Energy Access and Productive Uses for the Urban Poor

Final Report on Ghana Scoping Study

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ESMAP Mission
The Energy Sector Management Assistance Program (ESMAP) is a global knowledge and technical assistance trust fund program administered by the World Bank and assists low- and middle-income countries to increase know-how and institutional capacity to achieve environmentally sustainable energy solutions for poverty reduction and economic growth.

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ABBREVIATIONS AND ACRONYMS

ADB	Agricultural Development Bank
AMA	Accra Metropolitan Assembly
ASHMA	Ashaiman Municipal Assembly
DFID	Department for International Development
ECG	Electricity Company of Ghana
EPRAP	Energy for Poverty Reduction Action Plan
ESMAP	Energy Sector Management Assistance Program
GCB	Ghana Commercial Bank
GEN	Gender and Energy Network
GHAFUP	Ghana Federation of the Urban Poor
GLSS	Ghana Living Standards Survey
GNESD	Global Network on Energy for Sustainable Development
GOG	Government of Ghana
GPRS 1	Ghana Poverty Reduction Strategy
GPRS 11	Growths and Poverty Reduction Strategy
GRATIS	Ghana Regional Appropriate Technology Service
GWCL	Ghana Water Company Limited
ILGS	Institute of Local Government Studies
KMA	Kumasi Metropolitan Assembly
KNUST	Kwame Nkrumah University of Science and Technology
LPG	Liquified Petroleum Gas
MMDAs	Metropolitan, Municipal and District Assemblies
MTDP	Medium Term Development Plan
NBSSI	National Board for Small Scale Industries
NEP	National Energy Policy
NDPC	National Development Planning Commission
PDG	People's Dialogue Ghana
PISCES	Programme for Investment in the Small Capital Enterprises Sector
PURC	Public Utilities Regulatory Company
SNEP	Strategic National Energy Plan
SUF	Slum Upgrading Facility
TEC	The Energy Center
UESP	Urban Environment Sanitation Project
UNDP	United Nations Development Programme
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

Several contemporary studies have revealed a positive nexus between access to safer and modern forms of energy and sustainable development. The objective of the ESMED-EAfUP programme is "to create and sustain a network of energy practitioners to support development of Micro, Small and Medium Enterprises (MSME) as users and providers of modern energy services for slum upgrading programs." Premised on this, the purpose of the project, ***"Energy Access and Productive Uses for the Urban Poor",*** is to provide valuable insight into the productive uses of energy in slums in Ghana and to examine the possibility of deploying modern energy forms to enhance livelihoods. This report summarises the main findings of the scoping study conducted by the Energy Center, KNUST in three slums in Ghana from 1st October, 2010 to 20th December, 2010. The aim of the scoping study was to gain an understanding of the productive activities slum dwellers engage in that rely on energy services and the potentials and challenges of slums in Ghana regarding access to modern energy services and income generation from productive activities.

A representative sample of 1,060 households that were selected was interviewed for the study. Household heads who formed the unit of analysis were systematically selected from Akwatia Line (160 household heads), Old Fadama (450 household heads) and Amui Dzor (450 household heads). Using qualitative methods, 88 stand-alone enterprises were also selected purposively from Old Fadama, Amui Dzor and Akwatia Line in Ghana, for the study, using defined criteria. Based on six criteria (see sub-section 1.5.2 and Annex 4), the 88 enterprises were selected from the three slums. Information gathered from the two surveys included household demographic characteristics, economic characteristics and energy supply and utilisation patterns of households and enterprises. The key findings of the survey are presented below.

Housing Characteristics

In terms of housing characteristics, 79.3% of houses in the three slums were made with wooden shacks, thus affirming that the three study areas are slums. Akwatia Line was the foremost among the three in the use of wooden shacks. Indeed the monthly household income was the lowest in Akwatia Line. The tenure of households in the three slums was a major factor determining the type of materials used for the construction of houses. The survey observed that Old Fadama and Akwatia Line were occupied predominantly by squatters who were under constant threat of eviction by the city authorities (AMA, and KMA) and thus preferred to live in these temporary structures. It was observed that Akwatia Line and Old Fadama were not prime lands in the cities. They were found in waterlogged areas and in the case of Akwatia Line which is located near sawmills, the slum dwellers made attempts to use saw dust to fill the low lying and flood prone areas.

The findings of the survey revealed that all the households in Akwatia Line and Amui Dzor patronised public bathhouses and toilets because of the lack of these facilities in their dwellings. They purchased warm or cold water for bathing in the public bathhouses and paid 10GHp per visit to the public latrines. The public bathroom owners supplied hot water for bathing at Akwatia Line and Old Fadama especially during the cooler harmattan season of December and early part of January. Access to adequate space was a critical problem the slum dwellers had and coupled with this is the issue of the water logged nature of the settlements, which made the place damp for the greater part of the year.

Socio–Demographic Characteristics of Households

AGE STRUCTURE | The study observed a dominance of the active population (15 – 64 years age group) over the inactive population age groups (below 15 years and 65 years and above) in the slums. The dominance of the

active-population over the inactive population is reflected in the Age Dependency Rate (ADR) of 43.1% and differed significantly from the national average of 87.1%. The dominance of the active population in the slums is an indication that the slum dwellers, majority of who are migrants, are economic migrants who have come to the cities in search of employment.

HOUSEHOLD SIZE[1] | The survey revealed that the average household size for the three study areas was 3 members. The study also revealed that males comprised 71.1% and females, 28.9% of all household heads from the three slums.

REGION OF ORIGIN OF HOUSEHOLD HEADS | About 65% of the household heads migrated from the Northern Region of Ghana to seek better economic opportunities in the cities in the south.

EDUCATIONAL LEVELS OF HOUSEHOLD HEADS | The findings of the survey show generally low levels of education of household heads. About 36% had no formal education, whereas 17.3% started but never completed basic education. Furthermore, about 25% and 15% and 5% of the household heads had completed JSS/JHS/Middle and SSS/SHS, respectively with only 5% completing Technical/Vocational education. Household heads with tertiary education accounted for 1.7% of the total number of household heads in the three slums.

Economic Characteristics

EMPLOYMENT | Employment levels in the three slums were mainly in the informal sector and these were generally high, averaging about 98% compared to the urban employment rate of 95.7% for Ghana. The informal enterprises and service sectors of the local economy employed 52.0% and 46.0%, respectively. The informal industrial activities in the slums included scrap metal collection and processing, cook stove manufacturing and groundnut paste production. The service sector was dominated by food preparation and vending enterprises, public bathhouses, entertainment and head portage.

HOUSEHOLD INCOME, EXPENDITURE AND SAVINGS | The study identified that households' income levels are generally high compared to national averages. The findings of the study show that households in the slums earned an average monthly household income of GH¢459.2 compared to the national average household income of GH¢101.4, which challenges the assumption that slum dwellers are poor.

Household expenditure levels in all three slums were higher than the national monthly household consumption expenditure but tallied well with the Greater Accra Region's average. The average household monthly expenditure (including remittances) was GH¢243.6 for all three slums compared with the national figure of GH¢160.0 and Greater Accra Region's average of GH¢242.3. Premised on the lower household expenditure levels relative to their earnings, the study identified that households in Old Fadama, Amui Dzor and Akwatia Line have the capability to save GH¢2.7, GH¢2.6 and GH¢2.0, respectively, per day. However, only 39.9% of the households in the three slums saved their excess incomes with various financial institutions. Out of this, the majority (81.8%) saved with banking institutions (such as the Ghana Commercial Bank and the Agricultural Development Bank). The remaining 18.2% saved with non-banking financial institutions dominant among which were the savings and loans groups such as the First National Savings and Loans (9.6%), "Susu" (3.2%) and "Adashi" (2.4%).

