

**THE ROLE OF RURAL ELECTRIFICATION IN HOUSEHOLD WELFARE  
IN TANZANIA: A CASE OF KISARAWA DISTRICT – COAST REGION**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE  
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**CERTIFICATION**

The undersigned certifies that he has read and hereby recommends for acceptance by the Open University of Tanzania a dissertation entitled: **The Role of Rural Electrification in Household Welfare in Tanzania: A Case of Kisarawe District – Coast Region** In partial fulfilment of the requirement for the award of Degree of Master of Arts in Monitoring and Evaluation (MAME).

.....

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Date

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I, **Neema Lotang'amwaki Sembeo** declare that the work presented in this dissertation is original. It has never been presented to any other University or Institution. Where other people's works have been used, references have been provided. It is in this regard that I declare this work as originally mine. It is hereby presented in partial fulfilment of the requirement for the Degree of Master of Arts in Monitoring and Evaluation [MA (M&E)].

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Signature

.....

Date

**DEDICATION**

This dissertation is dedicated to my family my parents Mr. and Mrs. Lotang'amwaki Sembeo my lovely husband Gift Ondara, my beloved sons Craig and Carrick who support me hand in hand morally and financially in making sure that this study is successfully. May Almighty God bless you in each aspect of life.

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## ABSTRACT

The study focused on role of rural electrifications on households' welfare at Kisarawe district in Coast Region. The study specifically focused types of households' business investment before and after rural electrification in Kisarawe District. The difference of households' income accrued before and after rural electrification and the difference of households' welfare before and after rural electrification. The study employed mixed research approach whereby quantitative research approach was dominant and qualitative was used to supplement the quantitative design. The study employs cross sectional research design because data collection, analysis and interpretation were done once. Data were analyzed using both descriptive and inferential statistics. Results depicted before electrification households that households of Kisarawe were doing several businesses investments such as electric engine milling machine, electric pumping machines, modern saloons, modern bars, baking, and stationeries with scanners, photocopying machines, carpentry. On income accrued the study conclude that income generated were higher after electrification and households' welfare in terms of were improved access to better health, education food security and living conditions were improved. The study implies that the government and TANESCO should come up with solutions to the various problems that limit expansion of the services and therefore ensure that more people in rural areas access electricity while at the same improving the quality of grid electricity services to its customers.

**Keywords:** Rural Electrification, Households and Welfare

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**LIST OF ABBREVIATIONS**

ESMAP	Energy Sector Management Aspect Program
IES	International Energy Sector
IFC	International Finance Corporation
REA	Rural Energy Agency
REB	Rural Energy Board
REF	Rural Energy Fund
URT	United Republic of Tanzania

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background Information**

Rural electrification refers to the process of bring electrical energy to villages and remote areas. Electricity use span more from lighting and other households' uses to mechanization of income generating activities like milking, food processing and storage, agricultural production and running machines (IEA, 2009). Rural electrification refers to the efforts by the government in a particular country to ensure supply of power and electricity in rural and remote areas (Manhood and Gross, 2014). This is an initiative that is conducted by the government of the country for the purpose of improving livelihood of the people living in rural settings; as well as to ensure the attainment of the transformation of the country from a lower stage to a higher stage (Lenz et al (2017).

Despite that, most occupants in rural areas comprise of individuals with limited and or low income such that the setting of the infrastructure and the entire services is covered by the government since the focus is service provision and not profit generation (Li and Zi merle, 2019). This is evident with the fact that in most countries rural electricity is highly subsidized to the extent that the charges for the services are very low compared to the urban areas (Mawhood and Gross, 2015). This implies that the initiatives are mostly government own measures to ensure electricity supply.

According to the International Energy Agency (IEA) World Energy Outlook (2013), more than 1.2 million people worldwide did not have access to electricity in 2011. Almost all of them live in developing countries. The region most affected by lack of

electrification is Africa, specifically Sub-Saharan Africa. While the electrification in North Africa reached 99% in 2011, it was not higher than 32% in Sub Saharan countries. These figures are even more alarming when we consider the electrification rates in rural areas. The IEA reports that only 65.1% percent of rural areas in developing countries had access to electricity in 2011, while rural electrification rates of transition economies and OECD countries was 99.7 percent.

Among the strategy to reduce poverty is supplying energy to rural areas. In most rural areas of fewer developing countries human energy is the sole source of energy supply for food production, processing, and cooking, fetching water and firewood save for pastoralist community who can be supported by traditional animals like donkeys and camels. All these translate to more time consumption in comparison to mechanical energy using electricity hence to meet basic survival needs takes the whole day. The two constrains of human energy and time wasted can expose households to extreme poverty since they cannot engage in more income generating activities (UNDP, 2003).

Relationship between electricity and household welfare may not be absolute but lies on the assumption that electricity may contribute to economic growth being an essential basic need (IEA 2013). An argument by Kanagawa and Nakata 2008 is that access to electricity has a significant contribution in socio-economic development is aspects like health, education, agriculture, and household income. However, there is little scientific evidence to conclude electricity supply as a strategy for poverty reduction (World Bank 2003, Mead own 2003). Certainly, rural electrification benefits higher income households than lower income households (Jechoutek 1992, and Foley 1990).



According to the Tanzania National census 2002 70% of the population resides in rural areas. Since that is the case, electricity for several years has been largely problematic though the government has been engaging with various initiatives to assure electricity supply in rural areas (Frey, 2009).

However, in 2007 the government incorporated Rural Energy Agency (REA) which is an autonomous entity operating under the Ministry of Energy and Minerals of the United Republic of Tanzania (URT) (Frey, 2009). The entity is entrusted with the duty of assuring promoting and facilitating access of modern energy services in rural settings in Tanzania mainland since it is a nonunion matter. The key concern of the government has been to transform the rural settings and people into modern economy and improve livelihood whereas such transformations and improvements cannot occur with poor access of modern energy services, which is electricity (Msyani, 2015).

In that case, the government aimed at improving rural setting by ensuring that they transform through facilitating the supply of modern energy services at highly affordable costs with the government carrying the large portion of responsibility to serve its people (Msyani, 2015).

In that case, Rural Energy Fund (REF), Rural Energy Board (REB) and the organization itself as being Rural Energy Agency (REA) were established and became operational towards assuring adequate supply of modern energy services in the areas. In attaining efficiency and effectiveness the government subsidized the services such that they are accessed at highly affordable costs whereas once the infrastructures are well set customers are required to pay only 27,000 Tanzanian shillings (Magambo,

2015). This is set by the government since it has impact on the household income due to the transformation to modern economy, livelihood improvement and urbanization of the areas.

In 2019, 69.8% of the rural population has access to electricity, which is an increase from 49.3% in 2016. Despite of such progress only 24.5% of the households were connected to grid electricity in 2019 and 16.9% in 2016 (REA, 2020). Despite several efforts by the government to enhance rural electrification in Tanzania still number of many households are still poor, in the sense that majority failed to afford cost of living. In this light the current study intended to investigate the role of rural electrification on household welfare specifically at Kisarawe district in Coast Region.

## **1.2 Statement of the Problem**

Tanzania like many other countries established Rural Energy Fund (REF), Rural Energy Board (REB) and Rural Energy Agency (REA) in assuring adequate supply of modern energy services in the areas. Despite of such progress only 24.5% of the households were connected to grid electricity in 2019 and 16.9% in 2016 (REA, 2020) still households in rural areas are very poor.

