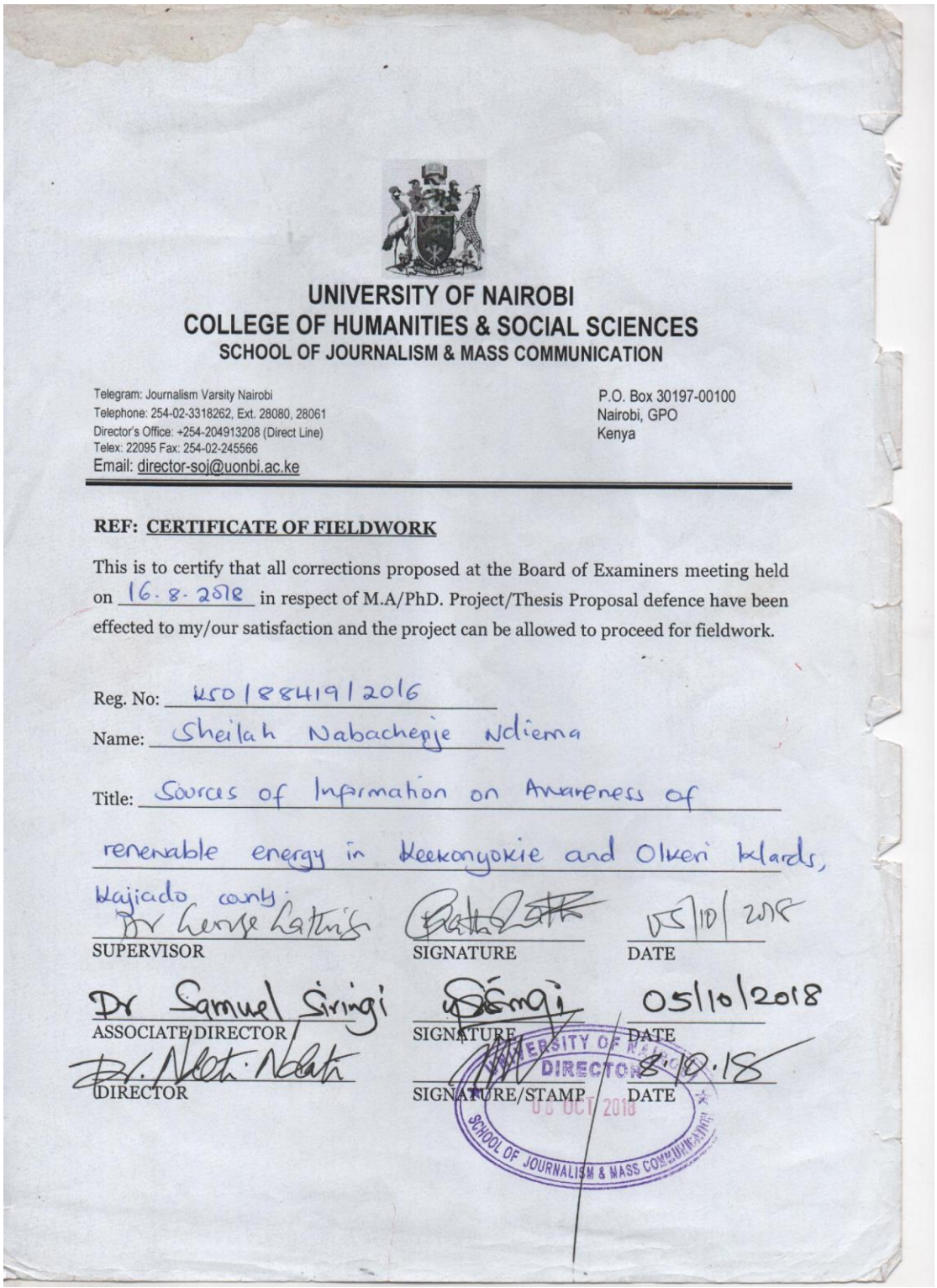
Valid responses were calculated as a percentage of the total number of valid questionnaires. These valid responses were used to calculate frequency percentages and the percentage of cases for the outlined questions.

	Cases					
	Valid responses		Missing responses		Total	
	N	percent	N	percent	N	percent
I am aware about the following sources of energy	291	97.0	9	3.0	300	100
Main source of information for renewable energy	255	85.0	45	15	300	100
If given a choice, which of the following sources would you prefer for cooking	298	99.3	2	0.7	300	100
If given a choice, which of the following sources would you prefer for lighting	289	96.3	2	0.7	300	100
What influences your choice of energy for cooking and lighting	292	97.3	8	3.7	300	100

APPENDIX IV: LINE TRANSECT OF KEEKONYOKIE AND OLKERI WARDS



APPENDIX V: CERTIFICATE OF FIELDWORK



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REF: CERTIFICATE OF FIELDWORK

This is to certify that all corrections proposed at the Board of Examiners meeting held on 16.8.2018 in respect of M.A/PhD. Project/Thesis Proposal defence have been effected to my/our satisfaction and the project can be allowed to proceed for fieldwork.

