

SOCIO-ECONOMIC IMPACT OF RURAL ELECTRIFICATION IN GHANA:
THE CASE OF GA EAST MUNICIPALITY

By



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CERTIFICATION

I hereby declare that this submission is my own work towards the CEMBA and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University except where due acknowledgement has been made in the text.
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I am indebted to God Almighty for granting me the strength, wisdom and courage for completing this research project.

I am also sincerely grateful to Dr Seth Agyemang, my supervisor without whom I would not have been able to complete this project successfully. His in-depth knowledge in rural

development, critical and quick analysis, and words of encouragement enabled this project to come this far.

I am also grateful to my wife, Anita Adams for her words of encouragement.

Mr. Nelson Yeboah of Electricity Company of Ghana cannot be left unmentioned for the vital information he availed for this research work.

Finally, I thank all other persons who in diverse ways contributed to the successful completion of this project not forgetting my respondents whose co-operation provided the primary data for the analysis.



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ABSTRACT

Lack of access to electricity is one of the major impediments to growth and development of the rural economies in developing countries, whereas the provision of same is associated with many benefits. The major objective of this study was to assess the socioeconomic impact of rural electrification project on rural areas in Ghana, using selected rural communities in Ga East Municipality in the Greater Accra Region as case study. Specifically the study sought to determine the general and most important uses of electricity, the changes that have been brought as result of the availability of electricity and examine people's perception about the impact of electricity as well as challenges associated with the enjoyment of electricity in rural areas. In collecting data, questionnaires were designed for three groups of respondents namely households (30), businesses (30) and teachers (20). Some engineers at the Electricity Company of Ghana were also interviewed. This constituted the primary source of data. Data was also obtained from secondary sources such as World Bank reports, journals from Ministry of Energy, Ghana and other relevant journals. The study found that the absence of grid electricity made life not worth living. Households were facing a lot of inconveniences, businesses were not operating effectively and efficiently and teachers were also hindered from exercising their full capacity.

However, the presence of grid electricity has brought an improvement in the standard of living in households. Businesses have seen some progress in output levels, profits and customer—base while eaching has been made more effective.

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CHAPTER ONE

INTRODUCTION

1.0 Background to the Study

Electricity is undeniably one of the most fundamental needs of modern society. It is also a key bedrock for socio-economic development; and driving force for industrialization. From our homes to the streets to the working place, electricity is what provides the light and the energy for us to live in dignity. Rural electrification is significantly linked to rural development, being positively associated with the two most critical inputs irrigation and innovation-in the agricultural sectors. It also has positive effects on development of rural industry and services. Further, it has major impacts on agricultural and industrial productivity, reduces rural-urban migration, creates more jobs and significantly raises the overall quality of life in rural areas (Samantha and Sundaram, 1983). One of the lasting legacies of Ghana's first President Osagyefo Dr. Kwame Nkrumah was the construction of the Akosombo Hydro-electrical power dam. From its use for studying, powering businesses, entertainment, etc, the beneficent utility of electricity is felt almost everywhere. Other quantifiable potential uses and benefits are cost saving and productive-industrial uses, agricultural uses as well as commercial uses (World Bank/IEG, 2008). Rural electrification is now among the priorities in government plans and development policies, particularly in developing countries.



—But the enjoyment of electricity is often taken for granted. While we enjoy it, we easily forget that some segments of our population have no access to it, and are thus living

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almost sub-human lives. We also tend to forget that at some point in our individual and community lives, this facility was not at our disposal, and that its presence now has caused a massive turn-around in our destinies.

Electricity is a basic need, and access to it is a basic human right. This is reflected in many international conventions and accords such as the Elimination of All forms of Discrimination Against Women (CEDAW) under article 14 (2) (h) and the International Covenant on Economic, Social and Cultural Rights (ICESCR) under article 11 (1) (Tully, 2007). Since Ghana's independence and especially in recognition of the strategic role of electricity in national development, successive governments have made one effort or the other to extend electricity coverage in the country. In 1989, the National Electrification Scheme (NES) was established as Government's principal instrument to achieve its policy of extending the reach of electricity to all parts of the country over a thirty-year period from 1990-2020. The goals and objectives of the programme were as follows:

i) Poverty reduction, especially in the rural areas; ii) Increasing the overall socio-economic development of the nation; iii) Increasing people's standard of living, especially those in the rural areas; iv) Creating small-to medium-scale industries in rural areas;

v) Enhancing activities in other sectors of the economy, such as, Agriculture, Health, Education, Tourism, etc.

vi) Creating jobs in the rural areas and thus reducing the rate of rural to urban migration.

A key strategy to developing rural areas has been the need to provide, among other things, electricity to these rural areas. It has been the longstanding hope of government that providing electricity to areas that lack them would provide the needed catalyst spiralling these areas on the path of rapid development, as a means of providing access to modern social amenities, and also bridging the yawning development gap between rural and urban areas. The provision of electricity to rural areas, it has been expected, would help halt the spate of rural-urban migration, spark the setting of industries that would provide skilled manpower, offer jobs, and provide market for agricultural goods, among others. In Ghana rural electrification has featured on the agenda of central government through its agencies including the Ministry of Energy and Petroleum, Ministry of Local Government and Rural Development, the Northern Electricity Development Company, Volta River Authority and the Electricity Company of Ghana.

A variety of measures have been suggested to improve the current rural electrification strategy, including the targeting of small-scale businesses and the promotion of increased productive use. This ensures that the general economic conditions of the connected households will be improved and that households, consequently, will be capable of covering the monthly charges. V In this way rural electrification could contribute to the general improvement of living conditions in rural areas, and the longterm financial sustainability of the electricity providing utilities could be ensured (Electrifying3frica: **Grid Extension Models** in Sub-Saharan Africa).

Thiystudy seeks to assess the socio-economic impact of rural electrification on rural communities in Ghana, using the Ga East Municipal Assembly as case study.

1.1 Problem Statement

Access to electricity is vital for the rural economy and rural development process (Mainali, 2011). Without electricity, there would be limited growth in economic activities in rural areas. One of the major issues confronting successive governments in Ghana has been the urgent need to bridge the development gap between rural and urban areas. It was realized that, whereas the urban areas such as Accra Kumasi, Tamale, etc, are well endowed in terms of modern amenities such as quality roads, good drinking water and electricity, among others, the same could not be said of rural areas. This had various implications for overall development of the country as it led to among other things, continued underdevelopment of the rural areas alongside rural-urban migration, increasing poverty, etc. Consequently, as a matter of priority, several efforts have been made to provide these neglected areas with some basic amenities in the expectation that they would help to halt the extent of degradation and squalor in these communities.

One instrument for delivering this quality of life in rural Ghana has been the provision of electricity. Without quality, safe and reliable electricity services there is little possibility of enjoying modern day life via utilizing modern electrical appliances, welding equipment, and machinery which may pave the way for small and rural industries. Also, without convenient lighting, businesses such as bars and retail shops would not be able to operate effectively. It is also worthy to note that, grid electricity is comparatively cheaper than other sources of power.

While government efforts have contributed immensely to connecting many rural areas in Ghana to the electricity grid, there still remain many communities that are living in darkness. In order to provide the evidence for government's continued attention to the

laudable dream, there is the need to come out with research on how the provision of electricity to rural areas is helping to improve quality of life and ensuring social and economic development at the individual, community and household level. Sadly, this is an area that there is not much research.

The need to fill this gap in the literature and contribute to knowledge in the broader field of rural development motivated this study, which aims to assess the socio economic impact of rural electrification in Ghana using Ga East Municipal Assembly as a case study. The study will uncover how communities were getting on before and after the rural electrification, and as well highlight the benefits and their welfare implications on individuals and the communities as a whole. Problems of funding towards the realization of rural electrification is very significant, it is for these reasons that the study also seeks to identify the importance and the justification of rural electrification.

1.2 Objectives of the Study

The main objective of the study was to assess the socio-economic impact of the rural electrification project on rural areas in Ghana, using the Ga East Municipal Assembly as a case study. The specific objectives are to:

1. Determine the general and most important uses of electricity in rural areas for households, small industries and teachers.
2. Identify the changes that have been brought about in rural households, businesses and education as a result of the availability of electricity.

3. Examine people's perception about the impact of electricity as well the challenges associated with enjoyment of electricity in these areas.

1.3 Research Questions

The key research questions that guide the research are as follows:

1. What are the general and most important uses of electricity in rural areas for households, small industries and teachers?
2. What changes have been brought about in rural households, businesses and education as a result of the availability of electricity?
3. What are people's perception about the impact of electricity as well the challenges associated with enjoyment of electricity in these areas?

1.4 Study Justification

Rural Electrification is a major preoccupation for many developing countries especially in Sub-Saharan Africa and Asia. It is believed that it is the catalyst for socio-economic development. Most rural electrification projects are funded by donor agencies. The research findings are anticipated to provide a better understanding to donor agencies, entrepreneurs, modern energy suppliers, policy makers and other modern energy patrons. The findings are expected to facilitate and stimulate the productive uses of grid electricity for increasing income generating activities. Additionally, the research is aimed at contributing towards examining whether electricity services will facilitate the increase

in performance and increase in income of commercial, farming and social network activities in rural areas.

The findings of the study would provide useful insights for the Ministry of Energy and Petroleum, Electricity Company of Ghana, Northern Electricity Development Company and the Volta River Authority to expand access of electricity to both rural areas and the informal sectors of the economy. It could also motivate the rural poor who depend much on small scale industries as a source of their income to advance their business plans and use electricity services productively. Rural electrification has been going on several years ago in Ghana and other parts of the world. The impact of it on the social and economic wellbeing of beneficiary communities and citizens of Ghana has to be assessed to inform stakeholders about the significance of such projects. Electricity Company of Ghana is now seeking consultants to assess the socio-economic impact of completed rural electrification projects in several hundreds of villages.

It is for these reasons that it was thought prudent to conduct an intensive study on Ghana's rural electrification using Ga East Municipal Assembly a suburb of Greater Accra Region as a case study.

1.5 Delimitation

The study was-limited to households that are connected to the national electricity grid, businesses that hitherto were using other means of electric energy but are now benefiting from grid electrification and teachers who work in schools with access to grid electricity.

1.6 Organization of the Study

This is an academic research work, aimed at assessing the socio-economic impact of rural electrification in Ghana, with the Ga East Municipality in the Greater Accra Region as case study. The study is organised into five main chapters. Chapter One forms the introductory part of the research work. This first part provides the contextual background of the research, statement of the problem, the research objectives, the research questions, brief outline of the methodology, justification of the study and the delimitations of the study.

Chapter Two is the literature review. This part outlines the literature review of the study, which provides support for the current study. The chapter defines rural electrification, talks about the objectives and the need for rural electrification and global institutional supports. It also discusses the impact of rural electrification. Chapter Three highlights the methodology adopted for the research. Issues presented in it include the research design, target and study population, sample procedure and sample size, types and source of data, research instrument, administration of research instrument and data collection. Chapter Four analyses and presents the field data obtained for the research. It is devoted to the presentations and analysis of the results and discussion of the findings collected in the study area. The final chapter, Chapter Five, takes an overview of the whole study and also includes the conclusion and recommendations of the entire work.



CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The objective of this chapter is to provide support for the current study which is aimed at assessing the socio-economic impact of rural electrification in Ghana, using Ga East Municipality as a case study. The socio-economic impact assessment of rural electrification has been conducted by many agencies, researchers and institutions like the World Bank, Asian Development Bank among others. The review is presented under seven main headings namely, definition and characteristics of rural areas, definition of rural electrification, objectives of rural electrification, the need for rural electrification and institutional contributions, impacts of rural electrification, cost benefit analysis and finally the conceptual framework within which the work is situated.

2.1 Definition and characteristics of rural areas

In general, a rural area is a geographic area that is located outside cities and towns. The Health Resources and Services Administration of the U.S. Department of Health and Human Services defines the word "rural" as encompassing all population, housing, and territory not included within an urban area. Whatever is not urban is considered rural.

Typical rural—areas have a low—population density and small settlements. Agricultural areas are commonly rural, though so are others such as forests. Different countries have varying definitions of "rural" for statistical and administrative purposes (Wikipedia, the free Encyclopedia)

Rural populations represent 70 per cent of the world's poor and 72 per cent of the population of the least developed countries. Rural/urban inequalities are a major obstacle to sustainable development. Also, rural areas comprise human settlements of less than

10,000 people and the rural space is dominated by farms, forests, water, mountains and/or desert. (Wikipedia, the free Encyclopedia)

Typically, rural people depend on agriculture for their livelihoods as farmers, nomadic herders, or fishermen; they deal with animal production, transformation and marketing of food and non-food agricultural products and services. Rural communities are diverse culturally, socially and economically. Their labour is cheap because gainful employment options are limited. Usually rural people lack access to adequate basic social services because they lack a political voice and rural areas have a low national priority (FAO/UNESCO).

Among the inherent characteristics of rural areas are small size, sparse settlement, narrowness of choice (with regard, for example, to shopping, schools, and medical services), distance from population concentrations, and an economic reliance on agricultural industries, sometimes in tandem with tourism. In keeping with Hobbs's assertion, not all of these essential characteristics necessarily apply to each rural community. For example, a community might be small but densely settled. The term rural, then, might imply small, but small need not imply rural. Even assuming uncritically that rural ~~implies small~~ can be problematic: sometimes large-enrollment centralized school districts serve geographically large rural settings (U.S. Census

Bureau, 2010)

Rural communities are also associated with aging populations and with population and job loss. For example, populations have dropped in rural areas in response to declines in traditional rural industries like wood products, textiles, apparel, and leather, coupled with

agribusiness consolidations and the decline of family farms. These trends have created one of the most pressing challenges facing many rural communities (U.S. Census Bureau, 2010)

But rural communities are also associated with positive attributes, such as beauty and serenity. And economies in rural areas grew briskly after the 1990—91 recession and grew more rapidly than those in urban areas in the first part of the 1990s. One study attributes the more rapid growth to technological innovations of the information age, new forms of work organization that permit workers to reside away from population centers, and the expansion of jobs that do not require college degrees. The study sees the largest share of jobs in the near-term rural economy as requiring more than a high school degree, but not as much as a college degree (U.S. Census Bureau, 2010)

According to the Food and Agriculture Organization, the definition of a 'rural area' should meet two criteria: one related to place of residence and land settlement pattern, and the other related to the type of work that residents engage in. First, rural areas are generally open areas, with low settled population densities (International Institute for Educational Planning, www.unesco.org/iiep).

A-high proportion of the unsettled land area and/or land used is for primary production (mining, agriculture, livestock, forestry, fisheries). Second, the residents of rural areas are largely dependent — either directly or indirectly — on these primary production activities as their principal, if not their only, source of livelihood. Nevertheless, coming up with a uniform definition of the term 'rural area', that all countries can agree on, and

which could be applied to any situation has proved difficult, since population-carrying capacity is partly ecologically determined, and since what is 'urban' and 'rural' may already be politically and administratively defined. For example, there are rural areas in South-east Asia (Bangladesh and Indonesia, for instance) with population densities that may be even higher than some areas classified as suburban or urban in North America or Europe. Hence, from a statistical perspective, the definition of the rural space varies very much according to countries. Both the criteria used and the threshold can be different. In countries retaining the population criteria, the borderline can be very different, e.g. 2,500 in Mexico, 10,000 in Nigeria etc (Gardou, 1991).

Although there is a common understanding of what is rural, a universal definition does not exist. In an effort to better capture the concept of rurality some authors used a multicriteria approach, defining rural areas as:

- A space where human settlement and infrastructure occupy only a small share of the landscape;
- Natural environment dominated by pastures, forests, mountains and deserts
- Settlements of low density (about 5-1 persons)
- Places where most people work on farms
- The availability of land at a relatively low cost

(International Institute for Educational Planning, www.unesco.org/iiep)

Indeed, the twentieth century witnessed an important redistribution of the world's population towards urban areas. Whereas 66 per cent of human beings lived in rural areas in 1960, by 2000 that proportion had declined to 53 percent, which however, still constitutes the majority of the world population (International Institute for Educational Planning, www.unesco.org/iiep)

In spite of these global trends confirming the urbanization scenario, available data also document the strength of rurality. It is worth noting that the bulk of the rural population is concentrated in a few countries, 35 nations representing 85 per cent of the world rural population in 2000. In 2030, it is expected that Bangladesh, Pakistan and Indonesia will join China and India in the group of countries recording over 100 million people living in rural areas. The overall population increase experienced during 1960-2000 led to a considerable growth in the size of the rural population from 2 billion in 1960 to 3.2 billion in 2000. This expansion was mainly due to rural demographic expansion in the less developed regions. (International Institute for Educational Planning, www.unesco.org/iiep)

Trends in rural fertility and population growth need to be considered for approaching rural development issues. In particular, rural demographic changes have far reaching implications on household income and on poverty. (International Institute for Educational Planning, www.unesco.org/iiep)

2.2 Definition of Rura Electrification

Access-to electricity is important for rural development and the improvement of the overall conditions in the rural community including health, environment and housing (Samantha and Sundaram, 1983). However, rural electrification itself has been defined differently by different authorities. For example, according to Samantha and Sundaram, (1983), rural electrification is the process of providing access to electrical power in the rural community. is also seen as the process of providing access to electrical power to rural households and communities (Mainali, 2011).