In coast Region it is only 48.0% of the rural areas has been electrified, however the extent to which rural electrification affects household welfare? Previous scholars such as Psada and Dieden (2007); Kirubi *et al.*, (2008) Peters *et al.*, (2019); and Burlig and Preonas (2020) assessed impact, challenges and income generating activities established after rural electrification. Hence scant empirical evidence is available on the extent to which rural electrification creates employment, improve household

income, and improve education and health as well as asset ownership among Kisarawe district households. In this respect the current study intended to fill this gap.

### **1.3 Research Objectives**

#### **1.3.1 General Objective**

The general objective of the study is to assess the role of rural electrification in household welfare in Tanzania.

#### **1.3.2 Specific Objectives**

- (i) To determine types of household's business investment before and after rural electrification in Kisarawe District
- (ii) To examine status on income accrued before and after rural electrification in Kisarawe district households
- (iii) To examine status of households' welfare before and after rural electrification in Kisarawe district households.

### **1.4 Research Questions**

- (i) What are types of households' business investments before and after rural electrification in Kisarawe District?
- (ii) What is the status of income accrued before and after rural electrification in Kisarawe district households?
- (iii) What is the status of households' welfare before and after rural electrification in Kisarawe district households?

### **1.5 Scope of the Study**

The current study assessed the role of rural electrification in household welfare in Tanzania. The role of rural electrification on living conditions, asset ownership, education, health was particularly assessed as detailed in the conceptual framework (Figure 2.1). The extent to which rural electrification affects business investment, income accrued, and household welfare were determined. The study was informed by household from Kisarawe district.

### **1.6 Significance of the Study**

The findings of the study are expected to be of theoretical and practical significance. Theoretically, the study is expected to make a paramount contribution to government and the households by providing insights into role of rural electrification in households' welfare and how households can use electricity to improve their daily life. It is envisaged that the study will boost the interest of stakeholders on rural electrification as a tool for achieving and sustaining competitiveness in the contemporary rapidly evolving corporate environment.

The study has practical implications for managers/ administrators and professionals in public service (TANESCO and the government in general) firstly, findings will be resourceful for other researchers and scholars, as it will form a basis for academic discussions on various aspects rural electrifications in Tanzania. The study will also be a source of information to other researchers who intend to conduct similar studies in Tanzania. Moreover, the study will make a valuable addition to the body of knowledge on rural electrification studies in developing countries particularly Tanzania

### **1.8 Limitation of the Study**

The study is specifically limited by sample size selection and purposive mode. Even though the number of villages selected for study is representative by 50% for the households selected the sample size it is only 378 respondents were contacted, however, to overcome the challenge of sample size the study employs the qualitative findings to supplement which in turn increase the authenticity of study findings. These limitations result from financial constraints and level of awareness at the community level where most individual would demand for some incentives(monetary) to be interviewed or participate in the filling the questionnaire however after informing them the reason behind the research is only for academic purpose hence, they accept to provide the information required. Another limitation the study being cross sectional study were data collection, analysis and interpretation were done once, hence the researcher recommend future study to be longitudinal to see changes of household's welfare on over time.

### **1.9 Organization of the Study**

The study is organized in five chapters whereas the first one consisted of the description of the study problem and the context. Chapter two highlighted the literature review of the study. Chapter three provide the description on research methodology. Chapter four provide the findings of the study, analysis, and the discussion of the results. The last chapter provides the summary of the study, conclusion, and recommendations.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

The chapter describes various reviews in line with the study and different theories guiding the study, empirical reviews, and the description of the study variables. The description of the study variables is illustrated through the conceptual model providing clear view of the variables of the study.

#### **2.2 Definition of Key Concepts**

##### **2.2.1 Household Welfare**

A household refers to a person or group of people living in the same compound, answerable to the same family head and sharing a common source of food and income while on the other hand household Welfare refers to the set of programs designed to meet the socio-economic indicators of a given group of people living the same compound with a common source of income (Estes, 2004).

The most common social economic indicator preferred by the economist is consumption (Consumption usually includes food consumption, non-food items including health, education and other non-food expenditures, housing expenditures including rent and utilities and consumer durables), which used as a proxy for living standards; welfare is usually proxied by measures of consumption or income (Howe *et al.*, 2008). In the current study household welfare were determined in terms of income accrued, change on the business investments, ability to pay for medical/health, better education, and building modern houses.

### **2.2.2 Rural Electrification**

Rural electrification refers to the efforts by the government in a particular country to ensure supply of power and electricity in rural and remote areas (Mawhood& Gross, 2014). This is an initiative that is conducted by the government of the country for the purpose of improving livelihood of the people living in rural settings; as well as to ensure the attainment of the transformation of the country from a lower stage to a higher stage (Lenz et al (2017). This is an important phenomenon and practice in the development because it assures major changes and transformation of people and activities in the area which serve as the quick path towards development. In the current study rural electrification, the process of bringing electrical energy to villages and remote areas.

### **2.3 The Household Welfare Status in Tanzania**

According to Landguiden (2011), Tanzania's political situation is stable, but it is a country affected by economic crises and ineffective administration. In Tanzania the number of people living under the international poverty line is almost 68 per cent. (UNDP, 2011) in assessing the human development indicators in Tanzania country profile ranked Tanzania in 152 out of 187 countries and belongs to the countries with Low Human Development. A third of Tanzanians live in households' classified hard core poor and a further fifth of Tanzanians live in households classified as poor based on their income.

According to the Tanzania Household Budget Survey (HBS) of 2000/01, the widest gap is between urban and rural populations. The depth and severity of poverty is greatest in the rural areas as around 85 per cent of the poor live in the rural areas since

most of the rural poor are primarily engaged in agriculture. According to United national development programme in assessing the multidimensional poverty indicators about 1.7 billion people live in multidimensional poverty, and the number of people living under the international poverty line US\$ 1.25 a day is estimated to be 1.3 billion people (UNDP, 2016). At one extreme, Dar es Salaam is substantially better off than the rest of the country.

The Poverty Reduction Strategy of the United Republic of Tanzania (URT, 2000) indicates that poverty is largely a rural phenomenon. In the rural areas, incomes are lower, and poverty is deeper than in urban centres. The findings by Liheta and Mosha (2014) revealed that, the overall household's welfare in rural is poor and only few of them have clear objectives, or a strong organizational structure. Based on the same report, findings show that 27% of the households in rural areas of Tanzania were insufficient to obtain enough food to meet nutritional requirements, and about 48 percent of the households were unable to meet their food and non-food basic requirements.

## **2.4 Theoretical Framework**

### **2.4.1 Welfarist Theory**

Welfare theory was developed by Adam Smith (Aidukaite, 2009). He created the invisible hand idea that is one of the most fundamental equilibrating relations in economic theory; the equalization of rates of returns as enforced by a tendency of factors to move from low to high returns through the allocation of capital to individual industries by self-interested investors. The self-interest will result in an optimal allocation of capital for society. He writes: "Every individual is continually exerting



himself to find out the most advantageous employment for whatever capital he can command. But the study of his own advantage naturally, or rather necessarily leads him to prefer that employment which is most advantageous to society”. Also, he argued that what is true for investment is true for economic activity in general. “Every individual necessarily labors to access necessities in life (well-being). The theory advocates that if someone lacks well-being means he is poor.

Therefore, he emphasis on efforts to be made by both government and non-government organizations to develop strategies and instruments to improve the poor people’s well- being. Based on the current study such strategies could include rural electrification as one of the most effective tools to help poor come out of poverty and have a sustainable life; the theory supports the idea of subsidizing TANESCO to lower the cost for the electricity in rural areas so they can offer services at affordable eats. The household’s welfare is measured through household studies with focus on the living standard of the individuals; kinds of business investments, incomes, capital accumulation, social services such as education and health as well as food expenditures (Brouweret *al.*, 2005). This theory is helpful in assessing the role of rural electrification on households’ welfare.