Reg. No: K50/84419/2016

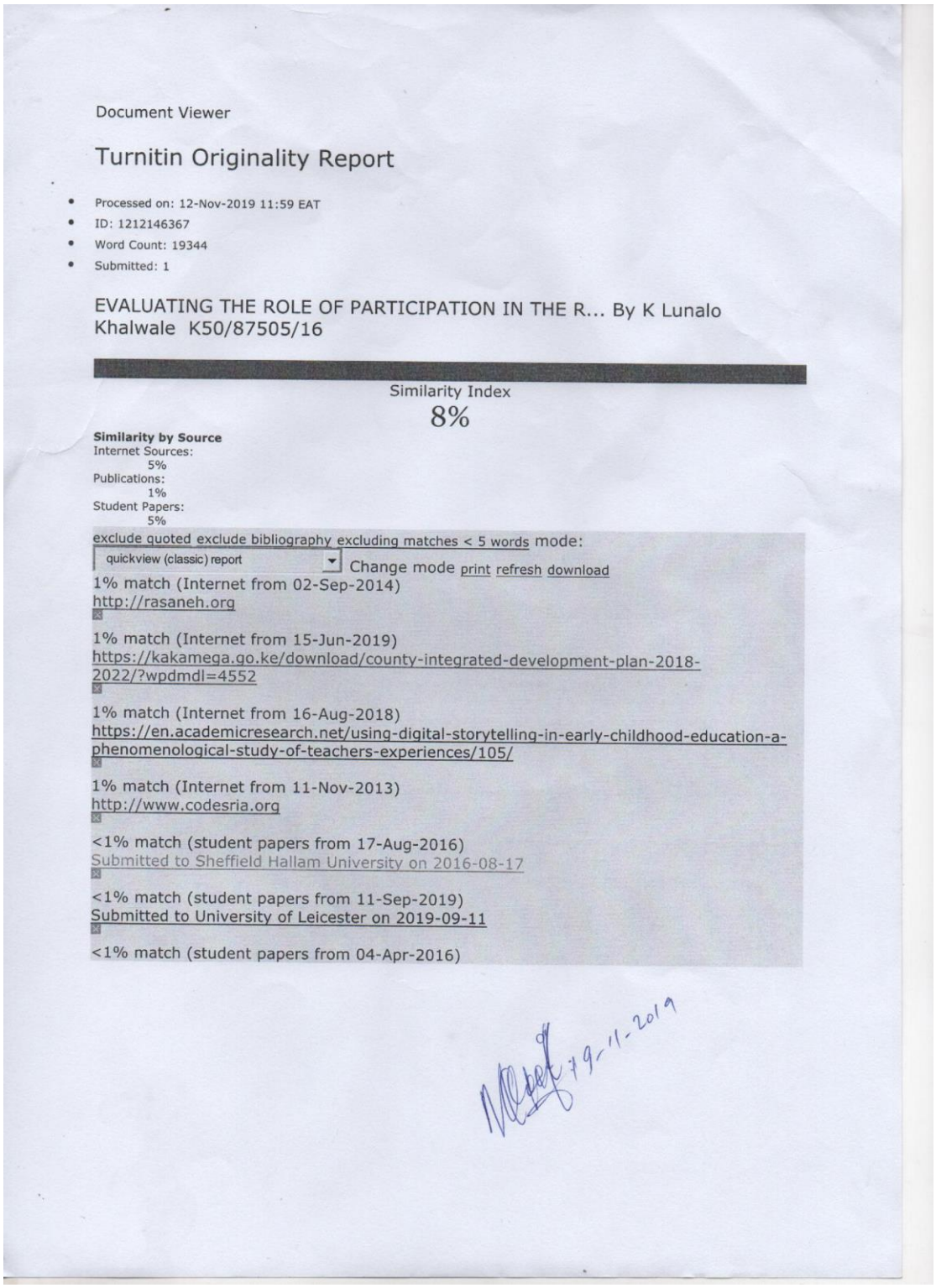
Name: Sheilah Nabachegje Ndiema

Title: Sources of Information on Awareness of renewable energy in Keekonyokie and Olkeri Wards, Kajiado county

Dr George Gathigia		05/10/2018
SUPERVISOR	SIGNATURE	DATE
Dr Samuel Siringi		05/10/2018
ASSOCIATE DIRECTOR	SIGNATURE	DATE
Dr. Nderi Ndeta		8.10.18
DIRECTOR	SIGNATURE/STAMP	DATE

UNIVERSITY OF NAIROBI DIRECTOR 05 OCT 2018 SCHOOL OF JOURNALISM & MASS COMMUNICATION

APPENDIX VI: CERTIFICATE OF ORIGINALITY



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APPENDIX VII: CERTIFICATE OF CORRECTIONS

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REF: CERTIFICATE OF CORRECTIONS

This is to certify that all corrections proposed at the Board of Examiners meeting held on 30.10.19 in respect of M.A/PhD. Project/Thesis defence have been effected to my/our satisfaction and the project/thesis can be allowed to proceed for binding.

Reg. No: K50/88419/2016

Name: Sheilah Nabachenje Ndiema.

Title: Sources of information, levels of awareness and adoption of renewable energy in Kerkoyuki and Olkeri wards, Kajiado county.

Dr. George Gathigia		25/11/2019
SUPERVISOR	SIGNATURE	DATE
Dr Samuel Siringi		27/11/2019
ASSOCIATE DIRECTOR	SIGNATURE	DATE
Prof. Ndeti Ndati		02.12.2019
DIRECTOR	SIGNATURE/STAMP	DATE

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