[1] A household refers to a group of people who cook and eat from the same pot and share the same house-keeping arrangements. This definition did not consider dependents living elsewhere who did not partake in the house-keeping arrangement.

Energy Supply and Utilisation by Households in the Slums

HOUSEHOLD ENERGY FOR LIGHTING | Relative to the national average of 66% and the national urban average of 79%, the study revealed that the slums have high (88.2%) access to electricity ranging from 95.1% in Old Fadama to 79.4% in Akwatia Line. Despite their high access to electricity, only 46.2% of the households acquired their electricity connection directly and legally from ECG and thus had electric meters. The remaining households (53.8%) were connected to their neighbours' electric meters, a phenomenon that is referred to in the slums as 'by-pass' and considered as illegal. The major reason for the illegal electricity connections was households' inability to provide building permits or police certification to make valid their applications for electricity connection from ECG. Subsequently, the study estimated that the potential revenue losses to ECG attributable to illegal connections for lighting could be as high as GH¢917,185.2 for Old Fadama, GH¢3,648 for Amui Dzor and GH¢12,996 for Akwatia Line. Furthermore, despite the use of high energy-consuming electrical appliances in the slums, households' electricity bills as a proportion of household expenditure (7.3%) were lower than the national average of 9.5%. The study therefore noted that revenue losses due to illegal connections, usually described as commercial losses, could be highly significant. At the national level the total distribution losses amounted to 25.3% of the total energy supplied (6328GWh) by ECG and NED in 2008, of which about 12% was commercial losses, including illegal connections and various malpractices, according to the Energy Commission (2008). The rest include inefficient utility and user equipment and appliances and poor housekeeping methods.

Further analyses show that the low access to electric meters is not the question of affordability since average household income of GH¢459 per month was three-times higher than the national average income of GH¢101.4 per month. Thus, households in the three slums could afford electricity connection legally or through the appropriate channel.

The other energy types used by households for lighting purpose apart from electricity were kerosene, dry cell batteries and candles. The survey identified that about 9.5% and 2.3% of the households in the slums used kerosene and candle, respectively as their main forms of energy for lighting because they do not have electricity connection in their dwellings. Dry cells however were used by about 30.5% of households as alternatives to their main energy forms for lighting (i.e., using touch lights). The dry cells were also used in radios.

HOUSEHOLD ENERGY FOR COOKING | The use of charcoal and firewood accounted for 73.9% and 10.6%, respectively, of households' total energy-mix for cooking at the domestic level in the three slums. The dominant use of biomass in the three slums as cooking fuel is higher than the national average of 63%. Firewood formed the highest household monthly expenditure on the various cooking fuels (i.e., GH¢42.9) because of the use of firewood at both the household and enterprise levels. Households with home-based enterprises could not differentiate between household energy consumption from that of the enterprise. Of the 10% of all households in the three slums that use firewood as cooking fuel, 74% of them used it at both domestic and enterprise levels.

Households' daily expenditure on charcoal in the three slums ranged from 50Gp to GH¢1.5 with varying weights from one slum to the other. Samples of charcoal taken from vendors revealed that 50GHp worth of charcoal weighed 1.3kg in Old Fadama, 1.5kg in Amui Dzor and 1.9kg and Akwatia Line. Charcoal in Akwatia Line was the cheapest because of its proximity to the charcoal producing areas of Kintampo, Techiman, Nkoranza, Atebubu, among others. The implication is that households in Old Fadama and Amui Dzor would have to use more charcoal to derive the same utility a household in Akwatia Line would.

The findings of the study further revealed that about 22.3% and 21.6% of the households would prefer to use LPG and electricity, respectively as cooking fuels in the slums. Interestingly, the preference for electricity as household cooking energy is highest in Akwatia Line and Old Fadama where illegal connections were high and the determination of electricity bills for most households is not dependent on the kilowatt hours of electricity they consumed per month, demonstrating the ignorance of the respondents about the actual cost of electricity they consume. The responses of households revealed that the deployment of LPG and electricity as modern cooking fuels to the slum dwellers were influenced by the perceptions of the slum dwellers about the use of charcoal, which are 'high cost' (19.4%), 'harmful' (13.7%), 'time-wasting' (39.3%) and 'unhealthy' (18.4%).

Energy Supply and Utilisation by Enterprises in the Slums

Characteristics of Enterprises

Using the six criteria[2] that informed the selection of the enterprises, 88 of them were purposively selected for the enterprise survey which was largely qualitative. These were made up of 21 public bathhouses, 10 petty retail shops, 22 food vending firms, 12 chop bars, 3 meat and fish mongering enterprises and 6 groundnut paste production enterprises. The rest were 3 bakeries, 5 hair dressing salons, 6 video centres and 5 scrap metal works.

Public bathroom operators provided water to the customers at the cost of 20GHp for cold water (average of 12 litres) and 25GHp for warm water (average of 3 litres) for bathing. Video centres were operated in the three slums as places of entertainment and hairdressing salons were vibrant beauty enterprises for the slum dwellers. The petty goods retail stores operators offered for sale all kinds of goods including toiletries, beverages, drinks, milk, bread, confectionaries and many more items to the inhabitants of the slums. Similarly, food preparation and vending enterprises offered cooked food for sale to the slum dwellers and the cities at large. The products offered for sale by the fish and meat mongering enterprises, bakeries and groundnut paste production enterprises were smoked fish and meat, pastries and groundnut paste, respectively. The scrap metal dealers processed scrap metals by remoulding/reshaping the scrap metals for onward transfer to companies in Accra and Tema as raw materials. These are all enterprises that relied on energy sources to operate.

Sources of Capital for the Establishment of Enterprises

Economic activities in the three slums were mainly informal small scale enterprises and characterised by "free entry and exit." About 89.4% of the enterprise owners established their businesses with personal savings and about 3.4% of them established their businesses with funds from personal savings complemented with credits from friends and family members. This is not unusual about informal enterprises in Ghana.

The study identified that only 34.1% of enterprise owners had acquired training through apprenticeship before establishing their enterprises. Apprenticeship as the main means of skills training for informal employment is also not unusual in the country. The remaining enterprise owners capitalised on the business opportunities posed by the demand for the variety of services provided by the community to establish their enterprises.

[2]The criteria used for selecting the enterprises are replicability of intervention and potential impact on employment; health imperatives; long-term prospects of enterprise; potential effect of energy intervention on women and children; extent of energy usage by different types and also by quantity; and peculiarity of enterprise to slum communities).

Roles of the Enterprises in the Urban System

The findings of the study show that the services provided by the enterprises located in the slums were significant and benefited not only the slum dwellers but also households and enterprises living elsewhere in the three cities. Food vendors contributed significantly to the supply of cooked food to both the slums and the cities at large. Traditional cook-stove manufacturers, groundnut paste producers, bakers and fish and meat mongers provided for the needs of residents in the three cities. Scrap metal dealers also supplied the raw material needs of manufacturing firms in the cities of Accra and Tema. Thus, the enterprises had clientele base both within and outside the slums.