## **2.5 Empirical Literature Review**

### **2.5.1 Rural Electrification and Types of Business Investments**

Dasso (2015) in the study “*The economic impacts of investing in rural electrification in Ghana*”. Data were obtained from Ghana Ministry of Energy and the Electricity Company of Ghana between 2005 and 2013. The study found access to electricity enables the modernization of agriculture (e.g., use electric pumps for irrigation) and

the reallocation of working hours which can raise earnings and improve welfare. The modernization of agriculture and extended business hours can provide increased employment opportunities to electrified communities, which can affect welfare.

Kirubi, Jacobson and Mills (2008) in the study “*Community-Based Electric Micro-Grids Can Contribute to Rural Development: Evidence from Kenya*”. Through a detailed case study analysis of a community-based electric micro-grid in rural Kenya, the study demonstrates that access to electricity enables the use of electric equipment and tools by small and micro enterprises, resulting in significant improvement in productivity per worker (100–200% depending on the task at hand) and in a corresponding growth in income levels in the order of 20–70%, depending on the product made. Access to electricity simultaneously enables and improves the delivery of social and business services from a wide range of village-level infrastructure (e.g., schools, markets, and water pumps) while improving the productivity of agricultural activities. The study also finds that increased productivity and growth in revenues within the context of better delivery of social and business support services contribute to achieving higher social and economic benefits for rural communities. Furthermore, the study demonstrates that when local electricity users have inability to charge and enforce cost-reflective tariffs and when electricity consumption is closely linked to productive uses that generate incomes, cost recovery is feasible.

### **2.5.2 Rural Electrification and Income Generation**

Kumar and Rauniyar (2018) in the study titled “*The impact of rural electrification on income and education: Evidence from Bhutan*”. The study used propensity score matching and found electrification had a statistically impact on non-farm income and

education. Nonfarm income increased by 61 percent and children gained 0.72 additional years of schooling and 9 minutes of study time per day. The study does not observe significant effects on farm income. Results are consistent and robust to different matching algorithms. Also, findings indicate that investments in reducing energy deficit may help improve welfare in Bhutan.

Kidole (2015) in the study "*Contribution of Rural Electrification to households' income in Moshi, Tanzania*". Specifically, the study aimed at identifying income generating activities undertaken using grid electricity, assessing the contribution of grid to household income as well as identifying the challenges in utilization of grid electricity services in income generating activities. A multistage sampling technique was used to select a total 120(60 with grid and without grid services respectively) respondents for the study.

The study identified among others, iron wedding, compact disc burning and grain milling as income generating activities influenced by presence of grid electricity. The household annual income ranged from 800,000 Tshs. to 46,000,000 Tshs and there were statistically significant differences in income between households with grid electricity services and those without.

Greenstar (2004) on the study titled "*Impact of electricity services on microenterprise in rural areas in Tanzania*". The study employed mixed research approach, with a cross sectional design. Data were collected using questionnaire and interview guide and analyzed using descriptive and correlation analysis in the study title demonstrated the significance of better lighting for increased income generation attributable to

extension of business hours in the evenings. The author cites examples of tailors who worked for four more hours and thereby increased their revenue by 30% in Bangladesh.

### **2.5.3 Rural Electrification and Household Welfare**

Olanrele (2020) in the study titled *“Effects of Rural Electrification and households’ welfare in Nigeria”* Household’s survey data were collected from Nigerian Institute of Social and Economic Research field survey were employed. The study revealed that access to rural electricity increases households’ income by 1.3 per cent. Although the coefficient was correctly signed, it was not significant. This outcome could be a result of constant electricity supply outages, which is strongly explained by the positive affirmation of 71 per cent of the respondents. The study further found access to electricity increases per capital monthly expenditure by about 6.4 per cent. Expenditure on electricity equally increases monthly per capital expenditure by about 4 per cent.

Hussein and Filho (2012) in the *“Analysis of energy as a precondition for improvement of living conditions and poverty reduction in sub-Saharan African”*. The study was qualitative employ interview in data collection. It is argued that the modern sources of energy are required for the improvement of living standards by creating employments and boosting productivity. Also supply of energy provides lighting of homes, cleaner fuels for cooking and heating.

The study found essentials aspects of human welfare (leading long and productive life, enjoy good health, have access to knowledge and education opportunities, having

enough income to supply themselves with ample nutrition, shelter and other materials and aesthetic needs) may improve only if energy is available for all.

Matimbwa (2020) in her study titled “*Rural Electrification and Household Welfare in Iringa*” using mixed research approach and data were collected using both questionnaire and interview. The study found that electricity enables rural households to engage in activities that generate income- by providing lighting that extends the workday and powering machines that increase output and raises the productivity.

Also, it was found that rural electrification improved health by powering equipment’s for pumping and treating raw water, also electricity enables health clinics to refrigerate vaccines, operate medical equipment’s and provides treatments after sunset. Not only that rural electricity provides lighting to schools thereby allowing people to study at night and thereby allowing their employment prospects.

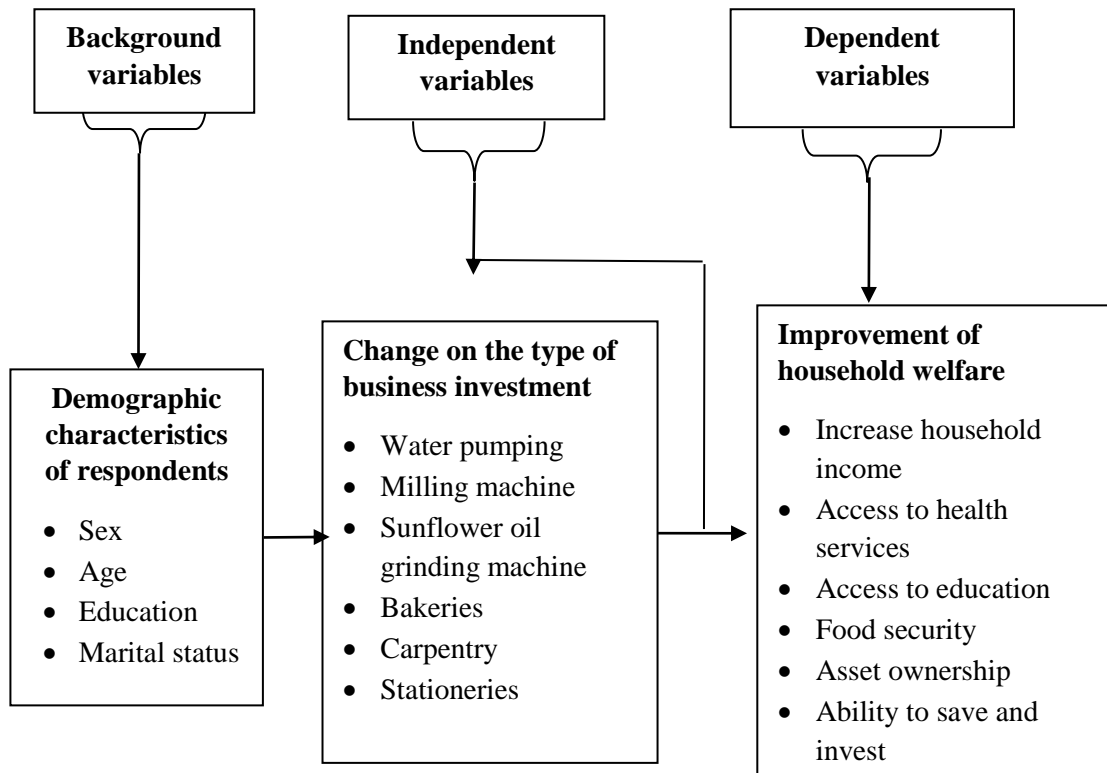
## **2.6 Research Gap**

Previous scholars such as Hussein and Filho (2012), Matimbwa (2020), Psada and Dieden (2007); Kirubi et al. (2008) Peters *et al* (2019); Olanrele (2020) and Burlig and Preonas (2020) assessed impact, challenges and income generating activities established after rural electrification. And few who assessed rural electrification and households’ welfare were not explored the extent to which rural electrification has resulted to the changes the kinds of business investment, income, and improvement of households’ welfare especially at Kisarawe District in Cost region. In this reject the current study intended to fill this gap.