Rural electrification is defined as the process by which access to electricity is provided to households or communities located in the isolated or remote areas of a country. There are well identified challenges confronting rural regions lacking electricity supply. They may lie at a reasonable distance from national or regional electricity grids, may be difficult to access (far from urban Centres with a difficult terrain such as large rivers or jungles, or may suffer harsh climatic conditions that render electrification through grid extension a perilous task.

Rural communities are also often highly dispersed with a low population density and characterized by a low level of education, low electrical load density generally concentrated at evening peak hours, and low revenues. Adding to these challenges, the rural poor without access to electricity either spend relatively large amounts of their scarce financial resources on energy, or a disproportionate amount of time collecting firewood (OECD/IEA, 2010).

Another definition states that rural electrification is the process of bringing electrical power to rural and remote areas. Electricity is used not only for lighting and household

purposes, but it also allows for mechanization of many farming operations, such as threshing, milking, and hoisting farm produce for storage. In areas facing labour shortages, this allows for greater productivity at reduced cost. (Wikipedia, The free

Encyclopedia)

2.3 Objectives of Rural Electrification

The main objectives of Rural Electrification are to eradicate poverty and better the lives of people living especially in developing countries (IEG, World Bank, 2010). This universal objective is in line with Ghana's own objectives under the National Electrification Scheme as outlined below:

- Poverty reduction, especially in the rural areas;
- Increasing the overall socio-economic development of the nation;
- Increasing people's standard of living, especially those in the rural areas;
- Creating small-to medium-scale industries in rural areas;
- Enhancing activities in other sectors of the economy, such as, Agriculture, Health, Education, Tourism, etc.
- Creating jobs in the rural areas and thus reducing the rate of rural to urban migration.

(Abavana, 2004)

Ghana's objectives cannot be mentioned without talking about other countries. The objectives of Bangladesh are by essence not different from other countries. It was observed that after independence of Bangladesh in 1971, the first major initiative to extend grid electricity in rural areas was taken in 1975 under a scheme called 'Total Electrification Programme'. This program looked beyond grid connectivity towards development of the basic distribution facilities for effective delivery of power to rural areas by 1978. Accordingly; Rural Electrification Board (REB) was established on 29th October, 1977 and started functioning on 1st January, 1978 with the following basic objectives:

- Ensure consumer participation in policy-making

- Provide reliable, sustainable and affordable electricity to rural people
- Help improve the economic condition of rural people by providing electricity for
Agriculture and small industries
- Help improve the living condition of rural people
- Expand electrification to entire rural Bangladesh

Since the inception of REB, rural electrification has grown significantly — starting from less than 10 percent connectivity in 1977, about 61 percent villages have received electricity by 2007. Under REB's program, about 800,000 new rural customers get electricity every year, which is phenomenal for a poor country like Bangladesh. The REB consumers are mostly domestic users of electricity (85percent), although industrial and commercial customers are also served, including those needing connection for irrigation pumps. REB plans to cover 75,000 villages of Bangladesh by the year 2020. The rural electrification program of REB is often viewed as one of the most successful government programs in Bangladesh (USAID, 2006).

Samanta and Sundaram, (1983) in their research in India established that rural electrification significant and positive impacts on gross irrigated area, cropping

intensity, cropping pattern, use of innovations and labour productivity. In the industrial sector³ rural electrification led to significant and positive impacts on industrial growth, number of industries, size of capital, full time employment, labour productivity, fuel costs, return on gross fixed assets, and product diversity. Seasonal employment also decreased. In the services sector, rural electrification led to the setting up of a larger number of shops in the village (Samanta and Sundaram, 1983).

In comparing electrified and non electrified service establishments, rural electrification led to larger size (as proxied by number of items sold), longer working hours during evening/night, higher incomes, and higher per employee incomes. At the household level, rural electrified households had lower birth rates, lower death rates (total and child deaths) and larger numbers of children attending school. Rural electrified households had a larger number of assets and higher incomes. Also, time spent by children in reading/studying, and community participation was higher in rural electrified households (Samanta and Sundaram, 1983).

With regard to regional balance, they found out that rural electrification contributed in a positive, though limited way in creating regional balance. In particular, rural electrification helped increase yields in certain villages which, prior to rural electrification, probably had lower yields when compared with other villages which were already electrified (Samanta and Sundaram, 1983).

2.4 The need for Rural Electrification

The link between electrification and rural development has been established.

Electrification is widely ~~believed to contribute~~ to the achievement of the MDGs based on the assumption that sustainable access to modern energy services fosters economic and social development, and leads to improvements in the quality of life. Yet particularly in sub- saharan Africa electrification rates are still low, as only 11% of the population use electricity (Bensch et al, 2010).

Many low developed countries have realized that electrification is one of the basic elements necessary for human development, and thus access to electricity has

increasingly received attention of governments. Investment in rural electrification is an investment in rural development which entails many socio-economic benefits. Electricity, along with other economic and social infrastructure, will help to boost economic activities in the rural areas (Haanyika, 2008).

In 1989, the Government of Ghana instituted a National Electrification Scheme (NES) as the principal vehicle for achieving universal access to electricity in Ghana. The objective of the NES was to extend the reach of reliable electricity supply to all communities with population above 500 by the year 2020 through extending the national electricity grid (Abavana, 2004)

A complementary activity to the NES is the Self-Help Electrification Project (SHEP). Under the SHEP, communities that are within 20km from an existing 33 KV or 11KV sub-transmission line can bring forward their electrification projects provided they procure all the poles required for the low voltage network and have a minimum of 30% of the houses within the community wired. Once these conditions are satisfied by the community, the obligation of the government is to provide the conductors, pole-top accessories, transformers and other installation costs needed to provide supply to the community (Abavana, 2004).

Prior to the commencement of the NES, an estimated 33% of the total population had access to electricity in Ghana (ACRES International, 1991). After some fifteen years of implementation, close to 70% of the total population now have access to electricity (GSS, 2003). Although increased access to electricity may have contributed to notable socio-economic improvements in beneficiary communities, especially in terms of enhanced provision of social services such as health, education and water supply, the overall socio-

economic development or transformation highly anticipated in these communities has not been realized. This has been largely attributed to the fact that there has not been much productive use of electricity to generate jobs and incomes for the people, in spite of the fact that ensuring productive uses of electricity was not made an integral part of the NES. Electricity has been primarily been used for domestic purposes, mainly for lighting, and entertainment. This is by far the main shortcoming of the NES (Abavana, 2004).

Khandker, et al (2004) emphasized in their study that lack of access to electricity is one of the major impediments to growth and development of rural economies in developing countries. That is why access to modern energy, in particular electricity, has been one of the priority themes of the government of Ghana; the World Bank and other development partners. Given these benefits, it is important to examine what determines electricity adoption at the household level. To accomplish this, they looked at a number of factors at the household and village level, including household's physical endowments (such as land) and human capital (such as adults' education), price of different fuels in the village and others.

Rural electrification is believed to contribute to the achievement of Millenium Development Goals (MDGs) via various channels (Bensch et al, 2010). The key among the MDGs is poverty which is widespread in rural areas.

It is important to increase access to energy services for rural areas in order to achieve the Millennium Development Goals in West Africa.(MDGsUN - Energy, 2005) As a result, countries have adopted policies through the help of the World Bank, multilateral institutions and other bilateral institutions to eradicate abject poverty by extending electricity to cover all the rural communities. Adegbulugbe (2006) noted that, electricity

is a catalyst for economic development. Because of the diverse nature and the extent of the socio-economic benefits of electricity in rural areas, RE is a critical issue for governments in developing countries.

For example in India, RE has been an important policy agenda for the central as well as the state government since independence. In 1947 only about 1500 villages were electrified (Government of India, 2010). By the end of March 2010 close to 500,000 villages in India around 84% of total, have been electrified. The rapid increase recently is due in part to governments effort under the accelerated RE programme and initiative for "inclusive Growth" which aim at both rapid growth and social justice.. The conditions necessary to satisfy basic needs and to promote economic and social development cannot be fulfilled if the energy deficiency is not addressed (Buchner and Mattei, 2001).

The aim of the rural electrification program is to provide reliable and high quality electricity supplies which can be used for domestic, industrial and commercial purposes (Kjellstrom, et al, 1992). As explained earlier, rural areas have much less access to the electricity services than the cities. In rural households less than 1% have access to electricity (Arvidson and Gustafsson, 2002). In Tanzania, the government believes that rural parts of the country cannot be transformed into a modern economy and that rural livelihoods cannot be significantly improved without a dramatic increase in their access to modern energy services, particularly electricity (ECON Analysis, 2004).

In a country like Fiji, about 56% of the population lives in rural villages and settlements, with about half of rural households lacking access to electricity. Poverty in Fiji is

concentrated in the rural sector, where isolation and lack of access to markets, social services, and amenities are leading causes (Reserve Bank of Fiji, Quarterly Review, March 2003, Fiji Participatory Poverty Assessment (ADB, 2003).

Rural households and communities with no access to the grid either have no electricity supply at all, or rely on more expensive and limited power supplies (e.g., small diesel generators), which constrains household energy services and economic activity in the areas concerned (Reserve Bank of Fiji, Quarterly Review, March 2003, Fiji Participatory Poverty Assessment (ADB, 2003).

Torero, (2009), in his work on Impact Evaluation Design for Millennium Challenge Corporation (MCC) Rural Electrification Interventions in El Salvador shows that in November of 2006, the Millennium Challenge Corporation (MCC) signed a five-year, \$461 million Compact with the Government of El Salvador (GOES) to improve the lives of Salvadorans through strategic investments in education, public services, agricultural production, rural business development, and transportation infrastructure. The Government of El Salvador has set up a management unit called FOMLIENIO to implement the 5 year Compact from September 2007 to September 2012. Social Impact has been contracted by MCC to conduct an impact evaluation of the rural electrification activity of the Compact. The Rural Electrification activity of the El Salvador Compact will extend electricity to households in the Northern Zone that currently are not connected to local power distribution networks.

The factors revealed above coupled with (IEA, 2009) estimations that roughly 85% of the people without electricity live in rural areas in developing countries especially in South

Asia and Sub-Saharan Africa. There is therefore the need to enhance RE to promote socio-economic development, to better the living standard of rural households and the communities as a whole-especially to improving women's quality of life and to reducing environmental degradation.

2.5 Impact of Rural Electrification

Electricity is an essential commodity in the modern era for improving the quality of life, and at the same time it is, arguably, an indispensable input in economic and social development. Despite its importance, access to electricity is limited in many developing countries.

The economic-and social benefits-that electricity brings to rural areas are manifold. In terms of economics benefit, electricity can be used for irrigation pumps, processing agricultural outputs, storing perishable agricultural goods, etc. It also makes it possible for rural entrepreneurs to start small businesses which to a large extent create more jobs. It also helps reduce rural-urban migration. In terms of social benefits, electricity allows students to study at night; it also contributes to health improvement as switching from biomass fuels to electricity produces clear indoor air (Barnes et al. 1997). It gives rural population opportunities to access telecommunications and mass media (Andreas, 2006). Additionally, electricity usage has been documented to have positive impact on women's lives in rural areas as using electricity in their daily routine such as cooking and pumping water, gives them more free time for other important activities (UNDP/World Bank,

2004). Thus, the provision of electricity has positive impact on the lives of rural populations where poverty remains widespread.

SMEC/NSW, (2005) noted in their work that poverty-reducing impacts of village and settlement electrification include a reduction and considerable shift in housework for women that will be less onerous and give them more time for leisure and incomegenerating pursuits. There will be more time to help children with homework, make more comfortable living conditions or produce handicrafts. Access to electricity will also improve social services, especially education, allowing children to study under good light at night and schools to have more equipment including computers, printers and audio-visual teaching aids.

Health service providers will also benefit enormously as vaccines and other medications requiring refrigeration can be stored safely. Rural folks put high priority on television and other forms of electronic communication to receive more information about other parts of the country and the world. Gainful employment, in the form of cottage industries of small business, will increase, e.g., shops (extending the range of goods sold in a shop such as frozen goods), mechanics' workshops, or welding businesses. To villagers, electricity represents an improved quality of life and savings in money, energy and time. The direct benefits of electrification are those that go directly to the households who have electricity. For households without electricity but located in villages with grid service, there is a possibility of indirect benefits as mentioned above. Households with electricity have decidedly better levels of income, expenditures, and education than those without electricity (Khandker et al (2004).

Khandker et al (2004) however, went further to illustrate that households without electricity in villages with electricity are worse off than those in villages without electricity. This is not surprising, because households in villages without electricity are expected to be a mix of all socioeconomic classes, but those without electricity in villages with grid service tend to be among the poorest in the community (a bulk of these households cannot afford connection or other costs).

According to a study in Bangladesh, (BETS-BUP, 2006) rural electrification program has a strong and robust impact for both economic and educational outcomes. For example, the gain in total income due to electrification can be as much as 30 percent. Electricity also leads to significant improvement in both completed schooling years and study time for children in r4households; and, not only does household electrification result in income improvement, but this impact is sustained for as long as 8 years, after which the benefits level off.

The study also addresses the issue of socio-economic impact of households grid connectivity using a cross-sectional survey conducted in 2005 of some 20,000 households in rural Bangladesh, based on rigorous econometric estimation techniques; this study finds that grid electrification has significant positive impacts. For example, the gain in total income due to electrification can be as much as 30 percent and as low as 9 percent. Benefits go up steadily as household exposure to grid electrification (measured by duration) increases and eventually reach a plateau. According to analysis of this paper's survey data, the major uses of electricity in rural Bangladesh are reported to be for children's education (43 percent), followed by entertainment (26 percent), information access (22 percent), and home-based businesses (9 percent) (BETS-BUP 2006).

Comparing cases with and without electricity both at village and household-level, and completed schooling years and study hours at individual level, households in villages with electricity have significantly better schooling outcomes. However, the differences in economic outcomes are not consistent. The village level electricity benefits may also include direct benefits to households and (indirect) spillover benefits, such as street lighting available to all households. This stresses the need for a close look at the complicated causal factors involved in examining development impacts (BETSBUP 2006).

2.6 Cost Benefit Analysis of Rural Electrification

The cost of rural electrification projects can run into millions of dollars while the benefits derived from it may be comparably infinite or even more than the cost incurred.

A cost-benefit analysis (CBA) of the impact of electricity on households, education, agriculture and agro-business, small scale industry and the public sector, estimates and aggregates the monetary value of the benefits and costs of projects to establish whether they are worthwhile. It is a framework that prescribes classes of benefits and costs to consider, means to measure them, and approaches for aggregating them. Of course, no tool is perfect, and cost-benefit analysis suffers from many criticisms. However, it is impossible to execute a project or human activities without incurring such a cost. Typical examples are environmental costs, installation materials cost, labour cost, running and maintenance cost, Cost of resources and logistics among others. (Detornoo

B, 2011)

2.6.1 Cost

Every project has a cost component from the inception, execution to the completion stages. Planning any major project comes with considerable amount of cost for example budget and time. Cost estimates are necessary for accurate budget projection which should eliminate cost overruns. Cost estimates provide clients with projected costs for completing a project or service. They provide a cost estimation of materials, labour or time (Detornoo, 2011)

Direct tangible cost refers to the cost of investment in the project. This includes: Cost of equipment/implements, Cost of materials to be installed and Cost of labour for the project.