The enterprises in the slums employed an average of three employees. However, groundnut paste producers and food preparation and vending enterprises which used labour intensive methods of production could employ as many as 16 and 20 employees, respectively. The public bathroom employed an average of two workers, food vending employed an average of three workers the chop bars[3] and groundnut paste production enterprises employed averages five workers and three workers, respectively. The bakeries employed an average of three workers, while the hair dressing salons employed an average of two workers and the video centres an average of two workers. It was common to find one person operating the petty retail shops and fish and mongering enterprises, usually the owner.

Energy Types Used by the Enterprises in the Slums

Petty retail shops, groundnut paste production, food preparation and vending enterprises, video centres, bakeries and public bathhouses all used electricity for lighting purposes. The petty retail shops used electricity for freezing and cooling the beverages they sold to the public and hair dressing salons used it for drying hair. For lighting purposes, some of the food preparation and vending enterprises used kerosene and candles at night to sell to customers. The public bathhouses and petty retail shops used kerosene and candles when there was power outage. Some food preparation and vending enterprises, and fish and meat mongers used charcoal for the preparation of soups and stews, and for smoking fish and meat. The video centres also used petrol to power their stand-by generators during power outages.

Firewood was the major energy type used by a number of the enterprises, including cooked food and vending enterprises, fish and meat mongers, and groundnut paste producers. All the bakeries used LPG as the main energy form. Scrap metal dealers also used kerosene to burn away insulators that cover metals and LPG to cut and weld metals into useful forms.

Energy Conversion Equipment used at Household and Enterprise Levels

The study identified that households used a wide range of electricity appliances for several purposes. Besides the electric bulbs used for lighting, electrical appliances such as television and radio sets, sound system, DVD, refrigerators, electric immersion heaters, electric ovens and electric stoves were used at the household level in the three slums. The other electrical appliances were electric sewing machines, rice cookers, electric irons, electric fans, electric cookers and personal computers. The proportion of households that used the electrical appliance were television sets (72.2%), radio sets (48.6%), sound system (36.2%), DVD (45.6%), refrigerators (18.7%), electrical immersion heaters (24.2%), electrical ovens (0.7%) and electrical stoves (0.5%). The commonest appliances were refrigerators, which 21.60% of the households used, 20.9% of the households used electric pressing irons and 29.34% used electric heaters.

[3] Traditional and local restaurants are referred to as chop bars in Ghana.

Traditional cook-stoves (which 92% of the households used) were the predominant energy conversion equipment used for the conversion of firewood into thermal energy by the owners of public bathhouses and food preparation and vending enterprises. Bakers, hair dressers, video centre operators and fish mongers used LPG ovens, hair dryers, TV sets and 'traditional-barrel ovens, respectively, in the running of their enterprises.

Problems/Challenges Associated with Supply and Use of Current Energy

Power outages, fluctuations and low currents were the major problems associated with electricity supply in the slums. Low currents and power outages were regular occurrences in Akwatia Line and Old Fadama. Petrol, kerosene and LPG supplies were also affected by the general shortages that sometimes hit the country. Increasing prices of energy products was another challenge that owners of enterprises that depended on LPG, petrol and kerosene mentioned.

Charcoal and firewood were readily available in the slums. However, whilst charcoal was considered to be time-wasting because it burns slowly, firewood was regarded as harmful to the people due excessive smoke and heat, taking into account the limited space in the slums.

Preferred Energy Types and Reasons for Preference

Linked to the identified problems with the supply and utilisation of the various forms of energy, 22.3% and 21.6% of the household in the three slums would prefer to use LPG and electricity (respectively) as cooking fuels at the domestic level. The households and enterprise owners expressed their desire for alternative energy forms that will maximise their utility relative to the current sources. Operators of food preparation and vending enterprises and public bathhouses within the slums require different energy forms that are affordable and produce uninterrupted power with low health risks.

Energy types preferred by owners of food preparation and vending enterprises, meat and fish mongering enterprises, chop bars, hair salons, bath houses, video centres, among others included those that were cheaper and less hazardous than what they were using at the time of the study. The need for alternative energy was underpinned by enterprise owners' desire for safe, reliable and affordable alternatives. Preference for LPG was very high among the food preparation and vending enterprises and bakeries. Despite the frequent interruptions associated with the supply of electricity, its preference among the enterprise owners was high. The study observed that enterprise owners want to see regular supplies of electricity with their own electric meters.

CONCLUSION

An analysis of the slum dwellers' income and expenditure levels revealed a high potential to save. Whilst household monthly incomes averaged GH¢459.2, household monthly expenditure averaged GH¢243.6, implying a high capability to save excess income. Using ability to adopt safer and modern energy forms as a criterion in assessing the effective deployment of safer and modern energy forms, the study concluded that the high propensity to save is an opportunity for their deployment if they can be sensitised about the benefits of using modern energy forms, which many of the slum dwellers are not aware of. Most enterprise owners could also capitalise on the credit policies of the financial institutions they saved with to adopt the modern energy forms.

Lack of education and limited awareness about the benefits of using clean, efficient and improved energy forms were some of the reasons for the use of inefficient and illegal energy forms among the slum dwellers.

The study recommends awareness creation among the slum dwellers about the benefits of using legal, clean and efficient energy forms in productive enterprises, which the NGOs can take up.

A major benefit of this study which is worth mentioning is the learning and sharing that took place among the research team because apart from the findings of this study that unravelled some relevant information that many stakeholders working in the cities of Ghana did not know about slums, there was also a lot of sharing of experiences that took place.

1 | INTRODUCTION

BACKGROUND

Energy service coverage and access in developing countries continue to remain low despite the huge investments by donors and governments. Influx of migrants from the rural areas to the cities in Ghana has created slums in the cities with varied demand for energy services. Compounding this challenge is the unwillingness or inability of utility companies to provide services to slums, leading to illegal connections and loss of income to the utility providers. For many governments, the task to meet the goal of expanded access is complex, expensive, and requires long term vision, commitment to policies that will meet the energy needs of the poor and concentrate efforts from a variety of stakeholders from the energy sector and community representatives. Energy Access and Productive Uses for the urban poor is an intervention proposed by ESMAP which is being implemented by The Energy Center of the Kwame Nkrumah University of Science and Technology.

This project is funded by ESMAP/SME Development – Energy Access for the Urban Poor (ESMED – EAfUP) in partnership with The Cities Alliance. The objective of ESMED-EAfUP programme "is to create and sustain a network of energy practitioners to support development of MSME as users and providers of modern energy services for slum upgrading programs." With this objective therefore, ESMAP has gone into partnership with research institutions, such as the universities, to design and coordinate programme activities in each of 5 selected countries, using a bottom up approach to implementation. Ghana (where Kwame Nkrumah University of Science and Technology (KNUST) is located) is one of the beneficiary countries. The project therefore has an in-build capacity building component with the intention of strengthening the capacity of the research institutions and other local stakeholders using the approach referred to as "learning-by-doing, learning-by-analyses and learning-by-sharing." The partnering organisation of KNUST, The Energy Center (TEC), is working with People's Dialogue Ghana (PDG) and The City Alliance. The essence of using this approach is to ensure local ownership of interventions in order to guarantee their sustainability. It is expected that the local institutions will consult actively and regularly with all stakeholders, particularly community based organisations, NGOs, key community groups and representatives. It is also expected of the partner institutions to engage local government officials and utility providers to develop strategies to build capacity of energy practitioners in Ghana. The Energy and Resources Institute (TERI) in India, has been contracted to produce knowledge products that will facilitate capacity building of energy practitioners in the client countries, which include Ghana, Vietnam and Uganda. The cities were selected by the Cities Alliance who recognise the commonality in purpose and have partnered to address the issues jointly to meet a common goal of responding to the challenges of rapid urbanisation and the growing demand to meet energy needs of the people. The two partners are interested in the outcome of this study.