## **2.6 Conceptual Framework**

A conceptual framework explains either graphically, or in narrative form, the main things to be studied, the key factors, concepts or variables and the presumed relationship among them. Vaughan (2008) argues that a conceptual framework provides the structure or content for the whole study based on literature.

The conceptual framework focused on the relationship between rural electrification and household welfare. The framework described the patterns of interaction between background, independent and dependent variables. Background variables included age, sex, and education of respondents. The independent variables included types of business investment, income accrued and welfare in terms of ability to cover cost of living, education, health, and school. Therefore, background variables influenced both independent and dependent variables, while independent variables influenced dependent variable. The dependent variables represented the study outcome, which was improvement of household welfare. Elements in dependent variables were adopted from the welfarist theory. It is assumed that households will have the expectation that they can manage to create employment opportunities or either expanding their business, afford the basic needs (food security, shelter, education, and health) of their families as the result of improvement of household welfare but could be a few factors from independent variable and background variable which can hinder or influence the achievements in attaining household welfare. In this study the theory has been used to assess the role of rural electrification on household welfare in terms of incomes, education, asset ownership, access to better education, access to health services, food security and food security.



**Figure 2.1: Conceptual Framework**

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter indicates the research type and the research design of this study. It explains the relevant methods and the suitable tools used to collect and analyze data in the study field. Besides, it describes the study area of the research, the study population, and the sampling techniques. It later, state types and source of data, the study variables, the research measurements, data collection methods, the validity issues, and data analysis methods to be employed in the research study.

#### **3.2 Study Area**

The study was conducted in Kisarawe District in Pwani region because it is one of the areas with rural features that have been well facilitated with electricity by the government and hence useful for the generation of adequate information to fill the research gap. The study focused on four wards of Kisarawe namely Cholesamvula, Kibuta, Kurui and Masaki.

Kisarawe has also been selected because the household's welfare was reported to be poor in few years back when it has not been electrified (Matimbwa, 2020), so the researcher wanted to understand if electrification had an effect to their welfare after being electrified. Other selection criterion is since more efforts of the government on electrification of coast region; however, it is unknown the extent to which it has impact on household welfare.



### **3.3 Research Approaches**

In this study mixed approach employed with stronger emphasis on quantitative method since it applied statistical model to analyze data, which provide comprehensive proof that answer, the research questions under the study. The quantitative employed when questionnaires addressed to households of selected wards in Kisarawe district and for qualitative part interview was done to the ward and village executive officers in which these households belong.

Using mixed methods tools increases overall confidence in the findings of the study” (Ngulube 2010) and helps address complex social problems that may not be answered successfully by a single approach (Creswell, 2009). Triangulation of instruments in research is essential for it enhances validity and reliability. Creswell (2003) suggests that the integration of quantitative and qualitative approaches is very necessary in solving research problems.

### **3.4 Research Design**

The research design refers to the overall strategy used to integrate the different components of the study in a coherent and logical way, thereby, ensuring you will effectively address the research problem. In the current study the research used descriptive cross sectional research design. It is descriptive because it aims to describe the effects of rural electrification on households’ welfare. It is cross sectional because data collection, analysis, interpretation was done once. Through this design adequate and relevant information concerning the study basing on the actual picture and opinion of the participants were collected; also, the case study is helpful in looking at phenomenon sufficiently for the purpose of realizing the objectives of the study.

## **3.6 Target Population and Sampling Design**

### **3.6.1 Population**

Population refers to the aggregate group of people or things on which the researcher is expecting to make generalization of the study (Pallant, 2005). In this study, the target population was all households of the selected wards in Kisarawe district (namely Cholesamvula 6061, Kibuta 10,146, Kurui, 2995 and Masaki 7,202), which makes a total of 26,404.

### **3.6.2 Sampling Design and Technique**

A sampling design is a definite plan for obtaining a sample from a given population. It refers to the technique or the procedure the researcher would adopt in selecting items for the sample (Robert and Morgan, 1970). To ensure samples are equally selected from the population the study employed probability and non-probability sampling design in data collection and because the fact that study is both quantitative and Qualitative research. Since the population is 26, 404, hence by considering Robert and Morgan sample determination table, this study had a sample of 378 households for the quantitative data, of which probability and random sampling employed. This sample was enough for correlation analysis as suggested by Hair *et al* (2006).

The sample size for qualitative analysis was 8 respondents (2 from each ward) who are sufficient considering that Creswell (2014) suggests that the rule of thumb requires a sample size of 4 up 10 for phenological studies. Interview was conducted to the ward and village executive here information regarding effects of rural electrification to households' welfare.

**Table 3.1: Table for Determining Sample Size from a Given Population**

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	<b>130</b>	<b>97</b>	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Source: Krejcie and Morgan (1970)

### 3.7 Types of Data

In the current study both primary and secondary data was collected.

#### 3.7.1 Primary Data

In this study data was collected through questionnaire and interview.

#### Questionnaire

Primary data was collected using questionnaires, which administered to KISARAWA households. Questionnaires used to gather information regarding effects of rural electrification in households' welfare. Both open ended and closed questions were prepared and distributed to the required respondents 378 in the four selected wards. Open-ended questionnaire used to get the experiences and feelings from KISAWA households about the effect of rural electrification on households' welfare. Closed-

ended questions used for gathering information that cannot be obtained by other means.

### **Semi Structured Interview**

Other primary data collected through semi structured interviews with village and ward executives of the four wards in Kisarawe district. Actual data collection exercise done with 8 village and wards executives officers. They will be interviewed in order to drag out their feelings and experiences concerning the effect of rural electrification on households welfare. According to Cooper and Schindler (2003) interview is the primary data collection technique for gathering data in qualitative methodologies. The sample size for qualitative analysis was 8 respondents who are sufficient considering that Creswell (2014) suggests that the rule of thumb requires a sample size of 4 up to 10 for phenomenological studies.

#### **3.7.2 Secondary Data**

Secondary data was extracted from documents and KISARAWA archives to check on the number of households connected with electricity in the ward. Data was collected by reviewing and analysing various relevant documents such as the types of business conducted by most of the households' materials from business officer in the district.

### **3.8 Data Analysis**

Data analysis refers to the process of assembling or reconstructing the data in a meaningful or comprehensive fashion. It is the process of examining the collected raw data and detects errors and corrects them (Saunders et al, 2012). The nature of the data collected in a mixed methods approach requires a combination of qualitative and

quantitative data analysis tools. Content data analysis for verbal or written responses used for qualitative data. The semi-structured interviews, which are qualitative in nature, evaluated and coded for identification of themes and patterns. The aim of coding was to reduce data to simple categories and themes that allows comparison and testing of the critical questions of the study.