Khandker et al (2004) noted in their study that the marginal distribution and connection costs incurred by the REB for each household range between US\$600 to US\$1,200 depending on the distance of communities from the medium or high voltages lines. This cost covers the poles, overhead lines, transformers, and other related costs necessary to reach rural households in communities without electricity.

2.6.2 Benefits

Energy for Development and Poverty Reduction by Douglas Barnes (2010) noted the benefits of rural electrification as numerous. The benefits are seen in education, health, environmental issues, communication, illumination, small scale businesses, farming activities and so on. It is true that not all of the benefits of electricity are affordable to poor people in developing countries, but certainly lighting, televisions, fans and others, may be within their means. Computers and internet cannot be far behind. Really, how can societies advance without electricity? The following are some of the benefits:

2.6.2.1 Education

Mulder et al (2006) noted that the impact of electrification on education enabled schools to offer night classes, which led to an increased number of students in Mozambique. Secondly, the promotion rates at day classes improved because of better study conditions. Also, the participation of female students increased, due to night classes and increased facilities such as a boarding school.

The IEG/World Bank, (2008) noted the main channels through which electrification may affect education to be:

- Improving the quality of schools, either through the provision of electricity-dependent equipment, or increasing teacher quantity and quality.

 Increase in study time at home.

Children in electrified households have higher education levels than those without electricity. However, this is a single difference estimate that does not allow for other factors such as parental education, household income and school facilities. But IEG's analysis of Demographic and Health Survey (DHS) data for nine countries also found that electricity has a direct impact on rural education once these factors are controlled. In low-income countries rural schools often lack basic equipment, such as furniture and adequate textbooks—the presence of electricity does not affect these important constraints. (IEG/World Bank, 2008).

'The failure of teachers to take up posts in remote locations and frequent absenteeism from such postings poses big problems in many countries. But the study supports the argument that the availability of electricity makes rural positions more attractive to teachers. This is thus one possible reason for the higher education levels, with improved school quality encouraging students to stay on longer or enabling them to do so as their

grades improve from better teaching. The other possible explanation is that increased study time at home results in better grades, so children stay in school longer. There is indeed evidence that electricity increases study time (by approximately an hour an evening in the case of the Philippines), but no study follows the causal chain through to improved results and higher educational attainment. (IEG/World Bank, 2008)

Electricity enables schools to be equipped with modern teaching equipment and information and communication technologies, especially access to the Internet. Unlike at the primary school level, school enrollment at the secondary level is significantly higher for households with a grid electricity connection. Thus, there is strong evidence that having electricity in rural households involves educational benefits (Detornoo, 2011).

2.6.2.2 Lighting

Although various forms of energy are used by all income groups, it is primarily the poor who depend on high-cost and less-efficient alternatives to grid electricity, such as candles and kerosene, to provide lighting. However, electricity provides more and better lighting at lower cost than kerosene lamps, for most households (IEG/World Bank, 2008). In essence, the quality of service from electrification is far superior to that from most alternative devices: The illumination derived from a compact fluorescent lamp is far superior to that provided by candles or kerosene lamps (IEG/World Bank, 2008)

Various studies illustrated that the immediate benefit of electrification comes through improved lighting, which promotes extended hours of study and in turn contributes to better educational achievements. Lighting can also benefit other household activities, such as sewing by women, social gatherings at night and so on.

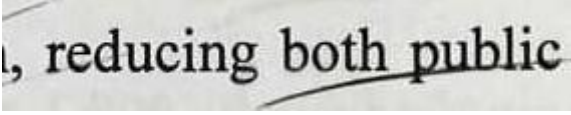
Khandker et al (2004) also explained in their work that the first use of electricity in rural areas is household lighting. The reason is that electric light is much brighter than that provided by kerosene lamps and the price per unit of light can be hundreds of times cheaper. Because of frequent power outages, people do not discard their kerosene lamps after they have gnd connection, but rele ate it to a standby energy source. In addition, with electricity, communities also get access to public lighting which improves the sense of security of inhabitants, in particular women.

2.6.2.3 Health and Environmental Benefits

The health benefits from rural electrification are enormous and they are as listed as follows:

- Improvements in health facilities.
 - Better health from cleaner air as households reduce use of polluting fuels for cooking.
 - Improved health knowledge through increased access to television and radio. ➤
- Better nutrition from improved knowledge and storage facilities from refrigeration.

The IEG/World Bank findings support the view that there are health benefits from llžral electrification, including infertility reduction. Additionally, the health risks from candles have also recently been appreciated. An Australian study showed that the lead used in candle wicks results in air lead concentrations at levels far in excess of established safety standards; burning a candle for a few hours in an enclosed room results in lead concentrations sufficient to cause feotal damage or to harm the mental development of children (IEG/World Bank, 2008). Since the Australian study was done, many developed countries have banned the use of lead in wicks, but these bans do not affect candles made for developing country markets.

Grid electrification will directly contribute to a reduction of respiratory illness among the rural population,  reducing both public and private healthcare costs. An IEG/World Bank, (2008) review showed that exposure to indoor cooking using traditional methods increased the risk of premature death by a factor between two and five. These diseases caused by indoor air pollution cause between 1.6 and 2 million excess deaths each year, 5 more than half of them among children younger than five. This figure accounts for 2.7 percent of the global burden of disease. There is also a fire risk. In addition, fuel collection imposes a costly time burden of up to 8 hours a week, once again usually mainly on women (IEG/World Bank, 2008)

In principle, RE can tackle both of these issues, promoting better health through reduced indoor air pollution and reducing the time burden on women of fuel collection. However, in practice, these benefits have been little realized because electricity is largely not used for cooking in rural areas. But improvements in indoor air quality can also come about through changes in lighting source (IEG/World Bank, 2008)

Kerosene lamps emit particles that cause air pollution; these are measured by the concentration of the smallest particles per cubic meter (PM 10). Burning a liter of kerosene emits PM51 micrograms per hour, which is just above the World Health Organization 24-hour mean standard of PM 10 of 50 micrograms per cubic meter. But these particles do not disperse, so burning a lamp for four hours can result in concentrations several times the World Health Organization standard (IEG/World Bank, 2008)

The extra risk of respiratory sickness from exposure to these levels of PMIO is captured in the hazard ratio (the relative probability of the exposed versus unexposed being sick), which is 3.5. Los'3idult work days average 3 per year, and the additional under-five mortality is 2.2 per 1,000. o substituting electric lighting for kerosene lamps has a quantifiable health benefit of \$2.50 per household (IEG/World Bank, 2008).

2.6.2.4 Communication

Communication can be defined as the exchange of information between two or more people for the purpose of bringing about understanding.

Radio and television are among the most important sources of communication and entertainment for rural households. Typically, after electric lighting, plug-in radio and television are the most common appliances in households with electricity. Without electricity, the cost to operate radio and/or television is extremely high, and the total hours listening to radio and viewing television tend to be relatively low or limited (BETS-BUP 2006)

Television viewing is one of the most desired uses of electrification. Television may be viewed at home, in the home of a friend or relative, or in a public place such as a bar. In some cases, the government may use mobile TVs for public education. However, women's ability to watch television elsewhere is limited by restrictions on their mobility, especially in the evening, and especially in conservative societies such as Zanzibar and Bangladesh. (BETS-BUP 2006)

So although in principle any benefits from television may spill over to non-electrified households, such a spillover is context specific and cannot be taken for granted. The most important household item in the Philippines is TV, accounting for on average 39

percent of electricity consumption; it is second most important in Laos, where it account&for 14 percent (IEG/World Bank, 2008).

Radios are the most widely used non-lighting appliance among rural households. Even though dry cell batteries cost more than 25 times more than car batteries and 270 times more than grid electricity per kilowatt-hour, they are still the energy source of choice for radio listening in rural households. The apparent anomaly of the most expensive form of radio listening being used the most is simply a reflection of the mobility of dry cellpowered radios (INEI, 2005). Indeed, as noted previously, dry cell battery radios are used even after electrification. However, it is reasonable to assume that almost all of the households using car battery-powered radios—126,200 households, or 9 percent of the total rural households without electricity, according to the Survey—would switch to grid plug-in models once grid electricity became available.

Radio listening is arguably an inferior good, with evidence that consumption decreaseswith increases in income, as households generally prefer to increase television viewing. Hence, the benefits of the transition from car battery to grid radios are best estimated as the financial savings per listening hour of switching to grid electricity (INEI, 2005).

2.6.2.5 Productive Uses of Electricity

Electricity in rural areas is used in productive ventures such powering mills, operating small businesses, agricultural activities among others.A general conclusion from analysis

of rural electrification programs is that the impact on productive activities is limited.



Considering home enterprises, the effects are greater than those from medium and large firms, although these enterprises may be small indeed, such as renting out refrigerator space. In addition, the presence of electricity extends the work hours of home businesses, and this increases the net income from these activities.

2.6.2.6 Knowledge and fertility Reduction

Access to television significantly increases women's knowledge of health and family planning. IEG's impact evaluation of health outcomes in Bangladesh (IEG 2005) found a significant impact of household electrification on maternal mortality. One possible channel for this effect is that access to media improves health knowledge. Study has demonstrated the link between electrification and access to knowledge. IEG analyzed DHS data for eight countries to examine how access to media (radio, TV, and newspapers) affects women's health knowledge.

The causal chain for the first possible health impact is as follows: access to electricity increases time spent watching TV and listening to the radio. Increased access to media increases awareness of health issues. This increased awareness results in changed health behaviour. Changed behaviour improves health outcomes and reduces infertility. It was also shown that the access to TV in villages where not all people have a TV cannot be taken for granted. Multivariate analysis of the determinants of women's knowledge of health and family planning provides very strong evidence that access to television significantly increases this knowledge.

The next step is to examine the extent to which knowledge affects practice. Two health

practice variables are examined: use of modern contraceptives and child immunization. The contraceptive knowledge variable was significantly positive in all 11 equations estimated. For immunization status, the knowledge variable was significant, with the expected sign in 53 of the 55 estimated equations. The link between knowledge and practice is thus firmly established (IEG, 2005).

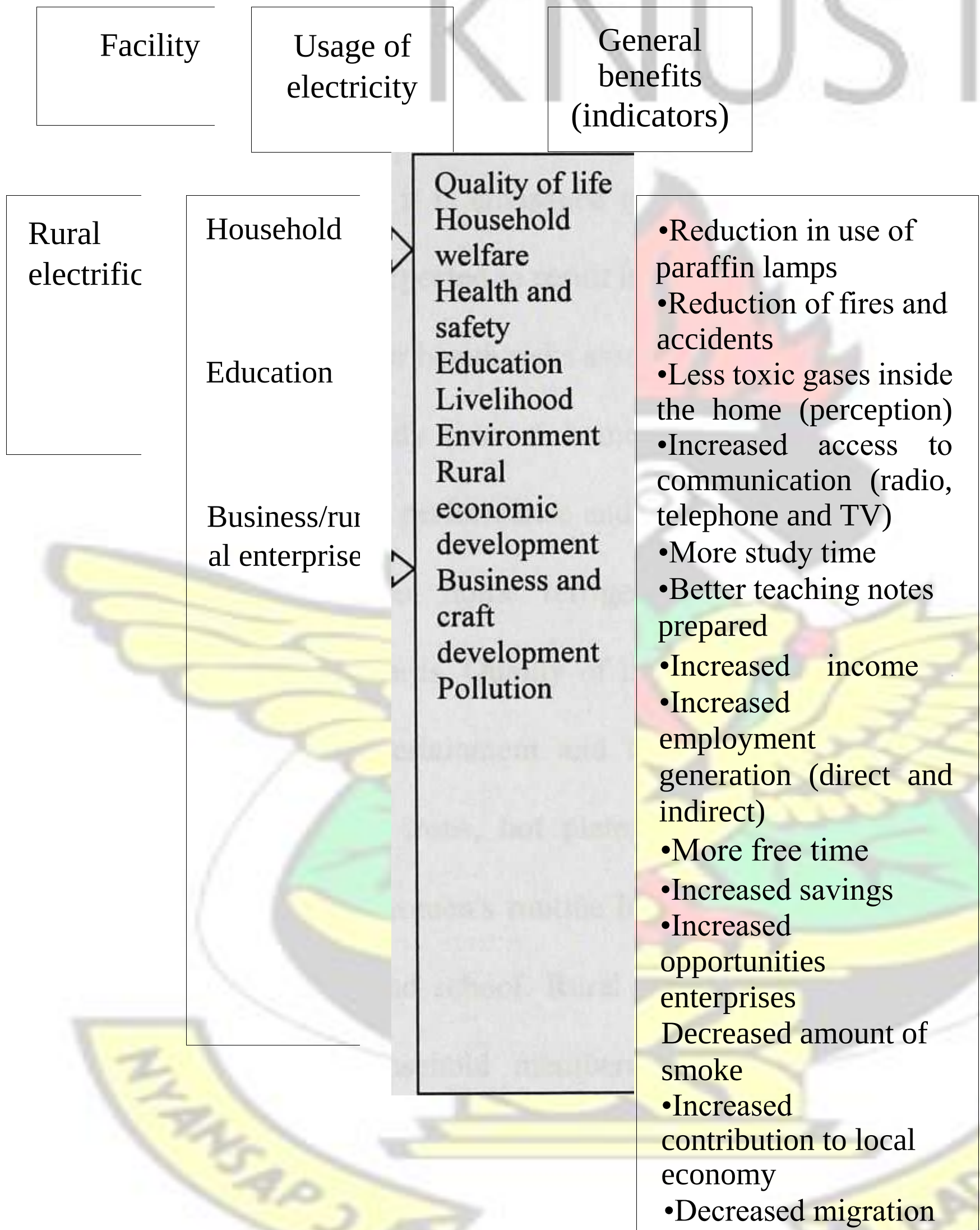
In India, electricity also led to improved health services: the hospital now offers 24 hours emergency attendance and improved equipment allows for increased and better treatment of patients. Measuring socio economic impact from health improvement requires finding appropriate "prices" to value health status. There is a voluminous study on the value of fatalities prevented, with best estimates ranging from \$0.6 million to \$ 13.5 million per fatality prevented. It was noted that in 2005 the hospital had to transfer 3 emergency cases to the hospital of Nampula city per month against 30 cases in 2001.

2.7 Conceptual Framework

The conceptual framework adopted for the study has four components: project output, rural electrification, interacting with other rural development outputs, leads to observable progress results, which in turn affect the areas of development concern. The impact of electrification on a particular household arises not only directly through its own use of electricity, but also indirectly through the use of electricity by other household or by the community as a whole. This theoretical framework gives an indication of the direct and indirect benefits of rural electrification activities, including how these benefits are manifested. The impacts are analyzed through four main component areas and focus

ofPgy4YJ1amely household quality of life, education, business, and the overall rural economy.

Fig. 1.1 Conceptual framework for studying socio-economic impact of rural electrification



Sources :Adapted from: Foundation Rural Energy Services (2013) Socio-economic impact assessment of rural electrification. Amsterdam, the Netherlands, and Herrin, A.

N, (1983) The Cagayan Valley Rural Electrification project: an impact assessment Philippine Institute for Development Studies . Working paper 83-04.Micro component of the Economic and

Socail impact analysis/women in development (ESIWWID) project.

Household

The concept of rural electrification impacton households envisages that electricity access would increase household quality of life and reduce expenditure on traditional energy sources such as kerosene and fuel wood. Since RE is expected to lower consumption of kerosene and fuel wood, it is envisaged to improve indoor air quality (i.e., environmental impact). RE is also expected to result in better health due to reduced incidence of respiratory ailments and other health risks associated with use of solid fuels and fuel wood, as well as increase study time at home for children, due to better lighting, translating into improved school performance and better-quality graduates (i.e., social impacts). For the household too, home refrigeration prevents spoilage of perishable foods and reduces health hazards. Quality of life improves as utilization of radio and television for education, entertainment and leisure for the household is assured. Moreover, appliances such as irons, hot plates, simple washing machines reduce work burden for women. Also, women's routine home chores are eased, which allows for daughters to be freer to attend school. Rural electrification is expected to encourage greater participation of household members in community and social activities, through its effect, on the one hand, in generating more community and social activities, that otherwise could not be efficiently conducted at night, and on the other, in freeing household members from time consuming chores. The latter effect is expected to be brought about by the household's use of electric appliances and access to electricity-

dependent water supply systems. Finally, RE is considered to have a positive impact on gender—empowerment by balancing the gender roles and control over financial resources.(Asian Development Bank, Impact Evaluation Study, 2010).