RESEARCH QUESTIONS

The main objective of the scoping study is to obtain an insight into the potential and challenges of slums in Ghana regarding access to modern energy services and income generation from productive activities. In an attempt to seek answers to address the main objective, answers were sought to a number of broad research questions including the following:

Policy Issues

- What are the existing national policies/regulations on energy with regard to informal settlements/slums; which national institutions are concerned?
- What are the existing national and local policies (bylaws enacted by AMA, KMA, etc) regarding access to modern fuels?
- Are there any regulations by utility companies (e.g., Electricity Company of Ghana (ECG), Northern Electricity Department) or the Ministry of Energy that guide the supply and utilisation of electricity in informal settlements/slums or that inhibit access to electricity by slum slums, particularly for productive activities?
- How does the utility company collect bills from these slums, and how often do they do the collection (for example, does ECG have a contractor in the community, does it collect bills every 30 days, etc)?

Community Level

- What is the type and nature of slums/informal settlements in urban Ghana and what are their socio-economic characteristics (including availability of savings and social groups)?
- What is the availability of energy supply in the slums?
- What is the number and types of enterprises that exist in the slums and to what extent have they been supported by savings and social groups?

Household Level

- What are the socio-economic characteristics of the households; family size, education of household head, economic activities of household members, etc?
- Which types of energy are households using for various domestic purposes including cooking, lighting and powering appliances, and what are their unit prices?
- What is the household income and how much do they spend on the various energy types per day/week/month/?
- What are the household's attitude towards and preference for modern energy fuels and quality of electricity/LPG, etc. as well as their ability and willingness to pay for them?

Enterprise/Business/Factory Level (Purposively Select for In-Depth Study)

- What are the preferences or choices of energy for various services (e.g., lighting, cooking, etc. at household and enterprise levels)?
- What is the cost and quantity of energy input for the business/enterprise compared to alternative modern energy fuels?
- What price per energy-service (kilo-lumen hour of lighting) by different energy types?
- How is the availability and regularity of energy supply?

OBJECTIVES OF THE SCOPING STUDY

The focus of the scoping study is to build the capacity of energy research institutions in Ghana, Uganda and the Vietnam to enable them assist the urban poor to have improved access to quality and modern energy in support of their income generating activities. Specifically, the research focuses on understanding, among others:

The Slums

- The socio-economic characteristics of slum dwellers.
- Facilities that exist for savings and credit for community development.
- Organization of societies, leadership and power structures prevailing in slums.
- Energy-related health problems in the slums.
- Level of accessibility to basic facilities like potable water, sanitary facilities, hospitals/clinics, community services-water, schools, cinema halls, etc.

Economic Activities

- Main livelihood and income generation activities of slum dwellers.
- Characteristics of selected enterprises (size, number of employees, income levels) in the slums.
- Processes and equipment used by households and enterprises in productive activities.
- Energy demand and supply (by Households and Enterprises)
- Quantity of energy consumption (by type of energy and purpose for which it is used).
- Energy expenditure (by type and purpose for which it is used).
- Supply of energy (availability by each type of energy, purpose, source of supply, uses for households and enterprises, etc.).
- Relationship with suppliers (availability, quality, quantity, support services, maintenance, illegal providers, etc.).
- Relationship between energy demand and supply, and the consequences
- Potential for energy substitution and efficiency improvements.

SCOPE OF THE STUDY

The study is expected to provide information on existing conditions in three slum settlements in Ghana, and the challenges confronting the urban poor in relation to energy access and its use for income generating activities. The study slums are Akwatia Line in Kumasi in the Ashanti Region and Old Fadama and Ashaiman, both in the Greater Accra Region.

METHODOLOGY

To carry out the study multiple approaches and stages were adopted in gathering data. These are policy reviews, questionnaire design, sampling, training of enumerators and data entry clerks, pilot testing and actual administration of questionnaires.

Desk Study

There was review of documentations related to slums and energy policies in Ghana to facilitate a deeper understanding of the issues. The review highlighted the definition and characteristics of slums and a discussion on enterprise development in the slums. The review took into consideration national and local development policies in Ghana in relation to the urban poor. The other areas reviewed are energy access/productive uses in slums, energy policies for the urban poor in GPRS I and II, and energy policies for the urban poor. Some of the documents reviewed included theStrategic National Energy Plan (SNEP) (2006-2020), National Energy Policy (NEP) (2010-2015) and Energy for Poverty Reduction Action Plan (EPRAP).

As part of specific policies aimed at enhancing slum dwellers' access to energy resources, there was a review of projects implemented by Kumasi Metropolitan Assembly (KMA) and Accra Metropolitan Assembly (AMA) from 2003 to 2009. Further, the Medium Term Development Plans (2006 – 2009) of the AMA and KMA were reviewed to identify completed and on-going energy projects for the slums.

Questionnaire Design

Guided by the objectives of the scoping study, two types of questionnaires, household and enterprise questionnaires, were designed to elicit the required responses from households and enterprises, respectively (refer to Appendix 1). The household questionnaires aimed at eliciting information on the demographic, socio-cultural and economic characteristics of the urban poor dwellers in the study areas. It also covered the governance systems within the slums as well as the availability of savings and credit groups. It sought information on energy supply and demand for productive enterprises in the study slums. The household questionnaires covered the household profile, expenditure on energy, sources of supply, availability, frequency and duration of supply.

The enterprise questionnaires which aimed at an in-depth qualitative study, sought to elicit the required information from purposively selected enterprises in the slums. The intent is to understand the energy types, need and usage by enterprises in the study areas. The following criteria were developed for the selection of enterprises for the interview:

- Replicability of intervention and potential impact on employment;
- Health imperatives e.g., indoor air pollution;
- Long-term prospects of enterprise (e.g., enterprises that thrive on an ongoing construction project will have to fold-up once the construction is over);
- Potential effect of energy intervention on women and children;
- Extent of energy usage by different types and also by quantity; and
- Peculiarity of enterprise to slums.

Training of Enumerators

A total of 30 enumerators were trained in the administration of the household and enterprise questionnaires. The purpose of training was to ensure that enumerators understood the import of the questions and could easily translate them into the local languages to aid the collection of the right information.

Training in Data Entry

Data entry clerks were trained using a template purposely designed for the household study. The software that was used is called Census and Survey Processing System (CSpro). The software provides a framework that can be used to design templates to meet the specific requirements of the user, unlike others which are normally restricted and inflexible. The topics covered in the training included data collection, data entry, data consolidation, data storage, data management and data delivery. The enumerators were taken through the process of the template design, the input of data into the software and redesigning of the template when the need arises.

Enumerators were educated on how the wrong data collected could negatively affect the outcomes of the project. The facilitator stressed the importance of first identifying the core questions in the questionnaire

that should be addressed carefully to ensure that the importance of designing the template is not compromised with other questions of less importance.

The training served as a capacity building for the staff of The Energy Center at KNUST and People's Dialogue Ghana, the local NGO assisting The Energy Center to link up with the slums.