The study used SPSS computer software to determine the effects of rural electrification on investment, income, and households' welfare such work was done to determine the range of effects. But also, percentages and frequencies of respondents were computed basing on demographic data to determine which affect most a certain group. As the study seeks to describe the variables, descriptive statistics were used as well. Inferential statistics (regression analysis) used on the effects of rural electrification on income, investment, and households' welfare.

### **Multiple linear regression analysis**

This is a statistical technique that utilizes several explanatory variables to predict the outcome of a dependent variable (Corder and Foreman, 2009). The goal of multiple linear regressions (MLR) is to model the relationship between independent and dependent variables and in the current study, business investments, income accrued, and changes on living standard on households' welfare.

### **3.9 Validity and Reliability**

The concepts of reliability and validity are core issues in determining the quality of a study. For a study to provide sufficiently sound, consistent, and relevant evidence, the information provided must be both reliable and valid (Maholtra and Nunan, 2007).

Reliability requires the use of standardized information collection instruments and survey procedures that are designed to enhance consistency. Validity is the extent to which the survey information is relevant to the conclusion being drawn and is sufficiently accurate and complete to support the conclusion, Validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are (Maholtra and Nunan, 2007). Therefore, both reliability and validity in this study ensured through checking inaccuracies or missing information at various points in the collection, maintenance, processing, and reporting of data, proper processing and reporting of data, usage of proper sampling procedures to obtain a representative sample, careful selection of standardized data collection instruments (questionnaire and interview).

### **3.9.1 Reliability of the Study**

The researcher ensured reliability of the instrument by conducting a minor pilot study to test the reliability and validity of the questionnaires. The pilot study was conducted at Kisarawe whereby 5 households were asked to fill the questionnaire and one ward executive was interviewed to determine whether the questions are understood or not to minimize errors, time to be consumed when filling the questionnaires, and to check whether the constructs are effectively covered. The researcher accommodates the comments of those informers who were involved in pre-testing to modify the instruments.

### **3.9.2 Validity of the Study**

To ensure validity the study employed triangulation strategy whereby data source triangulation and methodology triangulation. Through data triangulation, the

researcher collected data from multiple sources: primary source and secondary source. Methodological triangulation facilitated in collection of data using more than one method (face to face interviews, questionnaires, and document search). Therefore, triangulation helped to enhance the trustworthiness of the data generated, because the weakness inherent in one method or source will be offset by the strength of another.

### **3.10 Ethical Issues**

Ethical consideration is part of the research works, and cannot be avoided, (Bryman, 2004). The major aspects to consider ensuring adherence to ethical rules includes voluntary participation, the right to privacy, Freedom and Anonymity and Confidentiality, (Bless & Smith 2000). Observation of research ethics helps to protect the rights of the research participants, develop a sense of trust with them, and promote the integrity of the research (Israel & Hay, 2006).

According to Creswell, (2009); (Kombo& Tromp 2006), it is mandatory that research participants get informed before they are approached for data collection. To comply with this, the respondents were informed before data collection using consent letters. Consent letters containing important information about this research, and the importance of their participation in the study. The aim was to seek their consent, ensure voluntary participation and provision of information, as well as giving them free room to withdraw from the research participation any time they wish to, further researcher observed confidentiality in research study. In this study, the names of the respondents in the entire study were kept anonymous. This will reduce the possibility of the participants being recognized.

### **3.11 Chapter Summary**

This Chapter has discussed the design and methodology that used in the current study in terms of study area, research paradigm, research approach and research design, population and sampling design and techniques, types of data to be collected, data collection methods, data analysis techniques, validity of the study and reliability of the study and ethical consideration in terms of approval, consent, confidentiality and participative not forced participants.



## **CHAPTER FOUR**

### **RESULTS AND DISCUSSION**

#### **4.1 Introduction**

This chapter presents results and findings as regards the role of rural electrification in household welfare in Tanzania specifically at Kisarawe District. This study determined types of households' business investment before and after rural electrification in Kisarawe District, also examined difference on income accrued before and after rural electrification in Kisarawe district households and examined examine the difference on households' welfare before and after rural electrification in Kisarawe district households. Tables and figures were used to present the findings.

#### **4.2 Demographic Characteristics**

In this study, to have a better understanding on the demographic characteristics and specifications of the respondents, frequency and percentage analysis have been used. The samples of the questionnaires were taken from households' who consisted of 378 sample sizes. Totally, there were four questions that give a brief overview of demographic attributes of respondents, as presented below.

##### **4.2.1 Gender of Respondents**

The study involved a sample of 378 (100%) respondents who filled the questionnaires. 193 (51.0 %) of total respondents were male and 185 (49.0 %) were female. The results in the Table 4.1 reveal that there was slightly difference between male and female respondents. Therefore, these findings imply both genders were involved in the study (Table 4.1). Previous studies on whether gender matters on household welfare

found that both genders contribute to the improvement of household's welfare, however the extent of contribution is high among men compared to their female counterparts (Kidole, 2015). Matimbwa (2020) asserted that women spend more of their income on the children's daily needs because they spend more time with them. Bruck et al (2016) purports that since women tends to come more frequently and in smaller amount, it may be more readily spent on households' daily subsistence needs than lumpier seasonal income, which tends to come to men and is likely to be spent on more expensive items.

**Table 4.1: Respondent's Gender**

<b>Gender</b>	<b>Frequency</b>	<b>Percent</b>
Male	193	51.0
Female	185	49.0
<b>Total</b>	<b>378</b>	<b>100.0</b>

Source: Field Data (2020)

#### **4.2.2 Age of Respondents**

Age was considered as an important variable in the role of rural electrification on households' welfare at Kisarawe District in Coast Region. The study findings in Table 4.2 show that 15 (4.0%) respondents were from the age group between 18 and 24 years. 147 (39.0) respondents were from the age between 25 to 34 years. 143 (38.0%) were from the age group between 35 and 44 and 15 (4.0%) were from the age group between 45-54 years and the remaining 58(15.0%) were having more than 54 years of age. The statistics signify that all age groups were considered during data collection. However, many respondents who were more than half were from the age group between 25 to 34 years. Regarding age and household welfare Janjua and Kamal

(2011) found older adults are more likely to be poor than younger adults, but social security provisions have lifted most retired older adults above the official poverty line in industrialized countries. This could be explained by the fact that older people are less energetic compared to younger generation who involve themselves in different income generating activities to cover their cost of living.

**Table 4.2: Age of Respondents**

<b>Age group</b>	<b>Frequency</b>	<b>Percent</b>
18-24	15	4.0
25-34	147	39.0
35-44	143	38.0
45-54	15	4.0
55-64	58	15.0
<b>Total</b>	<b>378</b>	<b>100.0</b>

Source: Field Data (2020)

### **4.3 Respondents' Education Level**

The study findings found that majority of respondents 199(52.7%) had secondary education, while 129(34.1%) had primary education, 42(11.0%) had college/university education and the remaining 8(2.2%) had no formal education. This indicates most rural households' holds primary and secondary education. Natali and Morrati (2012) argue that education level of households has relationship with status of household welfare because the increase in the education level of household influences productivity and may affect individual incomes and the efficiency of the other family members. Also, Janjua and Kamal (2011) asserted that when education levels for households' heads rises, households' poverty risks weaken. As level of education plays a significant role in determining households' welfare and high education provides crucial and increasing benefits

**Table 4.3: Respondents` Education Level**

<b>Education Levels</b>	<b>Frequency</b>	<b>Percent</b>
No Formal Education	08	02.2
Primary Education	129	34.1
Secondary Education	199	52.7
College/University Education	42	11.0
<b>Total</b>	<b>378</b>	<b>100</b>

#### **4.3.1 Respondents Employment Status**

Regarding respondents' employment status the study found that 280(74.1) of respondents were self-employed, 39(10.3%) were retired officers, 42(11.1%) were neither employed nor self-employed and the remaining 17(4.50%) were employed either in public organization or private organizations. Tran et al (2018) found positive relationship between households' employment status by saying that employed/self-employed households had more income and, in most cause, they have ability to cover cost of living such as food, education and health.