Rural business/enterprise

Rural electrification would also impact on rural industries and businesses. This would be reflected in changes in employment, incomes, and productivity. Electrification leads to development of small industries to take advantage of the efficient and effective means of production. In terms of job avenues, electrification leads to employment opportunities when existing businesses expand while new ones are established. Also, in the agricultural sector, rural electrification might lead to changes in irrigated areas, causing changes in cropping intensity and cropping pattern, which in turn leads to changes in use of factors of production (for example, employment, agricultural innovations), all ultimately affecting productivity and income. The changes at the household and community levels may interact with and reinforce each other and may become selfsustaining processes. The interaction and changes at both levels produce certain outputs which may ultimately enhance the "rural quality of life"(Samanta and Sundaram, 1983). It is expected that rural electrification would affect total household income through (i) increased agricultural production/productivity generated by household or public investments in electricity-dependent irrigation systems in areas where alternative systems are either not feasible or are relatively costly;

(ii). increased business or trade income/productivity generated by household investment in electricity dependent machineries, tools and appliances,

- (iii). increased food production from livestock, poultry and backyard gardening activities generated by household or public investments in electricity-dependent water supply systems;
- (iv). increased home production/productivity generated by household investment in electricity lighting and electric durables, and
- (v). increased paid employment of household members, including women, generated by new opportunities created by electricity-dependent business enterprises.

Education

As per the conceptual framework, rural electrification improves rural education through several channels. For example, it is associated with community facilities such as libraries opening in evenings. There is also wider use of audio visual equipment and materials in schools and adult education programs. Again, teachers become more productive and better prepared due to home lighting. For students, it leads to improvement in academic work, through for example, longer time spent studying at home.

Overall, rural electrification is expected to increase enrollment rates and improve the quality of education through its effects on household income, on one hand (demand) and on the other through (i) expansion of educational services generated by the possibility of conducting night classes, and (ii) the improvement in the quality of instruction through the use of electricity-dependent tools, appliances and teaching aids.

In addition, the proper illumination afforded by electricity lighting in the homes is expected to improve lesson preparation by teachers, on the one hand, and to encourage and facilitate reading and completion of homework by students, on the other. Also, the

use of TV and other gadgets of mass communication contribute to education directly, through educational programmes, and indirectly, through an awareness of news/social issues, etc.

Rural economy

Finally, rural electrification has overall positive impact on the rural economy. Improved and increased craft production in addition to economic benefits, enhances the cultural and aesthetic values that craftsmen and crafts tradition mean to a nation. Rural electrification also stems the tide of rural migration to cities and improves rural-urban balance. Increased rural economic activity absorbs expanding rural labour force. Other benefits to the rural economy are improved citizens-government relationship, reduced socioeconomic imbalance in the population, expanded communications system to entire population as government is able to communicate with its citizens. There is also reduced foreign exchange expenditures for kerosene and oil used for lighting, cooking and heating. This framework and interrelationships would be used to study and analyse the variables and key themes in the current study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter deals with the research methods employed in collecting and analyzing data for the study. The chapter covers the research design which was used to structure the entire research work. It also covers the area of study, the study population, sampling procedure and sampling size, types and source of data, research instruments, administration of research instruments and data processing and analysis.

3.1 Research Design

The research design adopted is the Case Study type. The subject under study is in terms of rural electrification and has been implemented in several communities in Ghana. The case of Ga East municipality was adopted for this study.

3.2 Area of Study and Population

The area of study is the Ga East Municipality. It is made up of communities namely Abokobi, Teiman, Oyarifa, Pantang, Ashongman, Taifa, Kwabenya and Agbogba. The target population is the Teimantownship which shares boundary with Abokobi on the West, Oyarifa on the East and Pantang on the North. It is about three kilometers square in size with a population of approximately four hundred people. The study population is

made up of predominantly of farmers, teachers, businesspersons, artisans, civil servants, unemployed and school children among others.

3.3 Sampling Procedure and Sampling Size

Due to resource constraints, it was not feasible to conduct the study using the entire targeted population. A selected sample of small and medium scale businesses, households and teachers in the village were there fore used for the study. In all, a total sample of (80) eighty members of the population was used. A combination of random (probability) and non-random sampling techniques were used to select the respondents. Stratified sampling was used to divide the population into households, businesses and teachers for selection into the study. In selecting the households and businesses, the simple random sampling technique was employed. Snowball sampling technique was used to identify and administer questionnaires to the teachers. This is because at the time of the study, schools were on vacation and therefore it was difficult to conduct a straightforward enumeration of teachers. The stratified random sample helped to reduce the potential for human bias in the selection of cases to be included in the sample. It also provides us with a sample that is highly representative of the population being studied. Thus, units with larger sizes were allocated with higher sample proportion. Since the units selected for inclusion in the sample are chosen using probabilistic methods, stratified random—sampling allows-úš-Tñiake generalizations from the sample to the population.

Table 3.1 below indicates the various sampling proportions, the method of recruitment and the data collection methods.

Table 3-1 Distribution of the subsamples and methods of data collection

Sub-sample	Sample proportion	Method of sampling	Data collection
Households	30	Random sampling	Interview and questionnaire
Businesses	30	Random sampling	Interview and questionnaire
Teachers	20	Random and snow ball sampling	Interview and questionnaire

3.4 Types and Source of Data

The two types of data which are primary and secondary data were employed to source information for the research. Primary source of data was obtained directly from the respondents through personal interviews and questionnaires and random sampling of views from the people.

Other information used for the study was obtained from secondary sources such as Electricity Company of Ghana, Ministry of Energy and World Bank reports. Also sourced were data from journals and other printed literature.

3.5 Research Instruments and Data collection

Quantitative and qualitative data collection instruments were used as the main data collection method for this study. Specifically, survey questionnaire and interviews were used to collect data for this study. Different sets of questionnaires were designed to cover three different groups of electricity users. They are households, businesses and teachers. This enabled a broader assessment of the socio-economic impact of electricity on rural livelihoods. The

household questionnaire entailed questions about the sociodemographic characteristics of the respondents such as age, gender, marital status, number of household occupants, and the number of years they had stayed in the area as well as their job descriptions. It also contained questions about the impact of rural electrification on the households.

The business questionnaire also had questions about the socio-demographic characteristics of the respondents as well as their business characteristics. It also asked questions about the extent of dependency of the business on electricity and the impact of electricity on their businesses.

The impact of rural electrification on teachers and teaching for that matter was also tested.

The questions included socio-demographic characteristics, teaching characteristics and impact of electrification on teaching. All three sets of questionnaires also included questions about the challenges or problems that came with the rural electrification.

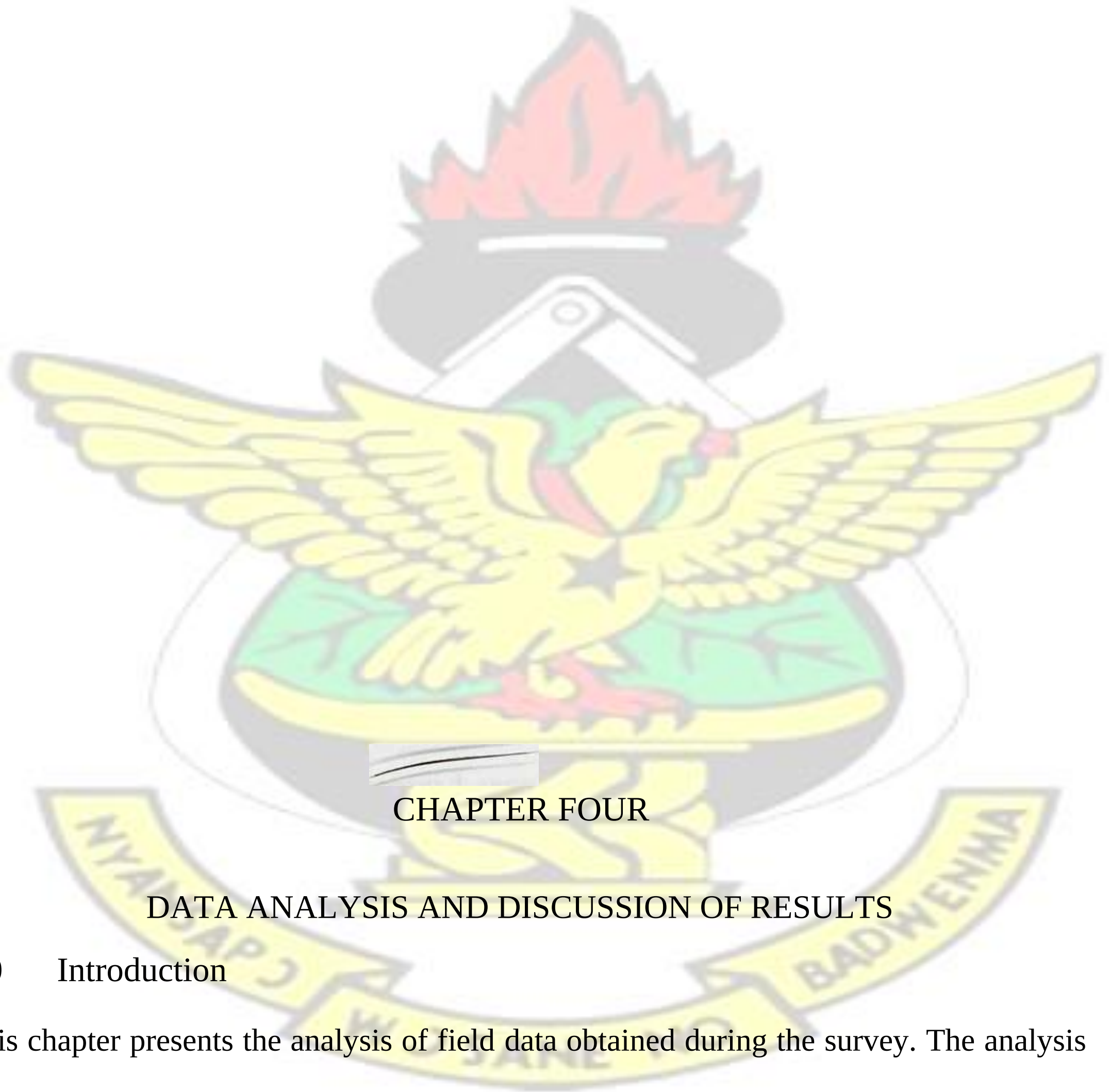
Apart from the teachers who were given the questionnaires to fill themselves, the household and business questionnaires were interviewer-administered by reading and interpreting into the local language of the respondents. This was to enable better comprehension and accurate provision-of-answers. All interactions took place within the person's home and business premises with only the participant and researcher present. This method of administering the questions presented no problems and respondents appeared to be quite at ease with the procedure.

3.6 Data analysis

The answered questionnaires were subjected to data organization before commencing with the analysis. The questionnaires were edited to correct entry errors and then

processed for further analysis. The results were subjected to descriptive analysis using frequencies and percentages and the results presented in graphs and tables. The SPSS was the main analytical tool used. The interviews were also analyzed and presented as the true expression of the respondents.

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CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF RESULTS

4.0 Introduction

This chapter presents the analysis of field data obtained during the survey. The analysis is supported with tables and charts to enable easy appreciation of the descriptive data. The chapter is partitioned into three major sections. The first section looks at the personal characteristics of respondents involved in the study. It highlights specifically on the age

and gender distribution of respondents. The second section focuses on the socio-economic impact of rural electrification in the municipality. It emphasizes the importance of the rural electrification project on households and the communities within the municipality. It also determines the living conditions of households without electricity and whether or not there have been positive impacts on households as a result of the rural electrification project. The third section evaluates the financial viability of the rural electrification project and suggests appropriate recommendations on widening the coverage of the rural electrification project to improve living standard of people in the municipality.

4.1 Characteristics of Respondents

The characteristics of the respondents were identified. This ranges from gender, age, marital status, educational background, number of people in households, period of stay in the community and occupation.

4.1.1 Age and Gender of Respondents

Data obtained on personal information of respondents indicate that, out of the 30 households selected for the study 63.3% (19) were males while 36.7% (11) were females. Also 75.0% (15) out of the total of 20 teacher respondents were males while 25.0% (5) were females. Also, 66.7% (20) out of the total of 30 business respondents were males while 33.3% (10) were females. The age and sex distribution of respondents are detailed in table 4-1.

Table 4-1: Age and Sex Distribution of Respondents

	Households	Teachers	Business
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Age Group	Male	Female	Total	Male	Female	Total	Male	Female	Total
18-24yrs	1	1	2	4	2	6	7	1	8
25-30yrs	6	1	7	8	3	11	4	4	8
31-35yrs	5	4	9	1	0	1	1	2	3
36-40yrs	1	2	3	2	0	2	3	1	4
41-45yrs	3	0	3				3	1	4
Above 45	3	3	6				2	1	3
Total	19	11	30	15	5	20	20	10	30

Source: Field Survey, 2013

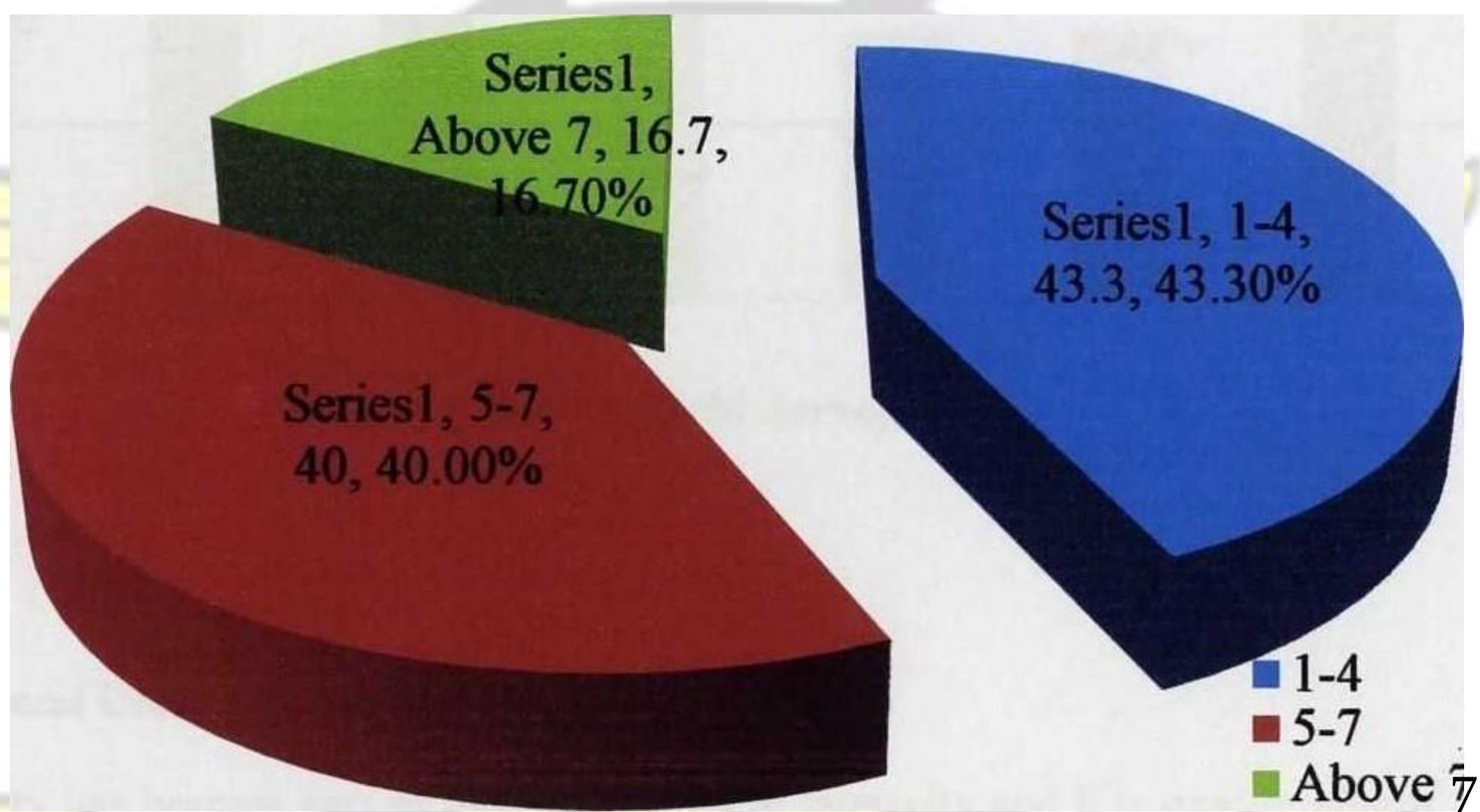


4.1.2 Household Population

Subsequently, the research sought data on the household size of respondents to ascertain their level of dependency and how it affects their accessibility of electricity in the municipality since new connection services to houses and business centers cost relatively high to the average person in the municipality. Based on the data gathered, it was realized that 40.0% have between 5 to 7 persons in their households while 17.0% have above 7 people with 43.0% recording between 1 and 4 persons in their households.