Pilot Testing of Questionnaires

Following the training, the enumerators undertook pilot testing of the instruments in the three slums, using the local languages. As part of the pre-testing, enumerators were to observe the time taken to administer each questionnaire, the responsiveness of participants and any difficulty experienced in understanding and interpreting the questions in the instruments. A major lesson learned by the team was the difficulty on the part of respondents to answer recollection questions particularly on annual incomes and expenditures. Due to this, the household questionnaire was revised to elicit information on the immediate past month. Thus, the data collection instruments were fine-tuned for a second pre-test, with the results from the pretesting which were complemented with inputs from ESMED – EAfUP Staff. The essence of carrying out the second pre-testing was to ensure that all the necessary minor corrections were done prior to data collection.

Kick-off Meeting

As a way of comprehending the social and cultural elements and economic activities that take place in urban slums, a kick-off meeting was organised, which brought together key stakeholders concerned with the development of slums. The participants at this kick-off meeting (refer to Appendix 2 for full report of the kick-off meeting) included representatives from, among others, the following organisations/agencies/company/institutions;

- Electricity Company of Ghana (ECG);
- Accra Metropolitan Assembly (AMA);
- Ashaiman Metropolitan Assembly (ASHMA);
- Ghana Regional Appropriate Technology Service (GRATIS);
- National Board for Small Scale Industries (NBSSI);
- Peoples Dialogue Ghana (PDG) and Federation of Urban Poor Dwellers in Ashaiman and Old Fadama;
- Gender and Energy Network (GEN);
- Cities Alliance;
- Slum Upgrading Facility (SUF); and,
- Institute of Local Government Studies (ILGS) Town and Country Planning

The essence of the kickoff meeting was to engage these key stakeholders in discussing the main objective of the project and to find out from them their knowledge about slums and the use of energy for productive activities in the slums. Further, the kick-off meeting was to provide an insight into the roles the stakeholders play in slums and how they are connected with the slums. For instance, one of the sub-objectives of the kick-off meeting was to find out from utility providers such as Electricity Company of Ghana (ECG) whether slums are served with electricity and if so, how they collect bills from them. Similarly, the meeting was to find out from the local governments of Accra and Ashaiman whether they recognize slums in city planning and zoning, and how they work with them as part of their urban development agenda.

With the commitment of the World Bank to use a bottom-up approach in this project, which is the first of its kind, there was a need to meet the stakeholders, and with them identify areas to focus on for data collection that will be used to advise the government and policy makers once the data is analysed and recommendations made at the end of the project.

Some of the key outcomes of the kick-off meeting are:

- There is no coordination among the agencies and other stakeholders in their quests to enhance the living conditions of the urban poor, irrespective of the area of focus.
- National and city authorities do not consider access to energy resources as a critical factor that would facilitate poverty reduction among the urban poor. Hence there are no specific energy policies to facilitate the development of the urban poor. For example, ECG does not have any specific pro-poor and pro-slum policies aimed at improving the slums' access to electricity.
- The requirement for 'building permit' for new electricity connections imposes a grave challenge on urban slum dwellers whose occupancy is characterised by insecurity emanating from the incessant threats of eviction from city authorities..
- The Assemblies (e.g., Ashaiman Municipal Assembly and Accra Metropolitan Assembly) perceive the existence of the slums as nuisance and thus do not have any specific interventions aimed at enhancing their access to energy resources.
- There is a critical knowledge gap on the energy efficient technologies observed among the participants from the slums. The slum dwellers exhibited a preference for charcoal for domestic activities though its efficiency is understood to be as low as 18%. The knowledge gap in particular was to serve as the point of entry by the project. Thus, the project's outputs are believed to have an impeccable implication for policy formulation and implementation.
- Slum dwellers could be potential sources of revenue for city authorities if they are recognised as stakeholders in the development arena. Currently, they pay far less for energy and other utility services because they are connected illegally. Financial institutions (e.g., Barclays Bank, Uni-Bank, etc.) identifying the potentials of these slums have extended their services to them.

Enumeration and Period of Enumeration

Having quality assured the data collection instruments (household and enterprise questionnaires) through the pilot testing, the trained enumerators collected the required data from the three slums. A total of 1060 households and 88 enterprises were selected for the study. A hundred and sixty (160) households were systematically selected from Akwatia Line whilst 450 households were systematically selected each from Old Fadama and Amui Dzor, Ashaiman. Households formed the unit of analysis and heads of households responded to the questionnaires, although they provided information about other household members. In the absence of the head of household, the next senior person in the household was interviewed.

None of the questionnaires were discarded as erroneous but not all the questions in the instruments were answered by or were applicable to every respondent. Consequently, responsiveness to items in the instrument varied from person to person and so responses to specific questions did not necessarily add up to 1060 in some cases. The household data collection spanned from October to November, 2010.

The 88 enterprises were purposively selected from all the three slums guided by the type of energy used and the purpose for which it is used in the enterprise (see Appendix 1.1). This survey was mainly qualitative, with the objective of understanding the operations of the enterprises with regard to the role

energy plays in their productive activities. The questionnaires were administered through interviews and enumerators' observations in December, 2010. Whilst collecting the enterprise data, key informant interviews were also used to elicit information on the governance structure of the slums. Further, the key informant interviews became useful in triangulating some of the findings (such as sources of electricity and ownership of land) from the slums.

Data Editing and Response Rate

Enumerators were guided by community leaders - one each from the three slums - during the enumeration exercise. Seeing a community leader in the team gave the respondents the courage to willingly answer questions[4], hence a 100% response rate was achieved. All the 1060 questionnaires were quality-assured by the research team and questionnaires with errors were sent back to the field for correction[5]; a process which extended the data collection timeframe. The follow up to get the questionnaires with errors corrected was again facilitated by the presence of the three opinion leaders who worked with the enumerators. The availability of the respondents in the three slums facilitated the follow up to correct the instruments with errors.

Data Analysis and Presentation

The quantitative data gathered from household heads were synthesised with the use of CSPro. Descriptive statistics such as the measures of central tendency, percentages and frequency distribution tables were used to present the household data. These descriptive statistics were generated with the aid of the statistical package, STATA.

The enterprise questionnaires provided both qualitative and quantitative data. The qualitative data were also analysed and in some cases by analysing responses from identified categories. Further, where necessary, reference to direct quotations from the actors' (enterprise owners and key informants') perspectives were in some instances presented as evidence. This was done to portray the exact situation.

Household and enterprise data were analysed independently. The statistics and quotations were synthesised in the report.

BRIEF BACKGROUND TO THE STUDY SLUMS

Old Fadama

Old Fadama is located in the Accra Metropolitan Assembly (AMA). It is Ghana's largest slum settlement located in the capital city of Ghana, which was established by migrant workers and internally displaced persons predominantly from the northern part of Ghana (65.9%). Data collected by PDG, a local NGO that has been working with the slum dwellers for the last few years indicate that the population of Old Fadama is estimated at 79,684 (made up of 50.1% males, 49.9% females). The study by PDG indicates that 65% of children under 18yrs living at Old Fadama does not attend school and 49% of the population there has no formal education.

[4] Slum dwellers in the three communities are known to be very antagonistic and hostile to outsiders because of the way the officialdom is always harassing them for illegally settling in these places. This has made them to be suspicious of outsiders and always taking a defensive side.
[5] Tracing respondents for the necessary corrections to be effected was facilitated by the contact details (address and cell phone numbers) of household heads which were taken during the first enumeration.

Retailing of petty goods remains the largest economic activity at Old Fadama, with head porters ('kayayee') making up the largest number of self-employed in the community. Like in all slums globally, Old Fadama is beset with a myriad of challenges, including environmental (caused by indiscriminate dumping of refuse into the Korle Lagoon), lack of access roads and sanitation facilities, perennial flooding and acute water shortage. Though Old Fadama is made up of individuals engaged in serious and genuine economic activities, with many of them owning small scale enterprises of various sizes, as is noted of all slums all over the world, the place is believed to be a den for criminals, and hence the unwillingness of city authorities to accept them as an integral part of the urban system.