**Table 4.4: Respondents` Employment Status**

<b>Employment status</b>	<b>Frequency</b>	<b>Percent</b>
Employed	17	4.50
Self employed	280	74.1
Retired	39	10.3
Unemployed	42	11.1
<b>Total</b>	<b>378</b>	<b>100</b>

Source: Field Data (2020)

#### **4.4 Types of Household's Business Investment before and after Electrification**

Regarding the type of business investment researcher was interested to know if there is any difference before and after rural electrification. Results in Table 4.5 reveal the following as it has been found that before electrification households use old diesel

grain machine but after electrification households used electric milling machine because those who do those businesses changed their machine from diesel to electric engine machine. Also, in irrigation previously most agriculture businesspeople used manual way of irrigating but after electrification they move from manual to electric pumping machine, which was found to save time, and serving a greater number of clients and earning more money.

Moreover, most carpentry activities were done manually before electrification but after electrification carpenter use electric carpentry, and even the number of carpenters increased. Not only that before electrification most businesspeople especially women bake their products using local means such as charcoal and wood which is not the case after electrification, they are using baking machine and nowadays even in village you can find good breads. Furthermore, before electrification many businesspeople had local “changaa” and local beers like bananas but after electrification now opened bars with fridge and local beers as well as modern beer like Kilimanjaro, Castle lite etc.

Also, the study found business investors had stationers which selling exercise books pens etc. without offering printing and photocopying services however after being electrified these people had advanced their business by having machines for scanning, photocopying, and printing. Lastly welding workshops were increased and improved after electrification even saloon both for women and men were modernized with electric machine instead of scissors and razor blades. These findings are in line with Kidole (2015) who found electrified business households were having businesses such as bar (40.0%), mobile phones charging (20.0), shops and iron welding (11.7%) grain milling (10.0%) saloon (3.3) and CD burner (3.3%).

**Table 4.5: Respondents` Types of Business Investment**

<b>Types of business investment</b>	<b>Before electrified</b>	<b>After electrified</b>
Grain milling	Old diesel machine	Electric milling machine
Irrigation	Manual way of Irrigation	Electric pumps for irrigation
Carpentry	Use generators	Use electricity in carpentry
Baking	Use wood and charcoal	Baking machines
Bar	Local bar/ clubs	Bars with electricity and beers
Stationeries	Stationeries without photocopying and printing machines	Stationeries with photocopying and printing machines
Welding workshops and garage	Local garage	Updated garage with electric for welding and other garage activities
Saloon	Normal plating of hair	Saloon for steaming, curling, drier machines

Source: field data (2020)

These findings also supported by village executive officer who cemented that

*“Most of the businesses in this village gained more profits after electrification and jobs were created after electrification as rural businessmen work more smartly, bringing new machinery and processes to make more efficient, reduce their costs and offer products and services. You may find videos centres “vibandaumiza” which we use to watch matches example Vodacom premier league, but before electrification we just listen football match through our radios.*

Another key informant said that

*“One household at Chumuli, a mill owner has transformed her own business by introducing electric milling machine, is one of those champions. She was keen to encourage other entrepreneurs to learn benefits of electrification and connect themselves. Also, I had one household’ who was using an old diesel machine for milling flour that was costly to operate. Though initially he was hesitating to purchase electric engine but later he managed to purchase the electric machine and within a short timespan there has been a big impact in his life as we talked, he has new motorbike and new house.*

Similar results were obtained by Dasso (2015) in Ghana he found, access to electricity enables the modernization of agriculture (e.g., use electric pumps for irrigation) and the reallocation of working hours, which can raise earnings and improve welfare. The

modernization of agriculture and extended business hours can provide increased employment opportunities to electrified communities, which can affect welfare.

Also, the findings conform with the study by Kirubi, Jacobson and Mills (2008) in Kenya found access to electricity enables the use of electric equipment and tools by small and micro enterprises, resulting in significant improvement in productivity per worker (100–200% depending on the task at hand) and in a corresponding growth in income levels in the order of 20–70%, depending on the product made. Access to electricity simultaneously enables and improves the delivery of social and business services from a wide range of village-level infrastructure (e.g., schools, markets, and water pumps) while improving the productivity of agricultural activities.

#### **4.5 Income Accrued before and after Rural Electrification**

The study also examines if there is any difference on households' income before and after rural electrification. Results in Table 4.6 illustrate; Income accrued was grouped into the following categories 50,000 to 200,000; 201,000 to 400,000; 401,000 to 600,000; 601,000 to 800,000; 801,000 to 1,000,000, 1000,001 and above per month.

Results depict that 113 (30.0%) of respondents asserted that their income was less than 200,000 before electrification however after electrification they managed to increase their income by 7% after being electrified, also 141(37.0%) said their income ranged between 141(37.3) before electrification but increase to 4.2% after electrification, others 54(14.3%) had income between 401,000 to 600,000 however after electrification their income increased by 3.4%, likewise 16(4.0%) declared that their income ranged from 601,000 to 800,000 before electrification and increased by

2.0%, and 18(5.0%) had income of 801,000 to 1,000,000 which increased to 3.0% and the remaining 20(6.31%) had income of above 1,000,000 increased to 3.79%.

These findings are in line with Kidole (2015) as he found the household annual income ranged from 800,000 Tshs. to 46,000,000 Tshs and there were statistically significant differences in income between households with grid electricity services and those without. Greenstar (2004) also conform the study findings he argued that significance of better lighting for increased income generation attributable to extension of business hours in the evenings. The author cites examples of tailors who worked for four more hours and thereby increased their revenue by 30% in Bangladesh.

Results from interviews were not far from the above; ward executive officer indicated that: those who were electrified their business expand and increase their income. He spoke.

*“...I am happy that electricity has increased households’ income. In many ways electricity enabled households to modernize their businesses example electricity water pumping, electric engine milling machine and modernized saloons and by doing so their income, and by using this electricity they were able to invest in their businesses, make profit and expand their businesses...”*

These findings are in line with Chaplin (2017) found rural electrification increase labour supply of men and women, schooling of boys and girls, households per income and expenditure, reduce poverty, but the larger share of benefits use accrues to wealthier rural households, with poorer ones having more limited use of electricity. The study further clarifies that electricity access is found to improve the gross income of household compared to households without access.



Moreover, the study findings conform to Karumba and Muchapondwa (2019) study, which found on average households without connected to hydroelectricity consume 1.5 liters less kerosene per month compared to households without any electricity connection. Also, non-connected households spend 0.92 USD more for recharging their cell phones batteries per month in comparison to those who were using micro hydroelectricity service.

**Table 4.6: Respondents` Income Accrued Per Month**

<b>Respondents' income accrued</b>	<b>Before electrified</b>	<b>After electrified</b>
50,000- 200,000	113(30.0%)	140(37.0%)
201,000-400,000	141(37.3%)	157(41.5%)
401,000-600,000	54(14.3%)	57(17.7%)
601,000-800,000	16(4.0%)	23(6.00%)
801,000- 1,000,000	18(5.0%)	32(8.00%)
1000,001 and above	20(6.31%)	38(10.1%)

Source: Field Data (2020)

#### **4.6 Households' Welfare before and after Rural Electrification**

The current study examined if household welfare were different before and after electrification. Household's welfare was determined by ability to cover basic needs like food, shelter, education, health, and ownership of assets.