This is shown in figure 4-1.

Figure 4-1: Household size



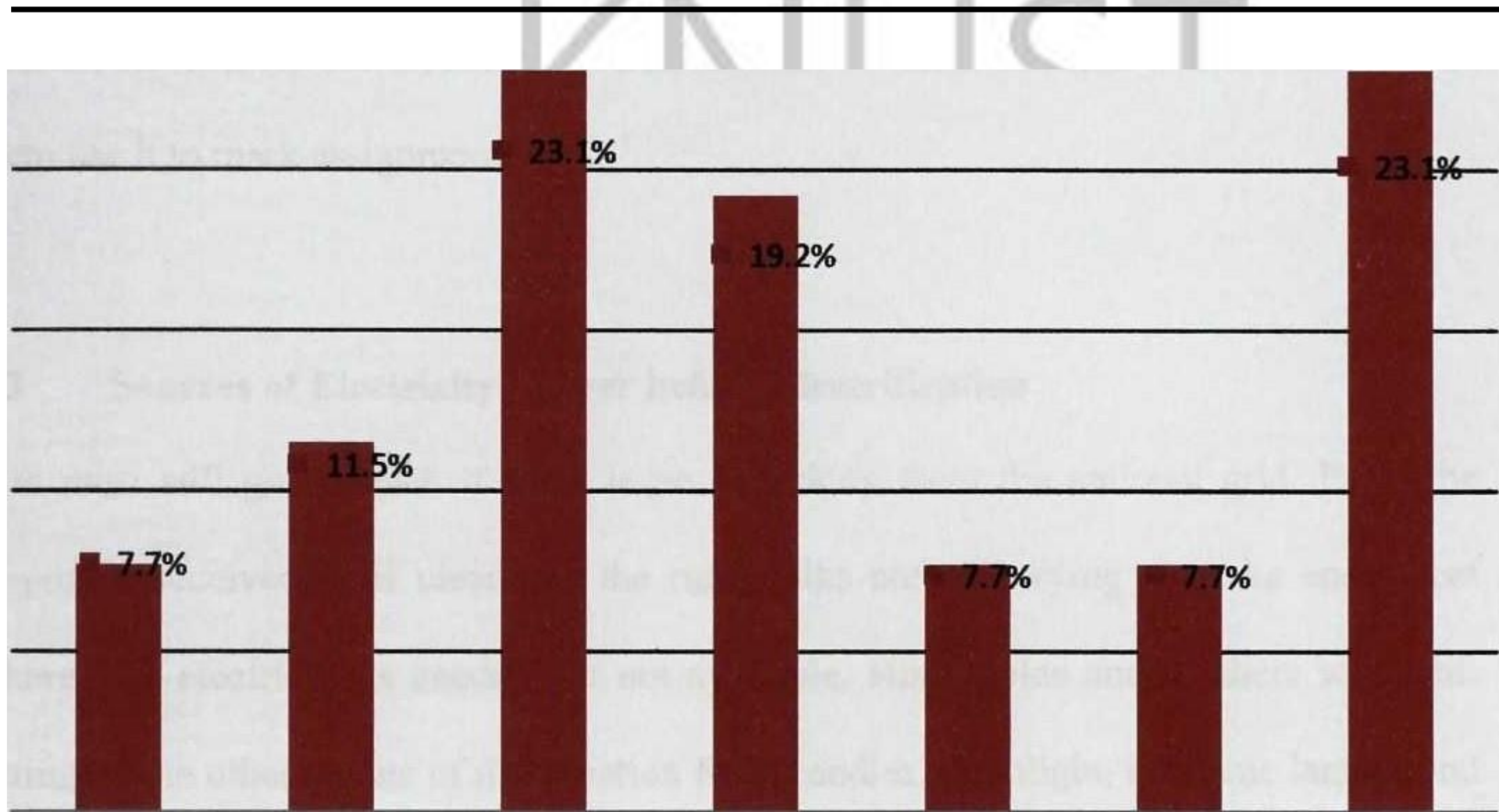
Source: Field Survey, 2013

4.1.3 Occupation of Households

The respondents are engaged in several forms of occupation for their living and their distribution is as follows. 7.7% of the respondents are unemployed, 11.5% of the

7.7% are bankers with the same percentage representing public servants. The remaining 23.1% of the respondents are engaged in other occupations such as block making, etc.

Fig 4-2 Occupation of Household Respondents



Source: Field Survey, 2013

4.2 General Uses of Electricity

Electricity has become part of the basic needs of humanity and it is used in almost all aspects of human activities. The common uses of electricity in households are for domestic lighting,,watching television, listening to news on the radio, ironing clothes, watching movies and refrigeration. The respondents were asked to indicate all what they use electricity for and this is how they responded. 26 out of the 30 households use electricity for domestic lighting, 25 uses electricity to listen to news on the radio, 24 uses electricity to watch television, 23 uses it to iron clothes, 19 of them use electricity to watch movies and 4 of them use electricity for refrigeration.

Teachers on the hand use electricity for preparing lesson notes, marking assignment, ironing clothes, listening to news, charging mobile phones and watching television. 19 teachers found the use of electricity to prepare lesson notes, 13 of them use it to charge phones, 12 teachers use electricity to iron clothes, 10 use it to listen to news whiles 8 of them use it to mark assignment.

4.3 Sources of Electricity /Power before Electrification

Life must still go on even if there is no electricity from the national grid. From the responses received, it is clear that the rural folks are still trying to make ends meet where grid electricity is needed but not available. Households and teachers were still getting some other means of illumination from candles, torchlight, kerosene lantern and car battery. Businesses were also relying on generators, diesel to run engines, car batteries and LPG gas. Based on the information gathered, it was revealed that 40.0% businesses depend on generators, 6.7% depends on kerosene lantern, 3.3% depends on LPG gas, 3.3% also depends on car battery and 43.3% depends on other sources of power for the effective running of their businesses. The use of other sources of power according to the respondents had a negative impact on their business since it causes a fall in their business—revenue and profit. On the other hand, information collected revealed that 66.7% of businesses extremely depends on electricity, 20.0% depends a little off-electricity while 10.0% depends not so much on electricity and 3.3% of businesses does not depend on electricity at all.

It was also revealed that a total of 60.7% households depend on kerosene powered lantern as their main source of lighting when there was no electricity in their households while 21.4% and 17.9% depends on candle and torch light respectively for lighting.

Households also relied on car battery and dry cells to watch television and listen to radio respectively. To iron clothes, households had to use charcoal box iron.

Comparatively, the responses from teachers during the field survey also reiterated same concerns as 50% of teachers said they rely on torch light for illumination. This figure is higher than what was recorded for households (17.1%) because most of the teachers could afford battery operated torch light which was considered relatively expensive by household respondents. Usually the unemployed households are the most very affected, especially without electricity.

4.3.1 Challenges with Other Sources of Electricity/Power

The use of other sources of power was found to have a negative impact in the lives of the respondents since respondents were quick to add that the use of power sources other than electricity causes poor visibility (39.3%), inconvenience (14.3%) and smoke in eyes (17.9%). 21.4% of households feel the cost of the other energy sources is too high. Households have to spend time and money in acquiring these energy types. To be able to buy kerosene, candles or even dry cells, one must walk a distance to a far away seller and at a relatively high cost. Those who were using car batteries have to walk to the next town which had electricity to be able to charge the battery. This is done at a fee and a lot of inconveniences.

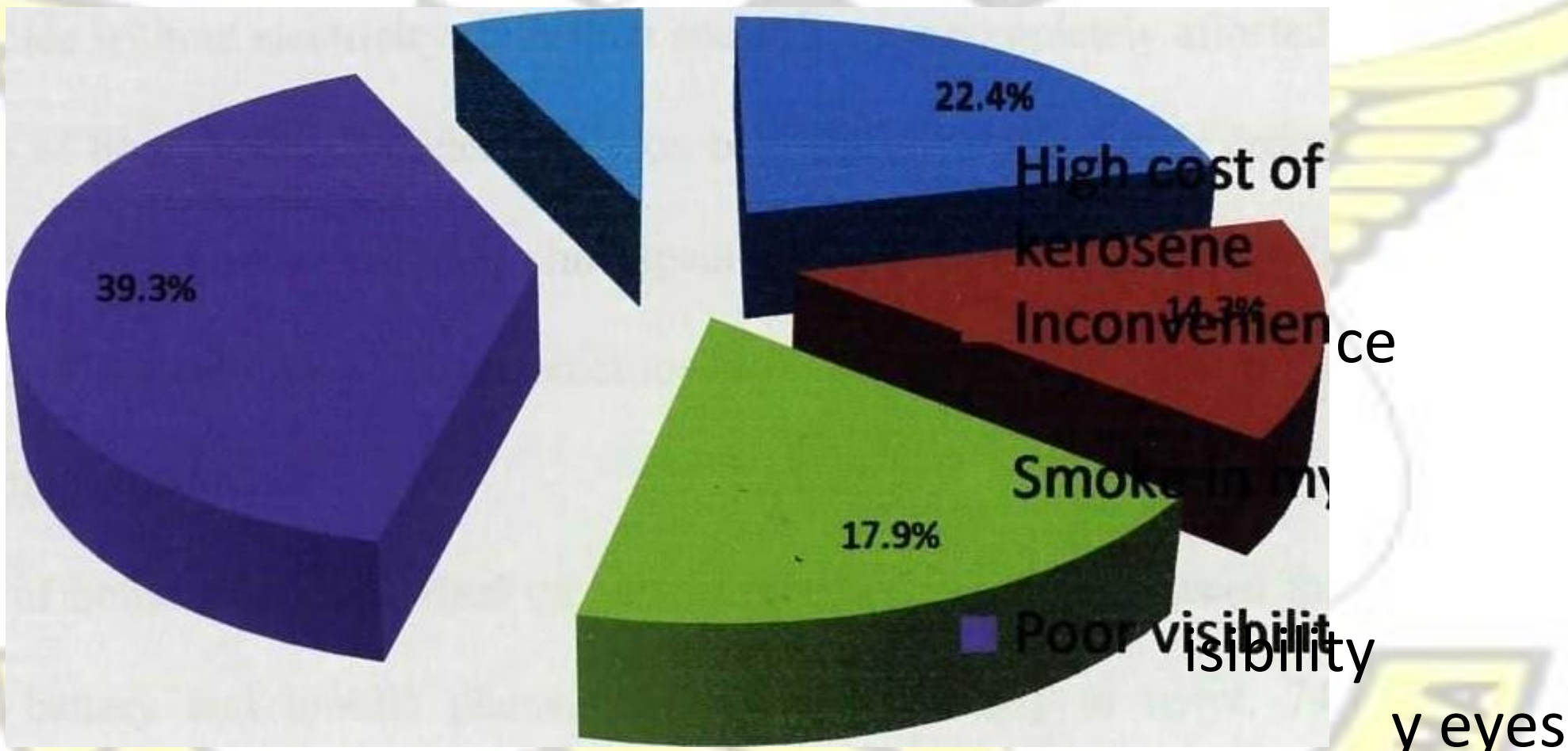
Table 4-2 and figure 4-3 shows the various complaints given by household respondents who depend on power sources other than grid electricity in the municipality.

Table 4-2: Challenges with the Use of Other Sources of Power

	Frequency	Valid Percent	Cumulative Percent
High cost of kerosene	6	21.4	21.4
Inconvenience	4	14.3	35.7
Smoke in my eyes	5	17.9	53.6
Poor visibility	11	39.3	92.9
Other	2	7.1	100.0
Total	28	100.0	

Source: Field Survey, 2013

Figure 4-3 Challenges Yßp the Use of Other Sources of Power



Source: Field Survey, 2013

4.3.2 Effect of absence of electricity on households

Some other challenges which were mentioned by almost all households are non access to television, difficulty in food preservation, poor academic performance of school children,

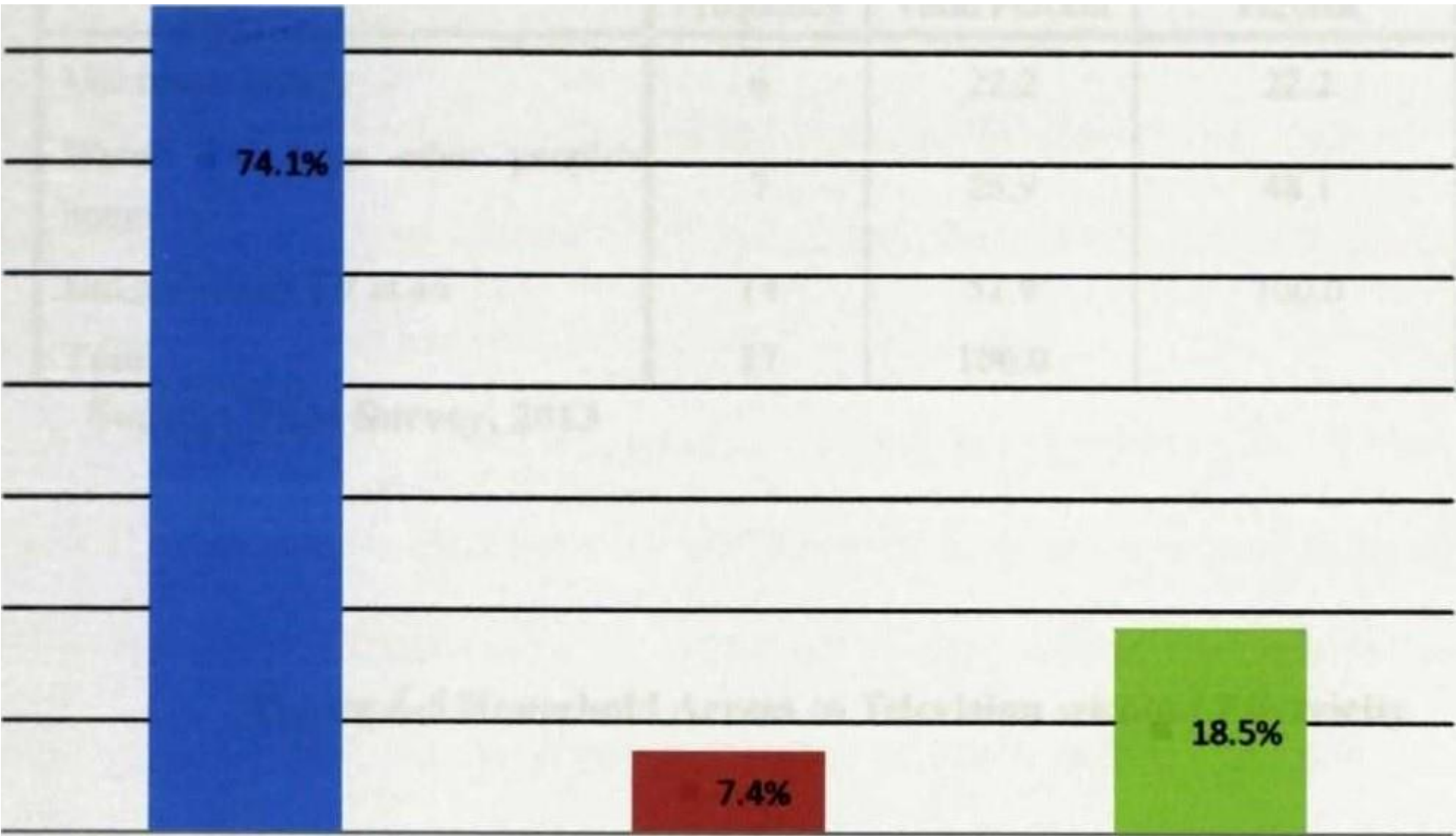
inability to iron clothes, lack of access to news and information, lack of entertainment, inability to use mobile phones and high insecurity. Life was indeed very unbearable without grid electricity but with perseverance, these rural folks are still surviving.