Akwatia Line – Kumasi

This is a squatter settlement founded in 1998 and located along the disused railway line in Kumasi, the second largest city in Ghana and also the second highest populated city. Prior to the establishment of this slum, the area was water logged with only one or two milling functioning enterprises. Most of the workers in the mills, mainly migrants from northern Ghana were housed in a structure known as "Bombay." With time as the population of the youth increased, they began to fill the area with biomass residue and therefore reclaimed more space for their use. This attracted many more people and gradually developed into a slum. In 2007, the place was demolished as a result of the demolition exercise that was carried out in the city, but with a new government in power, the people returned to the place.

The inhabitants are mainly migrants from the Northern part of the country whose jobs are located along the railway line and therefore find it convenient to live close by their jobs. With time the residents turned the working place into a residential area. Like Old Fadama, being an unplanned area, it lacks all the basic social facilities that make life meaningful in any human environment. Akwatia Line has similar characteristics as all slums in Ghana. It is made up of a total of 325 shacks, with each having an average household size of 3 persons. In terms of governance, the people are well organised and governed. The community has several tribal heads that are responsible for people from the different ethnic backgrounds. There is also an overall lord/caretaker of the place who serves as a link between the residents and the outside community.

The inhabitants are engaged in various economic activities, the main ones being porters ('kayaye') and collection of scraps. Other economic activities found at Akwatia Line are running of private bath houses and schools, rice and groundnuts mills, carpentry and cooked food vending.

Amui Dzor – Ashaiman

Amui Dzor is a slum community located at Ashaiman, which is next door to Tema, the industrial hub of the country. Tema is the only planned city in the country and during the development of this city, many of the workers who came to work at construction sites and the harbour resided at a nearby community called Ashaiman, which served as the dormitory town. Packages from the harbour were used by the slum dwellers to construct temporary dwelling units, which later and over the years never got changed and have become accepted as permanent dwelling units, and hence the many wooden structures at Ashaiman.

Amui Dzor has similar characteristics like Old Fadama and Akwatia Line but vary slightly in the type of economic activities the residents engage in. For example, there are fewer scrap dealers and commercial bath houses at Amui Dzor compared to the other 2 slums. Perhaps this can be attributed to the fact that Ashaiman has over the years developed into a large settlement and Amui Dzor has been absorbed as part of the growing township of Ashaiman with little to show that of Amui Dzor as isolated from the main township. The contrary is the case for the other two slums being studied.

The population of Amui Dzor in 2006 was made up of mostly young people. About 80% of the total population was aged 35 years or below, 63.7% were within the working ages of 16 and 60 years, and 33.9% of child population of between ages 0 – 15 years. The slum dwellers are engaged in various economic activities, including mainly petty trading, water vending, mechanic and urban agriculture.

ORGANISATION OF THE REPORT

This report is in five chapters. Chapter one provides a general overview by presenting the background to the study, objectives, scope and methodology. Chapter two provides a highlight of the lessons learned from the review of existing literature on the productive uses of energy in slums in Ghana. Chapter three presents and discusses the field data on households whilst chapter four presents data on enterprises. Chapter five summarises the findings of the study in line with the research objectives, and presents the recommendations.

2 | LITERATURE REVIEW

This chapter begins with a brief introduction to urbanisation in Ghana which is the major cause of slums development in the urban centres. The chapter argues that the rapid rural-urban migration with its ramifications on the development of slums is caused by both rural push and urban pull factors. The rural-urban drift has led to "urbanisation of poverty." Premised on the nexus between energy and poverty reduction, the chapter also considers the roles stakeholders have played in ensuring that slum dwellers have access to energy resources for productive use towards their economic empowerment.

URBANISATION AND SLUMS IN GHANA

This section of the chapter provides a brief overview of urbanisation in the Ghanaian context. It argues that urbanisation in Ghana is largely caused by rural-urban migration. It identifies the causes of rural-urban migration in Ghana and its effects on the development of slums.

Urbanisation in Ghana

The Ghana Statistical Service (2005: 124) defines urbanization as the change in the proportion of a population living in urban places (defined to include all slums with population of 5000 people and above). Urbanization occurs mainly through positive net in-migration and natural increase (Ghana Statistical Service, 2005). In Ghana, as in many other African countries, little attention was paid to the processes of urbanization until very recently because urban growth was not viewed as a threat to national development (Chan and Lee, 1995; Mba, 2001; Mbamaonyeukwu, 2001 all cited by Ghana Statistical Service, 2005; 124). As a result, development strategies were implemented without attention to the high rate of urban growth leading to an inefficient distribution of urban population across the country. Development strategies have focussed attention on the development of the cities and towns with little attention on the rural areas. The dichotomy in the levels of development between rural and urban areas is a significant cause of rapid urbanisation in Ghana. The Ghana Statistical Service (2005 citing Kelly and Williamson, 1984) argues that third-world urbanization is more a function of opportunities in the cities and towns than it is of population pressure from the rural areas. Firebaugh (1979 cited in Ghana Statistical Service, 2005) also claims that adverse rural conditions make an important contribution to rural-urban migration. Thus, both rural push and urban pull continue to explain migration to cities in developing countries like Ghana.

Urbanization Levels and Trends in Ghana

Rural-urban migration is by far the most significant form of movement in long-term spatial population redistribution in Ghana (Ghana Statistical Service, 2005). Economic and income disparities which give rise to a perception of availability of jobs in the urban areas appear to be the main driving force behind rural-urban migration.

Figure 2.1 reveals that the proportion of people living in urban areas has increased dramatically from 23% in 1960 to about 44% in 2000. This corresponds to an annual growth rate of about 4.2 per cent for the period 1960-2000.

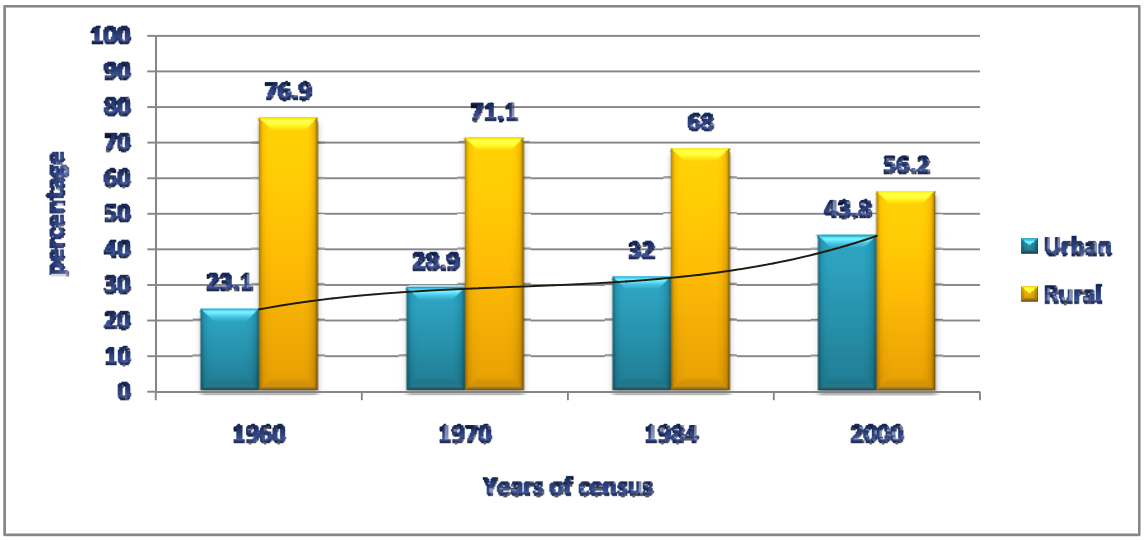

Figure 2.1 | Historical evolution of rural-urban population distribution

Table 2.1 indicates that the level of urbanization varies from one region to another. In 2000, the Greater Accra Region was the most urbanized (88%), followed by Ashanti (51%), Central (37.5%) and Brong Ahafo (37.4%) Regions. The least urbanized regions are Northern (26.6%), Upper East (15.7%) and Upper West (17.5%) (see Table 2.1.). The least urbanised regions are also the poorest in the country.