##### **4.6.1 Living Conditions**

On living conditions results in the study revealed through 36.4% of the respondents that they had mud floor before electrification whereby 30.7% indicate that they had un-plastered walls before electrification. This indicates that their living conditions was very bad and had not changed for the better. On the other hand, though 11.3% of the

respondents said they had mud floor after electrification because they changed the way they were doing business and 7.6% had un-plastered walls after electrification; therefore, the study found that after electrification, respondents improved their living conditions.

However, they managed to renovate their houses as they cemented their floors, had their houses roofed with iron sheets, plastered their house walls and having access to basic needs (such as food, shelter, and clothes). To support the study, Zaman (2000) revealed that, before rural electrification the low-income households failed to meet the basic needs of life (food, shelter, and clothes). Also, Town and Zone (2014) found that electrification of businesses had an explicit potential that intends to improve the livelihoods of households.

**Table 4.7: Living Condition**

<b>Response item</b>	<b>Before electrified</b>	<b>After electrified</b>
Mud floor	36.4%	11.3%
Un-plastered walls	30.7%	7.6%

Source: Field Data (2020)

The study also found that, the household welfare of respondents improved after taking being electrified compared to before. This was revealed through interview as one respondent had this to say.

*“Before taking electrification my business, it was hard times, and I could hardly afford the daily family needs. On top of that, the business was not doing well. But right now, I managed to build my business and I can see changes in family welfare as I have been able to meet almost all their needs...”. Another one quick added; “the electrification which was done few years back has really helped me a lot. I had so many*

*challenges regarding growth of my business which hampered the welfare of my family. It is now easy to cater for my family needs since the business is doing well...”*

#### **4.6.2 Education Status before and after Electrification**

The study results found that 57.1% of the respondents before accessing electricity sent their children to the government schools compared to after accessing electricity whereby only 7.6% of the respondents enrolled their children to government schools. Also, the study revealed that only 11.1% of the respondents sent their children to private schools before electrification while 30.8% of the respondents sent their children to private schools after electrification.

The findings imply that education status of respondent's children has improved after electrification whereby they now afford to buy scholastic materials, paying school fees, send their children to private schools and paying transport for their children to and from school. This means that, the increased income obtained from their businesses which were modernized due to electricity was used to take their children to school as the result of household welfare.

The findings supported by Hussein and Filho (2012) who argued that the modern sources of energy are required for the improvement of living standards by creating employments and boosting productivity. Also supply of energy provides lighting of homes, cleaner fuels for cooking and heating. The study found essential aspects of human welfare (leading long and productive life, enjoy good health, have access to knowledge and education opportunities, having enough income to supply themselves with ample nutrition, shelter and other materials and aesthetic needs) may improve only if energy is available for all.

**Table 4.8: Education of their Children**

<b>Response item</b>	<b>Before electrified</b>	<b>After electrified</b>
Government schools	57.1%	11.3%
Private schools	7.60%	30.8%

Source: Field Data (2020)

#### **4.6.3 Health Status**

Findings from the study revealed that 40.7% of the respondents were faced with inability to access medical services like x-rays and ultrasound however after electrification most of respondents managed to access better health services because hospital are now using modern health equipment's in providing services. Also 13.2% of the respondents were able to buy medicine before electrification while 36.2% were able to buy medicine after electrification. The findings imply ability to pay for medical services were enhanced as electrification had enabled to improve their business and earning more income, and by having high income increase ability to pay for medical expenses.

**Table 4.9: Health Service**

<b>Response item</b>	<b>Before electrified</b>	<b>After electrified</b>
Improved health equipment's	40.7% %	48.9%
Ability to pay for medicine	13.2%	36.2%

Source: Field Data (2020)

These findings collaborate with the study findings by Matimbwa (2020) in her study found that electricity enable rural households to engage in activities that generate income- by providing lighting that extends the workday and powering machines that increase output and raises the productivity. Also, it was found that rural electrification

improved health by powering equipment's for pumping and treating raw water, also electricity enables health clinics to refrigerate vaccines, operate medical equipment's and provides treatments after sunset. Not only that rural electricity provides lighting to schools thereby allowing people to study at night and thereby allowing their employment prospects.

Additionally, it was found in interview where majority of the respondents indicated that they increased their access to health services because most of them are now members of health insurance schemes such as Community Health Fund (CHF), one respondent argued that.

*“...Rural electrification has helped me to increase my access to health services because of the income generated from business. I am now a member of CHF, whereby now I use TIKA (TIBA KWA KADI) for which I pay only 10,000/= a year. Hence, the whole of my family can easily access health services from the near public hospital...”*

#### **4.6.4 Food Security Status Before and after Electrification**

The study results found that, 29.6 % of the respondents were buying food before rural electrification, while 7.6% of the respondents was buying food before rural electrification. On the same note, 8.8% of the respondents used improved farming inputs before electrification as compared to 17.6% of the respondents who used improved farming inputs after electrification.

Also 23% of the respondents were affected by pests before rural electrification while 16.4% of the respondents were affected by pests after electrification. This indicates that before electrification it was not easy for respondents to manage farming inputs expenses, which led to poor participation in agricultural activities, which resulted to

buying food for their household. But after rural electrification they were capable to afford farming inputs expenses and engaged in crop production, which led to availability of food. Also, after electrification they were able to buy pesticides as the number of respondents who affected by pests declined to 6.6% after electrification.

To support the study Ouma (2013) observed that, rural electrification enabled clients consumed more nutritious and diverse diets compared to those of non- electrified because of the income generated difference. Furthermore, households that could access microcredit would build their capacity to produce more and enhance their food security status using improved seeds and adoption of improved technologies, (Bogale and Shimelis, 2009).

Moreover, interview results conform to the qualitative study also, one of the respondents commented.

*“...Before electrification I wasn’t be able to get all the necessary food stuffs for my family because the household income was very low. Therefore, we were used to having the same cheap foods every day but now we are able to change our diet due to increased income from small business that am doing...”*

#### **4.6.5 Assets Owned after Electrification**

The study results found that 22% of the respondents owned mud houses before electrification while 9.9% of the respondents owned mud houses after electrification. This implies that respondents used the increased income to build better and renovate their houses to improve household welfare. The results conform to that of Todd (2000) who found that clients had completely moved out of poverty through owning valuable productive assets like machinery, vehicles, livestock, and better houses. Also, Brannen

(2010) revealed that rural electrification was able to access more household assets like mattresses, radios, stoves, and beds than non-clients.

The same findings were obtained in interview, as key informant cemented that:

*“...Through the profit I get from my business because of electrification, I managed to buy household furniture including refrigerator, I used to make ice cream and sale it to students. This helps to supplement household income; this is apart from my business said the respondent...”*

### Regression Output

Also, similar findings were obtained in regression analysis as seen in the 4.10 below where rural electrification were found to influence change of business investment, income accrued and households' welfare in a positive way. The findings show rural electrification has more influence on income accrued as the p value is less than 0.05, followed by change of household's welfare in terms of ability to afford living cost, education, health, ownership of assets as the p value obtained is 0.003.