In a comment by one household respondent, he stated that "In the absence of electricity life is not worth living because you will be completely cut off from the world and you may also be compelled to sleep early since there will be no source of entertainment what so ever".

The implication of this assertion simply indicates the low standard of living faced by most households without electricity since their social lives is completely affected. In this regard 82.1% of household respondents rely on box iron for ironing their dresses. This causes a lot of delay thereby reducing time spent on productive activities necessary to transform their lives positively. They sometimes lose their valuable clothes due to fire from the burning charcoal.

The number of households that relied on battery operated radios far exceed those that rely on car battery and mobile phones in terms of listening to news. 74.1% of households depend on the use of battery radio in order to access daily news while 7.4% and 18.5% of respondents rely on car battery and mobile phones respectively. A pictorial view is shown in figure 4-4 below.

Figure 4-4: Household's access to news with other sources



Source: Field Survey, 2013

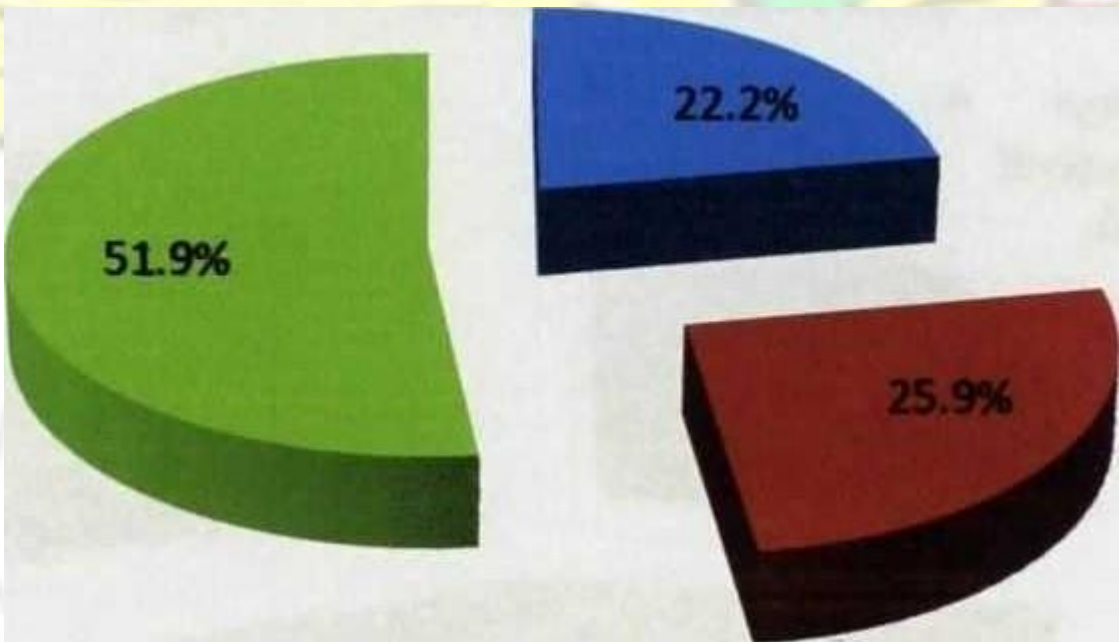
Access to television by the respondents was relatively poor as 51.9% of respondents did not watch television at all. 25.9% of respondents went to other people's house to watch television while 22.2% of respondents used car batteries to power their televisions. One respondent revealed that they lost a resident mysteriously who was going to watch television in another person's house one evening. They found the deceased the next morning in a bush but the cause of death was not revealed. This phenomenon discouraged a lot of the rural folks from going to another person's house to watch television. Table 4-3 below shows a breakdown of the television viewing statistics with figure 4-5 giving a pictorial view of the statistics.

Table 4-3: Household's Access to Television without Electricity

Means of powering television	Frequency	Valid Percent	Cumulative Percent
Use of car batery	6	22.2	22.2
Watch TV from other people's home	7	25.9	48.1
Did not watch TV at all	14	51.9	100.0
Total	27	100.0	

Source: Field Survey, 2013

Figure4-5 Household Access to Television without Electricity



- Use of car battery
- Watch Tv' from other people's home
- Did not watch TV at all

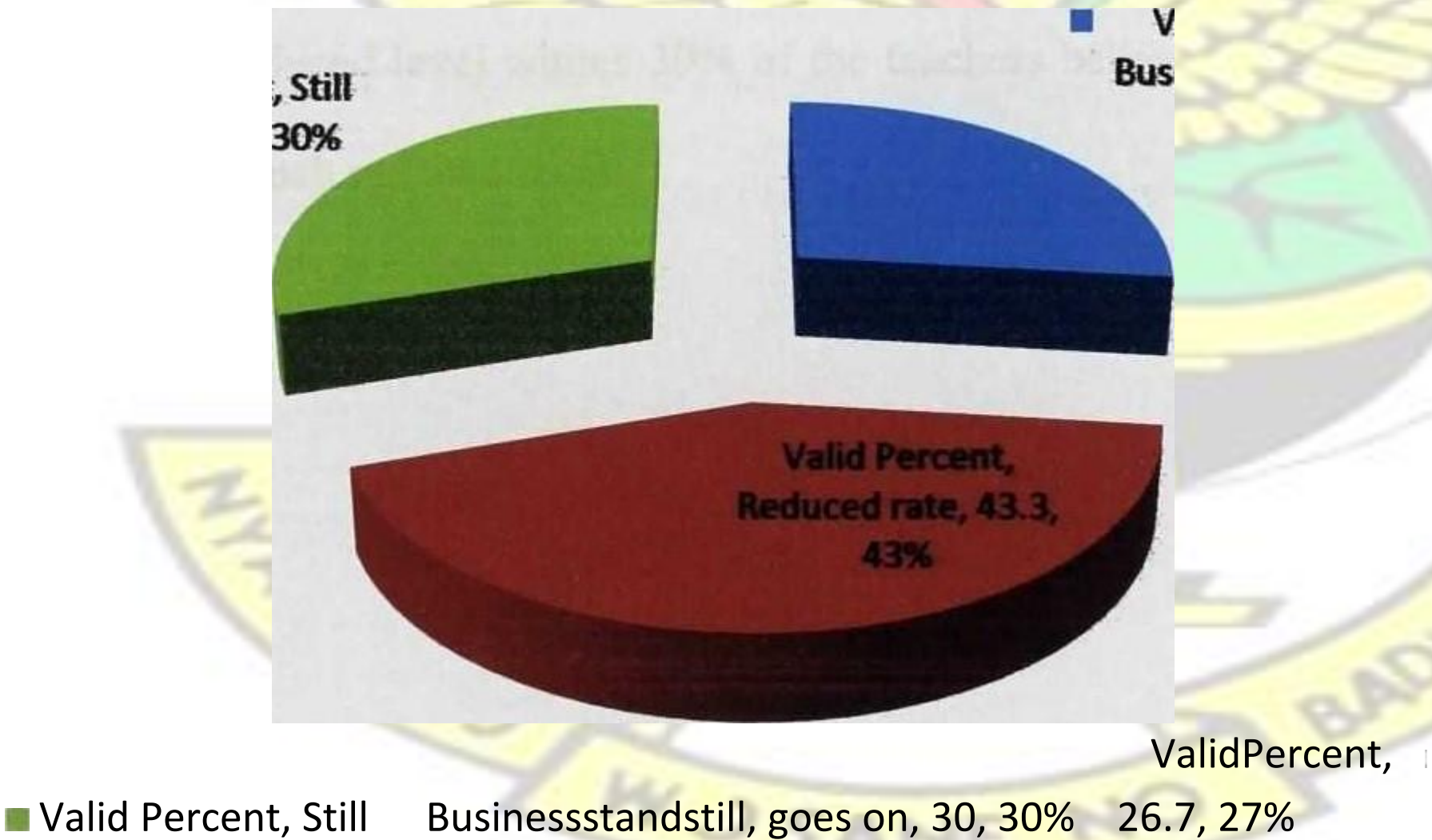
● Souree:-Field Survey, 2013

4.3.3 Effect of absence of electricity on businesses

In this day and age almost all businesses rely extremely on grid electricity or some processes of the business. Businesses which can be operated without electricity even suffers from limited operating time since it cannot be done when darkness falls. Businesses such as Corn milling, block manufacturing, sewing, drinking bars, retail shops and hairdressing among others depend on electricity in one way or the other.

43.3% of businesses will run at a reduced rate if there is no grid electricity whiles 30% of businesses cannot be at all and comes to a standstill. 26.7% of businesses still go on because of the use of alternative sources of energy. This implies that for businesses that run at a reduced rate, the scale of production reduces and this also reduces their profits. 86.7% of the businesses believe that they will make higher profits

Figure 4-6 Business Dependency on Electricity



- Business standstill
- Reduced rate Still goes on

if they had access to grid electricity.

Source: Field Survey, 2013

4.3.4 Effect of absence of electricity on teaching

Teaching without electricity is tedious and ineffective. All the teachers admitted that there is a delay in preparing lesson notes since it can only be done during the day. The day time is also packed with teaching and other curricula activities. Others also complained about their inability to send assignments home for marking. It became obvious from the responses of the teachers that there is a huge gap in effective teaching.

The quality of the notes is also compromised since further research is hindered. However 30% of the respondents believe that their work is as effective as there was electricity probably because they are able to use alternative sources of electricity. 45% of the teachers believe that their work goes on but at a reduced capacity while the work of 25% of the teachers does not go on at all. When the effectiveness of the teachers was ascertained, it came out that 45% of them think their effectiveness was not compromised in the absence of grid electricity. 25% of them believe that their effectiveness reduces at a somehow reduced level while 30% of the teachers believe that their effectiveness is reduced at a much reduced level.



Table 4-4 Effect of non-availability of electricity on the work of teachers

	Frequency	Valid Percent	Cumulative Percent
As effectively as there was electricity	9	45	45
At somehow reduced level	5	25	70
At a much reduced level	6	30	100
Other	0	0	100.0
Total	20	100.0	

Source: Field Survey, 2013

4.4 Impact of Electricity on Households, Businesses and Teaching

The responses from households, businesses and teachers with regard to how electricity impacted on them were very encouraging. Households have improved standard of living, businesses are expanding and increasing the scale of production and teaching has become more efficient and effective. The specific responses from the various groups are detailed below.

4.4.1 Impact of Electricity on Households

The wellbeing of households is to a large extent influenced by their access to electricity for several reasons. Among the most cited reasons expressed by respondents include their ability to put their electric appliances into effective use. Indeed the presence of

electricity accord households the opportunity to entertain themselves by watching television programs, listen to news, preserve food with refrigerator and also make their homes bright at night. The various households however have preferences when it comes to the use of electricity as shown in table 4-5 below.

Table 4-5 Most Important Uses of Electricity by Households

	Frequency	Valid Percent	Cumulative Percent
Lighting	15	50	50
Watching TV	3	10	60
Listening to news	4	13.33	73.33
Ironing of clothing	1	3.33	76.66
Food preservation	4	13.33	89.99
Other	3	10	100.0
Total	30	100.0	

Source: Field Survey, 2013

From Table 4-5 it can be seen that 50% of households deem illumination (lighting) by electricity as their most important use of grid electricity. This is due to the fact that, once there is light, there is some level of security. Most activities can also be executed ones there is good illumination. There is also a natural extension of working time. 13.33% of the respondents deem their most important use of electricity to be listening to news on radio. The same percentage of the respondents prefers to use grid electricity for food preservation. This was followed by those who require grid electricity to watch television and those who use—grid electricity—oQher purposes constitute 10%. Only one respondent indicated his most important use of electricity to be ironing of clothes and this formed 3.33%.

The reactions were that electricity gives them much comfort since with the press of a switch at any time, there is illumination. This is obtained without any stress unlike the use of candles, lantern, torch lights, (etc). Also just by plugging your radio set into an electric socket, you can have access to news, music and any other information at a relatively lower cost and without any inconvenience. Access to television has also been made very easy for those who can afford. Children are forced to stay at home since there is no excuse for going to other people's house to watch television. They are therefore not over exposed to bad influences by roaming at night.

It is very costly to live without any means to modern methods of food preservation especially with the use of refrigerator. Women spend a lot of time on cooking since there is no proper means of preserving cooked food. This implies that food cooked must be eaten or left to go bad. This reduces the amount of time spent on productive activities.

4.4.2 Impact of Electricity on Business

A lot of economic activities (businesses) rely extremely on grid electricity for their effective running. Businesses ranging from sewing, hair salons, block making, corn milling, retailing of goods, drinking bars, welding etc rely in diverse ways on electricity. Among the most crucial reasons expressed by respondents include their ability to

preserve goods, power their equipment or machines for their work with a lot of convenience, time saving, lower cost and higher productivity. This also increases the

patronage of their products and increases their profit.

86.7% of business respondents have observed that they make a lot of profit with the use of electricity for their business. 30% of businesses are not able to run continuously because their operation depends extremely on electricity. These businesses will grind to a halt if there is no electricity. 43.3% of businesses run at their full capacity when electricity is available. At full capacity, they are able to enjoy economies of scale and reduce their operational cost. A careful study of the trend of sales with and without electricity showed that 93.3% of businesses experience a drop in sales when there is no electricity. Out of this 28.6% does not make any sale at all when there is no light. In the light of the reasons above it was not surprising that 10% and 30% of businesses believe they are paying very reasonable and reasonable tariffs respectively. The level of dependency of businesses on electricity is shown in table 4-6 below.

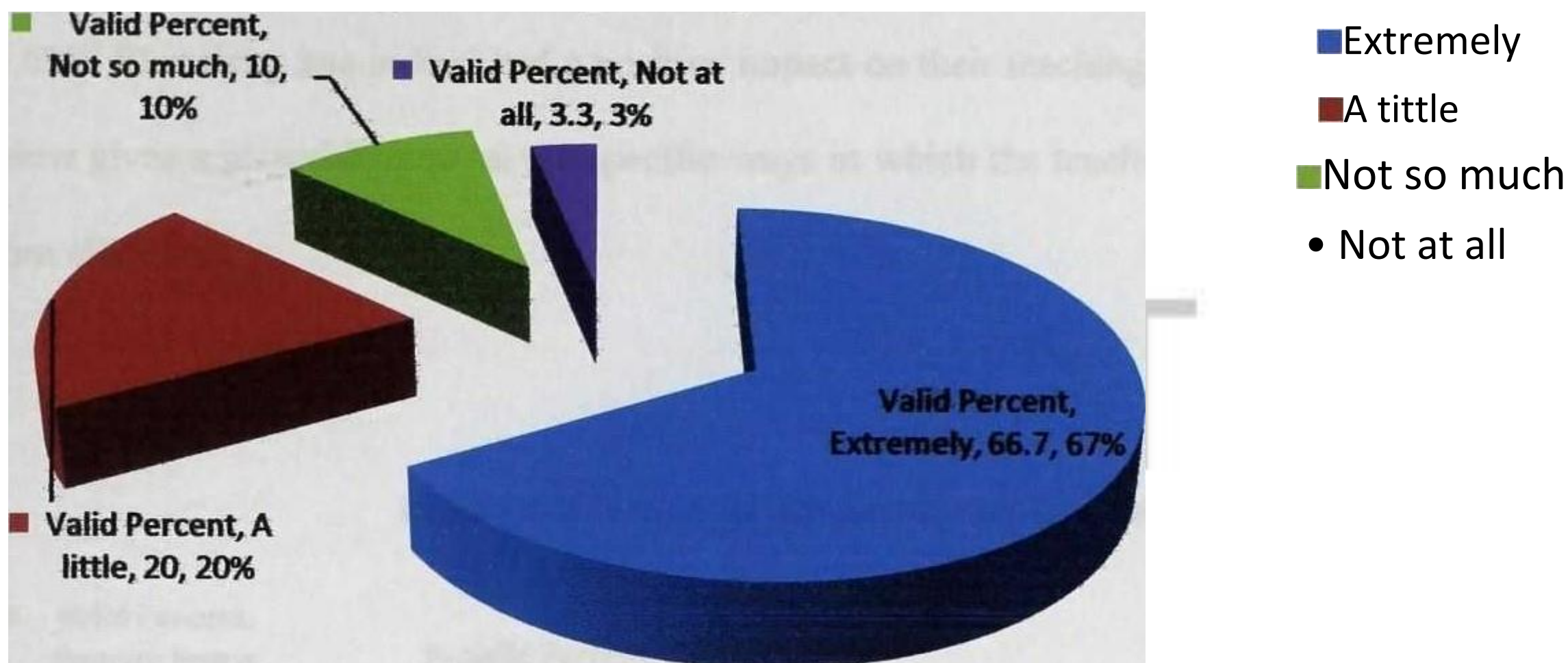
Table 4-6. Extent of Businesses dependence on Electricity