Table 2.1 | Urban Population and Growth Rates, By Region

Region	Urban Proportion				Annual Growth Rate			
	1960	1970	1984	2000	1960-1970	1970-1984	1984-2000	1960-2000
All Regions	23.1	28.9	32.0	43.8	4.7	3.3	4.6	4.2
Western	24.7	26.9	22.6	36.3	2.9	1.7	6.1	3.8
Central	28.0	29.1	28.8	37.5	2.1	1.7	3.7	2.6
Greater Accra	72.6	85.3	83.0	87.7	6.1	3.5	4.8	4.7
Volta	13.1	16.0	20.5	27.0	3.9	3.5	3.6	3.7
Eastern	21.1	24.6	27.7	34.6	3.4	2.9	2.8	3.0
Ashanti	25.0	29.7	32.5	51.3	4.6	3.1	6.3	4.8
Brong Ahafo	15.6	22.1	26.6	37.4	6.1	4.6	4.7	5.0
Northern	13.0	20.4	25.2	26.6	7.6	4.9	3.1	4.9
Upper East	3.9	7.3	12.9	15.7	7.8	6.5	2.3	5.2
Upper West	5.0	6.7	10.9	17.5	4.0	5.7	4.7	4.9

Source | 1960-2000 Ghana Population Censuses cited in Ghana Statistical Service, 2005.

Table 2.1 depicts that each of the ten regions experienced an increase in the level of urbanization over the period 1960 to 2000. Urban growth accounted for 65.7 per cent of total increase in population from 1984 to 2000. The contribution of the 15 largest localities in 2000 to overall urban growth is 62.0 per cent (see Appendix 3 for further details). There are significant differences, however, in the pace of urban growth within regions. The Greater Accra and Ashanti Regions are the two most urbanised regions in the country. This reinforces the observation that localities that offer the greatest opportunities for economic advancement and agricultural production are likely to be the most attractive destinations of migrants.

Unlike the developed countries and South East Asian economies that exploited the benefits of urbanization, the situation in Ghana is the converse. The pace of urbanization has outstripped the ability

of city and town planners to meet the requirements for services and infrastructure such as housing, water, roads, hospitals, schools, energy, etc. (Ghana Statistical Service, 2005; Ministry of Health, 2007). The continued movement of large numbers of people into the cities of Accra and Kumasi (the capitals of Greater Accra and Ashanti Regions, respectively) and the inability of infrastructural services to proliferate to accommodate the increasing demand for them have led to the emergence of slums. White et al. (2007) notes that continued urbanisation has led to widespread pollution and over-crowding, both of which have serious implications for the health and well-being of the population in large towns. Crime and vices are also linked to urbanisation.

TRENDS IN RURAL-URBAN MIGRATION IN GHANA

Migration as defined by the Ghana Statistical Service is "the movement of people in space, often involving a change in the usual place of residence" (2005, pg. 119). A migrant is, therefore, a person whose current usual place of residence is different from his/her place of birth or previous place of residence. Four main types of internal population mobility may be distinguished in Ghana: rural-rural, rural-urban, urban-rural and urban-urban (Ghana Statistical Service, 2005: 120).

In Ghana, the ten regions are at varying levels of socio-economic development, with considerable differences in the distribution of educational and vocational institutions, large scale industrial, manufacturing, commercial and construction concerns, and availability of productive land. Additionally, the concentration of government and private establishments in the more prosperous regions has exacerbated the scale and direction of out-migration (Kwankye, *et al*. 2009). Table 2.1 shows that in addition to Greater Accra, which has consistently been the highest recipient of migrants from other regions, Western, Brong Ahafo and Ashanti Regions have received relatively high proportions of inter-regional migrants compared with other regions. The net migration rate in Table 2.2 shows that the greatest net increase of 310 per 1000 population through migration is in Greater Accra, while the net loss of 332 per 1000 population is recorded for Upper West.

Table 2.2 | | In-migration, Out-migration, Net migration of Ghanaian by birth by Region

REGION	IN-MIGRATION	OUT-MIGRANT	NET MIGRATION	TOTAL POPULATION	NET MIGRATION RATE (PER 1000)
Western	519,584	168,792	+350,792	1,924,577	+182.3
Central	202,723	477,302	-274,579	1,593,823	-172.3
Greater Accra	1,106,52	204,749	+901,780	2,905,726	+310.3
Volta	130,227	533,631	-403,404	1,635,421	-246.7
Eastern	323,961	548,347	-224,386	2,106,696	-106.5
Ashanti	635,215	438,156	+197,059	3,612,950	+54.5
Brong Ahafo	371,557	207,808	+163,749	1,815,408	+90.2
Northern	117,557	256,279	-139,216	1,820,806	-76.5
Upper East	54,129	255,661	-201,532	920,089	-219.0
Upper West	36,221	227,874	-191,653	576,583	-332.4

Source | Ghana Statistical Service, 2005: 122.

The general picture that emerges from the foregoing is that some regions are more attractive to migrants than others. The most attractive regions appear to be Greater Accra, Western, Brong Ahafo and Ashanti. Among the factors that account for this is their greater access to modern infrastructure (such as good roads, communication, educational institutions, hospitals facilities and favourable climatic conditions for agriculture). Greater Accra is home to the national capital, while Accra and Kumasi are the major industrial and commercial nerve centres of Ghana. Western, Eastern and Brong Ahafo Regions have relatively

favourable agricultural and mining endowments. This partly explains why an overwhelming majority of the population in Brong Ahafo, Eastern, and Western Regions are rural dwellers, which is in sharp contrast to what pertains in Greater Accra (Ghana Statistical Service, 2005). As a consequence, a vicious cycle has emerged. Regions with considerable advantages attract more investments, leading to widening of the disparities. The perception of easy availability of educational and other economic opportunities encourages many young people to migrate to the cities, only to suffer disappointment and end up street hawking (Lee 1986 cited in Yeboah, 2008; Government of Ghana, 2003). A strong relation to the rural-urban migration process is the increase in urban poverty termed as the 'urbanization of poverty' (Ravallion, 2001).

DISTRIBUTION OF SLUMS IN GHANA

Since 1950, the proportion of people working in the primary sector of developing countries has declined by 20 to 30 per cent (Gruber *et al.* 2005). As a consequence, a large percentage of the urban poor voluntarily migrated from the rural to the urban areas in order to exploit actual or perceived economic opportunities (Ghana Statistical Service, 2005; Lee 1986 cited in Yeboah, 2008). These manifest largely in the growing urban informal sector, which is most visible in the growing and large-scale slum settlements in urban centres.