**Table 4.10: Regression Output**

Model	Coefficients			t	Sig.	
	Unstandardized Coefficients		Standardized Coefficients			
	B	Std. Error	Beta			
	(Constant)	1.773	1.665		1.064	.289
	Business investment	.002	.044	.004	.056	.004
1	Income accrued	.493	.045	.709	10.852	.000
	Households' welfare	.072	.051	.092	1.409	.003

a. Dependent Variable: Household welfare improvement

Not only that the study has found that rural electrification has assisted the households to change their business with p value of 0.004. These findings imply with rural electrification income of most households were increase because of the change of business in a more modernized way, and with this change which facilitate their income to rise as enhance their ability to afford the cost of living in different ways. These findings are in line with (Toman and Peter, 2017).



## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter commences with a summary of the study explaining important elements including the purpose of the study, specific objectives, research methodology used and major findings or results. The chapter winds up with recommendations as well as areas for further studies.

#### **5.2 Conclusion**

First, regarding types of business investments before and after electrification the study conclude that households of Kisarawe were doing several businesses investments such as electric engine milling machine, electric pumping machines, modern saloons, modern bars, baking, and stationeries with scanners, photocopying machines, carpentry.

Secondly on income accrued before and after electrification the study conclude that that their income was less than before electrification however after electrification, they managed to increase their income.

Thirdly on households' welfare the study concludes that household's welfare in terms of were improved access to better health, education food security and living conditions were improved. As households' ability to access better schools were enhanced as some sent their children to better schools including private schools, also their ability to buy food were enhanced as well as ability to pay for health services. In

short, their living conditions were improved from mud house to good house with plastered walls.

### **5.3 Recommendations**

#### **5.3.1 General Recommendations**

To increase households' income and therefore reduce poverty in Tanzania, the government should hasten the pace of rural electrification.

The government and TANESCO should come up with solutions to the various problems that limit expansion of the services and therefore ensure that more people in rural areas access electricity while at the same improving the quality of grid electricity services to its customers.

#### **5.3.2 Recommendations for Future Studies**

This study has been focused on the role of rural electrification on household welfare specifically by considering types of business investment, income accrued and households' welfare (living condition, Food security, Education, health status) hence future study can focus on other effects of rural electrification on other issues.

The current study was cross sectional hence I recommend future study to be longitudinal to observe the role of rural electrification on households' welfare over time as in most of the time there is change on the extent of rural electrification.

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## APPENDICES

### Appendix I: Questionnaires

**Dear respondent,**

I, Neema Lotang'amwaki Sembeo, I am a student at Open University Tanzania pursuing a master's degree. I am in my second year of study and as part of the program's requirements; I must conduct a research study. The study is on **The Role of Rural Electrification in Household Welfare In Tanzania: A Case of Kisarawe District – Coast Region**. This questionnaire has been designed for the sole purpose of collecting data on above mentioned topic. Therefore, I am requesting you to respond to the best of your knowledge. The data you provide will be treated as highly confidential, solely used for academic purposes and not otherwise. You are kindly asked to fill out this questionnaire by putting a “tick” against the applicable cell or provide your answer to the space provided. Your participation is highly appreciated.

#### Section A : Respondents Profile

**Please put a tick (✓) in the appropriate box () as the most agreed answer to the following questions:**

##### 1.1 Specify your Sex:

Male

Female

##### 1.2. Specify your Age range:

18-24     25-34     35-44     45-54     55-64     65 and above

**1.3. Specify your education level:**

- Primary level
- Secondary level
- Certificate level
- Diploma level
- Degree level
- Other, please specify.....

**1.4 Households Employment Status**

- Employed    Self-employed    Retired    Never employed

1.5 Is there any change in business investment before and after rural electrification? If yes explain.....

1.6 . What was the monthly household income before rural electrification?  
.....  
.....

1.7. What is the approximate monthly household income after rural electrification?  
.....  
.....

1.8. How do you spend the increased amount of income?  
(a) Business improvement (b) Add business capital (c) Household expenditures

1.9. Have you managed to expand/improve your income generating activities after rural electrification?

[A] YES [B] NO

2.0. What is the Living condition situation of your household before and after rural electrification?

<b>Living condition indicators</b>	<b>Before electrification</b>	<b>After electrification</b>
Mud floor		
Grass thatched roof		
Un-plastered walls		

2.1. Please, indicate if you were able to meet education services of the household before and after rural electrification?

<b>Education status</b>	<b>Before electrification</b>	<b>After electrification</b>
Scholastic materials		
Fees payment		
School type (Government)		
School type (Private)		

2.2. Please, indicate if you were able to meet healthy services of the household before and after rural electrification?

<b>Healthy status</b>	<b>Before electrification</b>	<b>After electrification</b>
Ownership of NHIF cards		
Ability to buy medicine		
Paying out patient bills		
Frequency of illnesses		

2.3. What was the food security status of the household before and after rural electrification?

<b>Food security status</b>	<b>Before electrification</b>	<b>After rural electrification</b>
Improved farming inputs		
Pests Infestation		
Enough food		
Buying food		
Three meals per day		
Balanced diet		

2.4. Please, indicate the type of assets you own before and after rural electrification?

<b>Assets owned</b>	<b>Before electrification</b>	<b>After rural electrification</b>
Land ownership		
Motorcycle		
Mobile phone		
Television		
Livestock		
Household furniture		
Mud house		

2.5. Apart from assets what are the other needs do you afford to pay after rural electrification?

.....

**Appendix II: Check List for Key Informants- VEO AND WEO**

1. Is there any difference on business investment in this ward before electrification and after electrification? Please explain
2. Does rural electrification contribute to the household income?
3. Is there any change on household welfare before and after rural electrification?
4. Do the household businesses expand after rural electrification? Explain
5. Do the household living condition improved after rural electrification?

**Thank You Very Much for Your Co-Operation**

## Appendix II: Research Clearance Letter

### THE OPEN UNIVERSITY OF TANZANIA

#### DIRECTORATE OF POSTGRADUATE STUDIES

P.O. Box 23409  
Dar es Salaam, Tanzania  
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**Our Ref: PG201801136**

**27<sup>th</sup> October 2020**

**Town Executive Director,**

Newala Town Council,

P.O.Box 31,

**MTWARA.**

#### **RE: RESEARCH CLEARANCE**

The Open University of Tanzania was established by an Act of Parliament No. 17 of 1992, which became operational on the 1<sup>st</sup> March 1993 by public notice No.55 in the official Gazette. The Act was however replaced by the Open University of Tanzania Charter of 2005, which became operational on 1<sup>st</sup> January 2007. In line with the Charter, the Open University of Tanzania mission is to generate and apply knowledge through research.

To facilitate and to simplify research process therefore, the act empowers the Vice Chancellor of the Open University of Tanzania to issue research clearance, on behalf of the Government of Tanzania and Tanzania Commission for Science and Technology, to both its staff and students who are doing research in Tanzania. With this brief background, the purpose of this letter is to introduce to you **Ms. LOTANGAMWAKI, Neema Sembeo Reg No: PG201801136** pursuing **Master of Arts in Monitoring and Evaluation (MAME)**. We here by grant this clearance to conduct a research titled **“Role of Rural Electrification in Household Income in Tanzania”**. She will collect her data at your area from 23<sup>rd</sup> October 2020 to 30<sup>th</sup> November 2020.

In case you need any further information, kindly do not hesitate to contact the Deputy Vice Chancellor (Academic) of the Open University of Tanzania, P.O.Box 23409, Dar es Salaam. Tel: 022-2-2668820. We lastly thank you in advance for your assumed cooperation and facilitation of this research academic activity.

Yours,

**THE OPEN UNIVERSITY OF TANZANIA**

Prof. Magreth Bushesha

**DIRECTOR OF POSTGRADUATE STUDIES.**