Level of dependency on electricity	Frequency	Percent	Valid Percent	Cumulative Percent
Extremely	20	66.7	66.7	66.7
little	6	20.0	20.0	86.7
Not so much	3	10.0	10.0	96.7
Not at all	1	3.3	3.3	100.0
Total	30	100.0	100.0	

Source: Field Survey, 2013



Figure 4-7 Dependency of Businesses on Electricity



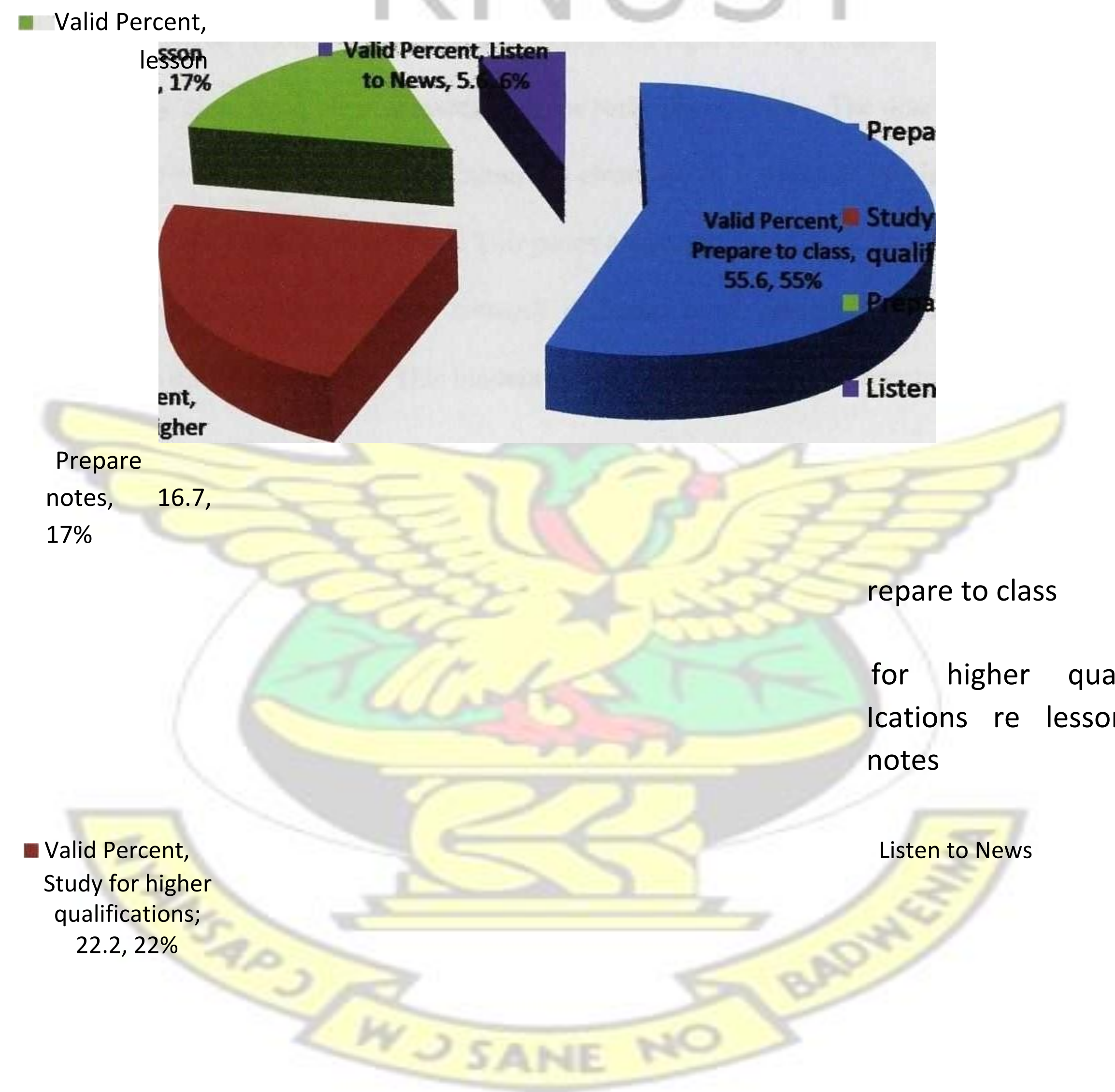
4.4.3 Impact of Electricity on Teaching

The impact of electricity on teaching is quite significant. 60% of the teachers teach more than one classes with an average of forty (40) students per class. The demand on them is therefore enormous and they will need to spend some evening hours preparing lesson notes, marking assignments and doing other extra curricula activities. Obviously all the aforementioned activities cannot be done during teaching hours. The existence of electricity has helped all the teachers to prepare better lesson notes and lesson plans, update themselves on events happening in the world, iron their clothes for school and organize household which have ultimately impacted on their work as teachers. Because of the time saving, some of the teachers have been able to study for higher

qualification. Specifically, 55.6% of teachers believe the use of electricity contñute in diverse-ways to their wellbeing by helping them to prepare more effectively for their class work Others demonstrated similar concerns including their ability to study for higher qualification (22.2%), prepare effective lesson notes (16.7%) and listen to news (5.6%). Electricity has indeed had a positive impact on their teaching career. Figure 4-8

below gives a pictorial view on the specific ways in which the teachers have benefitted from electricity.

Figure 4-8 Impact of Electricity on Teachers



Source: Field Survey, 2013

4.5 Challenges/Problems with Electricity Supply

Increased access to grid electricity services has different levels of impact on the welfare of the community folks in the study area. That notwithstanding, there are serious challenges that is hindering the continuous enjoyment and utilization of the power supply. The challenges stated by the respondents in connection with grid connectivity include: Frequent power interruptions and low voltages at certain times, High electricity

bills and delays in delivering bills to customers, High initial connection fee and low voltages. The business respondents complained about unreliable power supply, high bills and low voltages with a distribution of 55%, 40% and 5% respectively. The teachers also complained about the unreliable supply and high bills. Households also gave complains about the challenges with electricity to unreliable supply(35%), high bills (50%) and low voltage (15%)

In an interview with some ECG officials, the main challenges with rural electrification are getting the needed funds to implement the project and right of way issues. There are no proper survey plans with clear demarcations for rural communities. The distribution networks are therefore constructed with minimum clearance or sometimes no clearance between buildings and the overhead lines. This poses a threat to the lives of the residents and even makes maintenance of the network difficult. Load centers for installing transformers are difficult to obtain. This hinders proper distribution and compromises on the quality of power supplied.



CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This is the final chapter of this thesis and it deals with the summary of the findings of the research work, lessons learned from the studies, conclusions drawn and recommendations derived from the findings.

5.1 Summary

Lack of access to electricity is one of the major impediments to growth and development of the rural communities in developing countries. That is why access to modern energy, in particular to electricity, has been one of the priority themes of every nation.

Without quality, safe and reliable electricity services there is little possibility of utilizing modern electrical appliances, welding equipment, and machinery which may pave the way for small and rural industries. Also, without convenient lighting, businesses such as bars and retail shops will not be able to operate effectively. It is also worthy to note that, grid electricity is comparatively cheaper than other sources of power. It is in this light that this study assessed the socio- economic impact of rural electrification in Ghana using Ga East Municipal Assembly as a case study.

The general objective of the study was to assess the socio-economic impact of the rural electrification project on rural areas in Ghana. Specifically the study sought to

determine the general and most important uses of electricity, the changes that have been brought as result of the availability of electricity and examine people's perception about the impact of electricity as well as challenges associated with the enjoyment of electricity in rural areas. In collecting data, questionnaires were designed for three groups namely households, businesses and teachers. Some Engineers at Electricity Company of Ghana were also interviewed. This constituted the primary source of data. Data was also obtained from secondary sources such as World Bank reports, journals, and reports of the Ministry of Energy, Ghana and other relevant sources.

The absence of grid electricity made life not worth living. Households were facing a lot of inconveniences, businesses were not operating effectively and efficiently and teachers were also hindered from exercising their full capacity.

However, the presence of grid electricity has brought an improvement in the standard of living in households. Businesses have seen some progress in output levels, profits and customer base while teaching has been made more effective.

5.2 Findings

5.2.1 Impact of absence of electricity on households

From the results obtained, the households led poorer quality of lives when there was no grid electricity in their communities. It was revealed that a total of 60.7% of households depend on kerosene powered lantern as their main source of power when there was no electricity in their households while 21.4% and 17.9 depended on candle and torch light respectively. The poor visibility and inconveniences posed by the use of these energy

sources cannot be overlooked. 90% of the respondents indicated that using kerosene, torchlight—and candles caused a lot of inconvenience and poor visibility. Currently, households deem illumination as their most important use of electricity since without proper illumination, no activity can be performed at night. This implies that you only have half a day to be productive. This however is not enough to execute all activities for survival. Studying in the night cannot be done since visibility from other sources of energy is poor. This affects school children in a long run. The children end up dropping out of school when they don't pass the examination for further studies. They sometimes become deviants in the society and a threat to humanity.

Also it became obvious that majority of the household respondents did not watch television at all and this is a great disservice to humanity. However a greater majority of household rely on battery operated radio to listen to news but sometimes visual expression of news items are better understood than through audio when it even comes to public education through the electronic media. They are therefore cut off from civilization and remain ignorant of so many educative programs which are being carried out on the media.

5.2.2 Impact of absence of electricity on businesses

Economic activities were very low when there was no electricity since 66.7% of businesses currently depends extremely on electricity. This implies that in the absence of electricity, those businesses cannot be operated. Those which operate without electricity run at a reduced rate since certain processes cannot be executed. This in turn affects their output, their revenues and for that matter their profits. The engine of growth of every economy is based on vigorous social and economic activities (business) and so without

grid electricity, unemployment rate in the villages becomes high and this even leads to rural-urban migration.

5.2.3 Impact of absence of electricity on teaching

Teachers were also affected by the non-availability of electricity as majority of them experience a reduction in their effectiveness as teachers. They were not able to read and prepare themselves more effectively for class. Lesson notes have to be prepared after school when darkness has fallen and so without proper illumination good and adequate notes cannot be prepared. Access to the internet to source information becomes hampered and this affects their own growth in career and the impact on the school children.

The presence of grid electricity enables 55.6% of teachers to teach more effectively, while 22.2% are able to study for higher qualification when they had access to grid electricity and this will have an impact on the quality of students produced. Good lesson notes are also prepared when there is grid electricity since access to necessary information is made easier. This is obtained from the internet where there is a huge depository of information.

5.2.4 Challenges with implementation of rural electrification

The challenges and risks that are faced by rural electrification from the stages of inception, appraisal, implementation and closure were also identified and analyzed. The biggest challenge faced by rural electrification projects is the source of finance (ECG). Rural Electrification projects are capital intensive and getting the required financial support does not come easily. A great deal of justifications is needed to warrant the release of such financial supports from the donor agencies who are the main financiers of the projects beside Government. Rural electrification projects do not pay back in short

periods and so makes it less attractive but with Government's support, commitment and proper justifications, it gets the necessary approvals for implementation.

There are serious bottlenecks when it comes to implementation. The fact remained that most of the projects are faced with land tenure issues and access to right of way to construct the network infrastructure. There is difficulty in acquisition of lands at strategic locations for putting up of secondary substations which will serve the community with the electricity supply. The distribution networks are sometimes constructed too close to buildings and/or over buildings. This poses a threat to residents and makes it difficult for easy maintenance.

The road reservation that is meant for installation of utility facilities were encroached to a large extent by land lords in the community and to do the electrical installations with ease, the Town and Country Planning Department has to be invited to show the right demarcations for the parties involved in the encroachment.

Lack of proper appraisal also poses a challenge to rural electrification, but if a more acceptable review of all aspects of the project is undertaken the project progresses well. This appraisal will help identify the technical viability, cost and benefits of implementing the project.

The closure stage which is the final part of the project involves the post implementation evaluation, accepting the project and handing over to the users. A post implementation of the project identifies the impact of the project on the households and community, the challenges the users are facing-arsûigestions for improvement. Most of the respondents did not hesitate to complain about the erratic nature of the power supply, high electricity bills, and delay in receiving bills. Some of them received their first bill after two years of

using the electricity and were forced to pay huge accumulated bills which they were not capable of paying.

5.3 Conclusion

In conclusion, based on the objective and the outcome of the study, it is clear that there is a positive impact on the social and economic wellbeing of the people in Teiman after the rural electrification project. Households are enjoying the benefits of grid electricity and life has become more comfortable and dignifying. Security of the residents has also seen a facelift with the existence of bright street lights. Children of school going age can now have extended hours of study and become responsible citizens in future.

Businesses have also sprung up with the execution of the rural electrification project. Most businesses which were not in existence are now being operated and those which hitherto relied on other sources of energy have now converted to electric energy because of convenience and lower cost. The scale of production of most businesses is larger with the use of grid electricity than other sources of energy. Revenues and for that matter profits are also higher with the use of grid electricity.

With the compliance of the recommendations below, the project would go a long way to help the national economy and the people of Ga East Municipality. Similar projects can be extended to other deprived communities to enhance their development and achieve the aims of the national electrification scheme (NES).

5.4 Limitations

The researcher observed that some of the respondents were not too forthcoming in providing answers for questions about how they were coping without grid electricity.

This was probably because they had forgotten or they did not see the immediate need for the survey now that they are enjoying electricity. It had to be explained to them that it was for academic purposes and also going to help in extending electricity to other areas that is not connected to the national grid.

The respondents were also not comfortable with providing information about how much they were earning as revenue and how much they were paying as electricity bills. They felt it was a way of determining whether they were paying low bills. Majority of them saw their bills as too high.

5.5 Recommendations

Upon critical analysis of data obtained from the field it has become imperative to suggest the following series of recommendations to enable the sustainability, expedient execution and acceleration of the coverage of rural electrification in Ghana. Also of importance is the operation and maintenance of the electricity distribution network to ensure the supply of constant, reliable and safe electricity to consumers.

Rural electrification is a basic vector of development of rural areas and a pillar for poverty reduction. However the non financial profitability and the huge capital requirement pose an impediment for its funding by Government.

The Government should therefore set up a special fund for rural electrification projects. Adequate tax systems should be put in place to contribute money into this fund. Part of the amount of VAT on electricity bills can be repaid into the fund. The perpetual subsidy can also be reversed and paid back into the fund. Also of significance is the introduction of

public-private partnership to provide funding for rural electrification projects. The Government should encourage more private investors to invest in electrification projects. The pressure on the Government will be reduced but more efficient strategies should be introduced to be able to recoup the investments made by the private individuals.

The utility reservations (land) needs a critical attention. The town and country planning department should be vigorously involved in the planning of all lands in the country. No individual should be allowed to sell lands without adherence to a proper planning scheme from the town and country planning department. In so doing, utility corridors will be left when lands are being sold out. This will enable proper designs and extension of the electricity grid in an optimal way which will reduce the amount of system losses incurred by the distribution company. High voltage networks can be extended to the various load centres before installing transformers to supply low voltage to the distribution lines. Operations and maintenance of the network will also be enhanced.

After the completion of rural electrification projects, the Government should provide support to innovative individuals to expand their businesses thereby encouraging entrepreneurship. Also the Government itself should create avenues for employment in the rural areas to curtail rural-urban migration. Once jobs are created and avenues for private jobs are also created, the rural folks will be ready to pay realistic tariffs. This will enable the utility company to operate more efficiently and moreover enable the Government itself to be able to remove subsidies as suggested above.

At least a five year maintenance plan and budget should be added to the cost of the project with proper guidelines. This will enable faster and better maintenance of the power distribution network and will ensure the reduction in power outages which is a major challenge faced by majority of the respondents. Since the wellbeing of households and the community is influenced directly and indirectly by the availability of electricity, constant supply of power by the Electricity Company of Ghana is necessary. A more stable power will also encourage customers to pay their bills regularly to support the operations of the company.

The billing mechanism need to be critically reviewed to forestall the undue delays in distributing bills by the electricity company. The processes involved in capturing prospective customers and generating appropriate database of these customers for the delivery of prompt bills should be done simultaneously with the implementation of the main rural electrification project. This should be accompanied by situating revenue collection offices close to the rural areas to enable the rural folks pay their bills conveniently and promptly.

To encourage more rural folks to get connected to the national grid, Government can subsidize cost of electricity for a certain period of time after which the economic wellbeing of the users would have improved. Once they are financially independent the Government can then withdraw the subsidy for electrification coverage in other areas. For the rural poor, high tariff is a barrier to accessibility of electricity since they cannot pay for their bills regularly.

From an economic standpoint, it is obvious from the study that rural electrification investments have generated sufficient benefits but detailed cost benefit analysis need to be conducted to justify the financial viability.

It is also recommended that rural electrification projects must be extended to other rural communities to enable quick eradication of poverty and curtailment of rural-urban migration. This will also improve on the quality of education, increase access to modern health facilities and bridge the gap between the rural and urban centres in all aspects.



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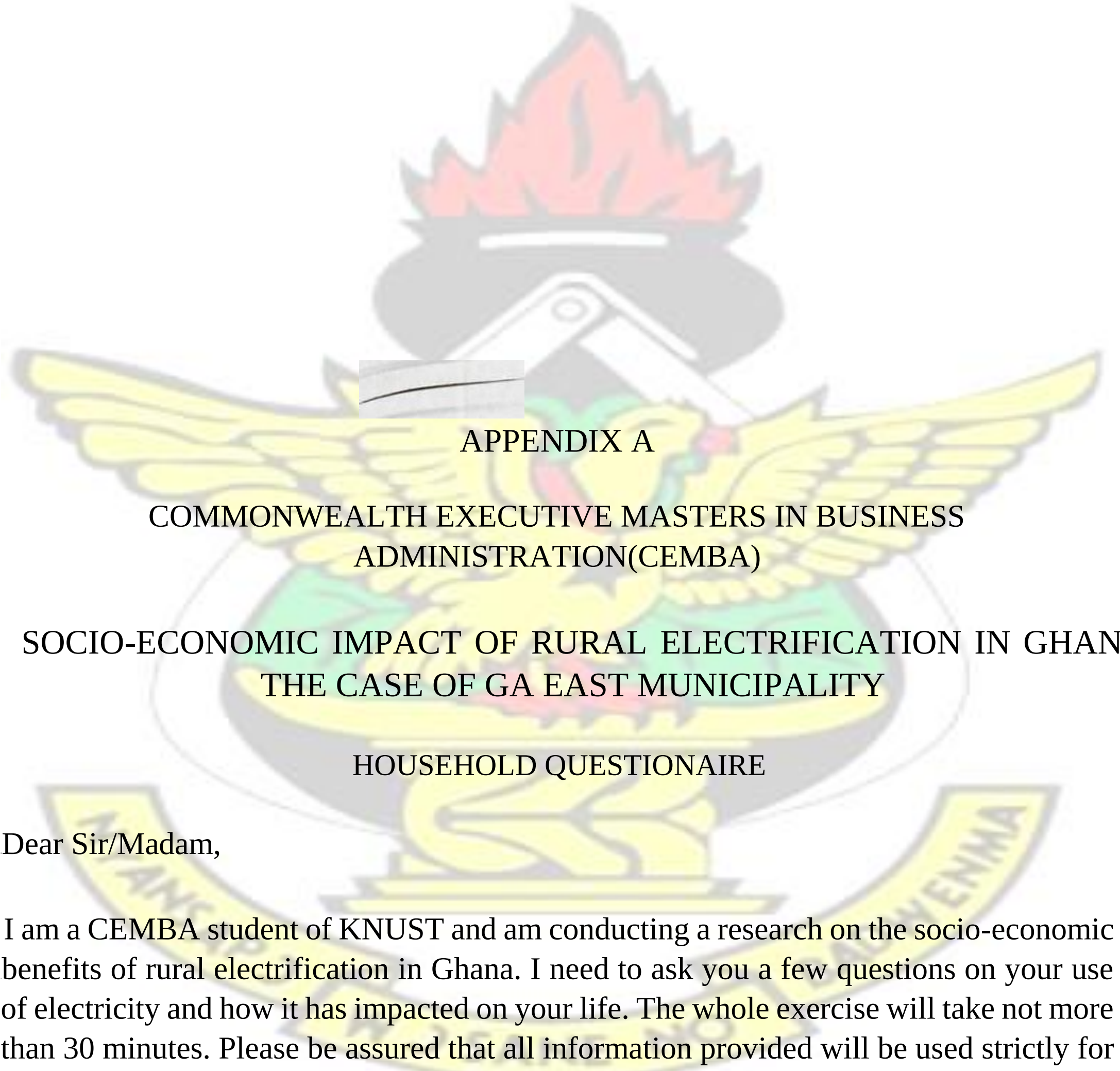
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APPENDIX A

COMMONWEALTH EXECUTIVE MASTERS IN BUSINESS ADMINISTRATION (CEMBA)

SOCIO-ECONOMIC IMPACT OF RURAL ELECTRIFICATION IN GHANA: THE CASE OF GA EAST MUNICIPALITY

HOUSEHOLD QUESTIONNAIRE

Dear Sir/Madam,

I am a CEMBA student of KNUST and am conducting a research on the socio-economic benefits of rural electrification in Ghana. I need to ask you a few questions on your use of electricity and how it has impacted on your life. The whole exercise will take not more than 30 minutes. Please be assured that all information provided will be used strictly for academic purposes and will not be disclosed to anyone else.

Section A: PERSONAL DATA

1. Please indicate your gender.

A. Male ☐

B. Female ☐

2. How old are you?

3. What is your educational level? (Tick one)

A. None ☐

B. Basic ☐

C. Secondary/senior high Secondary ☐

D. Diploma ☐

E. Tertiary ☐

F. Other please specify ☐

4. How many people are in your household?.....

5. How long have you lived in the Municipality?.....

6. What is your main occupation? (Tick one)

A. Unemployed ☐ B. Farming ☐ C. Petty trading ☐ D. Artisan (mechanic, mason, carpentry, etc) ☐ E. Teaching ☐ F. Banking ☐ G. Civil/public service ☐ H.

☐.....

Otháspecify)

7. Marital status: A. Single ☐ B. Married ☐ C. Widowed ☐ D. Separated ☐ E. Other

8. How long is it since you started enjoying electricity in your home?

9. Before your access to electricity what was your most important source of domestic lighting?

Section B: IMPACT OF RURAL ELECTRIFICATION

10. What are your common uses of electricity? (Tick all that apply)

1. Domestic lighting ☐

2. Watching of TV ☐

3. Listening to news ☐

4. Ironing of clothing ☐

5. Watching of movies ☐

6. Other (please specify) ☐

11. What is your most important use of electricity? (tick only one)

1. Lighting ☐

2. Watching of TV ☐

3. Listening to news ☐

4. Ironing of clothing ☐

5. Cooking ☐

6. Preservation of food ☐

7. Other (please specify) []

12. What was your main source of fuel for domestic lighting before you had electricity?

1. Use of kerosene [] 2. lantern [] 3. use of candle [] 4. torch light [] 5. Other []

13. What problems did you encounter with the use of above?

1. High cost of kerosene/candle []
2. Inconvenience []
3. Smoke in my eyes []
4. Poor visibility/Darkness []
5. Other (please specify) []

14. How did you get access to TV before you had electricity?

1. Use of car battery []
2. Watched TV from other people's homes []
3. Did not watch at all []

15. How did you listen to news/music before you had electricity?

1. Use of battery operated radio/FM []
2. Use of car battery []
3. Use of mobile phone battery, etc. []

16. How did you iron your clothing before you had electricity?

1. Use of box iron []
2. Did not iron []
3. Other (please specify) []

17. In all how many electrical gadgets do you use?.....

18. How much do you pay for electricity per month?.....

20. What are the specific ways in which electricity has helped you? (please mention three)

1 ...

.....

2.....

3.....

21. Can you mention some of the challenges you and your household faced in times when you did not have access to electricity?

1.....

 2.....

 3.....

 22. How did you and your household cope with the problem of no electricity?

23. What complaints do you have about the use of electricity?

- 1. High monthly bills []
- 2. Frequent power outages []
- 3. Electricity shocks []
- 4. Faulty electrical connections []

24. How do you suggest these problems could be solved?

1.....

 2.....

 3.....

APPENDIX B

COMMONWEALTH EXECUTIVE MASTERS IN BUSINESS ADMINISTRATION(CEMBA)

SOCIO-ECONOMIC IMPACT OF RURAL ELECTRIFICATION IN GHANA: THE CASE OF GA EAST MUNICIPALITY

QUESTIONNAIRE FOR BUSINESSES

Dear Sir/Madam,

I am a CEMBA student of KNUST and am conducting a research on the socio-economic benefits of rural electrification in Ghana. I need to ask you a few questions on your use of electricity and how it has impacted on your life. The whole exercise will take not more

than 30 minutes. Please be assured that all information provided will be used strictly for academic purposes and will not be disclosed to anyone else.

4. Please indicate your gender.
- C. Male [☐]
- D. Female [☐]
5. How old are you?.....
6. What is your educational level? (Tick one)
- G. None [☐]
- H. Basic [☐]
- I. Secondary/senior high Secondary [☐]
- J. Diploma [☐]
- K. Tertiary [☐]
- L. Other please specify [☐]

4. How many people are in your household?
5. How long have you lived in the Municipality?.....
6. What is your main occupation? (Tick one)
- B. Unemployed [☐] B. Farming [☐] C. Petty trading [☐] D. Artisan (mechanic, mason, carpentry, etc) [☐] E. Teaching [☐] F. Banking [☐] G. Civil/public service [☐] H. Other (specify) [☐]..... specify)
7. Marital status: A. Single [☐] B. Married [☐] C. Widowed [☐] D. Separated [☐] E. Other

Section B: Business characteristics

8. What type of business do you engage in? Please tick.
1. dressing
2. Dressmaking/tailoring
3. Trading
4. Drinking bar
5. Restaurant/chop bar
6. Other (please state)

How old now is the business?

9. What times do you carry out your business activities 1. Day 2 .Night 3.Both day and night
- 10.How many are employed by the business?.....

Section C: Use of electricity

- 11.To what extent would you say your business depends on electricity?

1. Extremely [1 2. A little [1 3. Not so much [1 4. Notatall [I

12. Since when have you been using electricity for your business? []

1. Ever since the business was started J

2. Sometime after the business was started [I

3. Only recently [I

13. In the absence of electricity, what would have been the alternative source of power in order to keep your business running at this level?

1. Generator t | 2. Kerosine lantern t 1 3.LP gas [4.Car battery | 5. Other (please state)

14. Please mention the activities/processes for which you use electricity in your business

15. About how many people do you provide services for each day?

16. What is the quantity of your output every day?

17. How much does your business pay as electricity bill every month?

18. Would you say that the amount you pay for electricity every month is reasonable?

1. Very reasonable t 1 2. Reasonable (1 3.Toolowt 1 4. Too high(I

Section D: Impact of electricity on business

19. About how much sales do you make every day?.....

20. In the absence of electricity how much sales would you have made?.....

21. In what specific ways has your business benefited from electricity?

1. Increased scale of production [I

2. Higher sales [I

3. More profits [I

4. Increased patronage []

22. Would you say that electricity has helped you in your business more than other sources of power would have done?

1. Extremely so [] 2. It is so [] 3. Somehow so [] 4. Not that much []

23. In the absence of electricity, what other source of power would you have used for your business?

- Generator [] 2.Kerosine lantern [] 3.LPgas [] 4.Car battery [] 5. Other (please state).....

24. During times when there is no electricity, what do you do with your business?

1. Business stops altogether because I rely on electricity []
2. Business runs at reduced rate because some processes cannot be done []
3. Business still goes on as usual because I use alternative sources of power [] 25. Would you say you would have made the same level of profit even without electricity?

1. Very much so [] 2. Somewhat so [] 3. Not at all []

26. Would you say that the scale of your business would have been the same level if —even you operated without electricity?

1. Very much so [] 2. Probably so [] 3. Not at all []

Challenges associated with use of electricity

27. What are the main challenges you have with use of electricity for your business?

1. Unreliable power supply/frequent power outages []
2. High electricity bills []
3. Risk of electrical shocks []
4. Other (please state).....

28. In what ways do you think the problem should be solved?

THANK YOU VERY MUCH FOR YOUR RESPONSES



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APPENDIX C

COMMONWEALTH EXECUTIVE MASTERS IN BUSINESS ADMINISTRATION(CEMBA)

SOCIO-ECONOMIC IMPACT OF RURAL ELECTRIFICATION IN GHANA: THE CASE OF GA EAST MUNICIPALITY

QUESTIONNAIRE FOR TEACHERS

Dear Sir/Madam,

I am a CEMBA student of KNUST and am conducting a research on the socio-economic benefits of rural electrification in Ghana. I need to ask you a few questions on your use of electricity and how it has impacted on your life. The whole exercise will take not more than 30 minutes. Please be assured that all information provided will be used strictly for academic purposes and will not be disclosed to anyone else.

SECTION A: Personal characteristics

1. Please indicate your gender

A. Male []

B. Female []

2. How old are you?.....

3. What is highest educational qualification?

A. B.E.C.E. []

B. WASSCE []

C. Diploma []

D. Cert 'A' []

E. FIND []

F. Degree []

4. Marital status:

A. Single []

B. Married []

C. Widowed []

D. Separated [] E. OtherL []

5. How long have you lived in the Municipality?.....

SECTION B: Teaching characteristics

6. What level of education do you teach?
- A. Lower Primary
 - B. Upper Primary
 - C. JHS
 - D. Senior High
7. Which category of teacher do you belong to?
- A. Pupil teacher
 - B. Professional teacher (Diploma/Cert 'A')
 - C. Professional teacher (Graduate)
 - D. Graduate non-professional teacher
 - E. Other (please state)
-

8. What subject(s) do you teach?.....
9. No. of classes taught.....
10. In all, about how many students/pupils do you teach per week?.....
11. How many years have you taught in the district?.....

SECTION C: Uses of electricity

12. Since when did you have access to hydro-electrical power in your community?
- A. Ever since I started teaching in the district
 - B. Soon after I started teaching in the district
 - C. Sometime after I started teaching in the district
 - D. Only just recently
13. As far as your work is concerned, what are the major things you use electricity for?
- A. Preparation of lesson notes
 - B. Marking of assignments/homework
 - C. Ironing of clothing
 - D. Listening to news
 - E. Charging of mobile phone
 - F. Other (please state).....

SECTION D: Impact of electricity on Teaching

14. To what extent would you say that electricity has helped you in your work as a teacher?
- A. Regular source of power to prepare lesson notes/lesson plans

- B. Able to listen to news to update myself on events in the country/the world
- C. Able to iron my clothing for work
- D. Able to organise other household chores that ultimately impact on my work as a teacher
- E. Other (please state).

15. In what specific ways do you benefit from electricity in your work as a teacher?

- A. More effective teaching
- B. Able to study for higher qualification
- C. Better lesson notes preparation
- D. Listening to news to be well informed
- E. Entertainment/relaxation
- F. Other (please state).

16. During times when there was no electricity, what was your major source of power/In the absence of electricity, what do you normally use as source of power?

- A. Torch light
- B. Candle
- C. Kerosene lamp
- D. Car battery
- E. Other (please state).

17. During times when there was/is no electricity, how did/does your work as a teacher go on?

- A. As effectively as there was electricity
- B. Work goes on but at a reduced capacity
- C. Work does not go on at all
- D. Other (please state).

18. How effective we you as a teacher during times when there was no electricity?

- A. As effectively as there was electricity
- B. At a somehow reduced level
- C. At a much reduced level
- D. Other (please state).

19. Would you say that electricity has helped you in your teaching profession more than other sources of power would have done?

1. Extremely so [J 2. It is so [J 3. Somehow so [J 4. Not that much [J

SECTION E: Challenges associated with use of electricity

20. What are the main challenges you have with use of electricity for your business?

1. Unreliable power supply/frequent power outages []

2. High electricity bills []

3. Risk of electrical shocks []

4. Other (please state).....

21. In what ways do these problems affect your work?

22. How do you think the problem should be solved?

THANK YOU VERY MUCH FOR YOUR RESPONSES