The term 'slum' has many nuances and meanings. There is a wide range of characteristics which give every slum a different structure because slums vary with regards to population density, unclean central city tenements to spontaneous squatter settlements without legal recognition or rights (Gruber *et al., 2005).* First appeared in the 1820s, the term 'slum' has been used to refer to areas with lowest housing quality, most unsanitary conditions dominated by 'vices' and drug abuses; a refuge for marginal activities including crime; a likely source for many epidemics that devastate urban areas; a place apart from all that was decent and wholesome (Gruber *et al.,* 2005; Lacoboaea, 2009*).* The UN Habitat (2007) definition of slum "a heavily populated urban area characterised by the lack of one or more of the following;

- Durable housing of a permanent nature that protects against extreme climatic conditions;
- Sufficient living space which means not more than three people sharing the same room;
- Easy access to safe water in sufficient amounts at an affordable price;
- Access to adequate sanitation in the form of a private or public toilet shared by a reasonable number of people; and
- Security of forced evictions.

The growing incidence of slum development in Ghana has been the result of rural-urban migration, limited supply of land, and regulatory frameworks that are, at best, indifferent and hostile to the needs of the poor (Government of Ghana, 2003; Wateraid, 2008). However, the exact number of people living in slums and number of slums in Ghana are issues yet to be resolved. In 2001, the number of people living in slums in Ghanaian cities was estimated to be 4,993,000 and growing at a rate of 1.8 per cent per annum. Selby (2010) also estimates that around 70 per cent of Ghana's urban residents live in slum conditions.

The slum areas are pronounced in Accra, Kumasi, Sekondi-Takoradi, Tema and Tamale with growing incidence in the secondary cities of Cape Coast, Koforidua, Sunyani, Ho and Bolgatanga. What appears to be a consensus is that Ghana's urban poor, like most slum dwellers around the world, struggle with issues of poor housing, sanitation, infrastructure, fire outbreaks (because of densely packed wooden structures) and flooding (as many of Ghana's slums are located on marginal land prone to flooding) (Baker, 2008;

United Nations, 2010). Above all, they face the challenge of forced evictions. For example, in Accra and Kumasi, competition for land, limited financial and technical capacity amongst local/national authorities and suspicion of those living in slum settlements have combined to worsen housing and infrastructure problems including access to modern energy in poor communities (PDG and GHAFUP, 2006). As a result, an increasing proportion of the urban poor lack access to secure land for shelter development. The situation has compelled the poor to house themselves on marginal lands (such as waterlogged areas and land reserved for the street furniture), government lands reserved for future development and congested communities with so many health implications. PDG (2010) identifies Old Fadama, Agbogbloshie, Sabon Zongo and Avenor as the slums in the Accra Metropolis, and Community 1 as the slum community in the Tema Metropolis. Accra Metropolitan Assembly (2006) also adds communities such as Ga Mashie, Nima, Liberia Camp, Chorkor, Gbegbeyise, Mamobi, Abuja, Ayidiki, Akweteman, Nima and Alajo to the list of slums identified by PDG. In all there are about 29 slums in the Accra Metropolis (AMA, 2006). New Tafo Zongo, Akwatia Line, Apagyahene, Sawaba, Race Course and Anloga are slums identified in the Kumasi Metropolis and New Takoradi, Kwesimintsim, Kojokrom in the Secondi-Takoradi Metropolis. The pronouncement of the slums in the cities reaffirm the claim that slum development is the result of the overwhelming consequences of urbanization, the result of high incidence of rural-urban migration and natural increase.

TYPOLOGY OF ENTERPRISES IN GHANAIAN SLUMS

Following the observation that slum dwellers are mostly economic migrants, this section reviews literature on the slum dwellers' sources of livelihood. This section also considers the likely impact access to energy resources would have on their operations.

Globally, slums are home to the poor - mostly in urban areas - majority of who have been priced out of the formal sector. Though the sources of livelihood to the slum dwellers are numerous, the majority of them are employed in the informal urban economy and play a significant role to the sustainable development of the urban economy (through employment creation and revenue to households and governments). Despite the significance of their economic roles in national development, state institutions (such as the Ministry of Local Government and Rural Development and Town and Country Planning Department) have failed to recognise their existence and therefore their productive activities are often unaccounted for in national statistics (PDG, 2010). Due to this, data on the slum dwellers' sources of livelihood are difficult to come by. Premised on this limitation, the study relied on data from the Civil Society Organisations (such as PDG and GHAFUP) who are playing advocacy roles on behalf of the slum dwellers.

PDG and GHAFUP (2006) in their enumeration exercise in Amui Dzor in 2006 identified a total of 708 enterprises (of 29 different categories/types) (see Table 2.3.). As part of this study, a transect walk through Amui Dzor and Old Fadama identified other enterprises operational in the slums that did not appear on the PDG and GHAFUP's list. They include blacksmithing (production of cooking utensils, coal pots and LPG powered stoves), tailoring, carpentry/wood work, groundnut paste production, fish mongering, baking (bread and pastries), food vendors, hair dressers, sachet water production and transportation (transport owners, drivers and mates). The others are auto-mechanics (repair of vehicles, recycling of bolts and nuts) scrap metal works, construction firms (mostly into housing), bath houses (communal showers) and entertainment (video game playing centres, cinema centres and brothels).

Table 2.3 | Enterprises in Amui Dzor

SN.	ENTERPRISES	NUMBER	PERCENTAGE
	Bathhouses (showers)	208	29.4
	Chop bars	35	4.9
	Restaurants	41	5.8
	Provision store	77	10.9
	Scrap metal works	1	0.1
	Hair salons	33	4.7
	Grinding mills	6	0.8
	Factories	6	0.8
	Forex bureaux	1	0.1
	Petty trading	32	4.5
	Spare part shops	11	1.6
	Tailoring	41	5.8
	Vulcanising	2	0.3
	Animal farms	21	3.0
	Veterinary	3	0.4
	Herbal shops	6	0.8
	Clothes shops	3	0.4
	Filling stations	1	0.1
	Wood selling	1	0.1
	Charcoal selling	5	0.7
	Shoe repairs	7	1.0
	Mechanics	33	4.7
	Electrical and electronic shops	23	3.2
	Mobile phone cards shops	3	0.4
	Mobile phone call service (mobile-to-mobile)	33	4.7
	Landline	27	3.8
	Schools	9	1.3
	Water points	33	4.7
	Toilet	6	0.8
	Total	708	100.0

Source | PDG and GHAFUP (2006).

Similarly, an enumeration at Akwatia Line by GHAFUP in September 2010 revealed a total of 291 enterprises operating within the community as presented in Table 2.4.

Table 2.4 | Enterprises in Akwatia Line

SN.	ENTERPRISE	NUMBER	PERCENTAGE
1.	Mechanics	3	1.0
2.	Scrap metal works	150	51.5
3.	Hair dressing	11	3.8
4.	Sawmills	14	4.8
5.	Dressmaking	8	2.7
6.	Food Vending	23	7.9
7.	Video centres	2	0.7
8.	Provision	9	3.1
9.	"Chop" bars	16	5.5
10.	Groundnut mills	3	1.0
11.	Vulcanising	3	1.0
12.	Sale of Sachet water	10	3.4
13.	Communal toilets	1	0.3
14.	Communal/commercial bathhouses	13	4.5
15.	Shoes making	25	8.6
	Total	291	100.0

Source | EAfUP, September, 2010.

The observation here is that most of the enterprises operating within the slums are energy dependent using several energy forms as indicated in Table 5. Thus, sustainable poverty reduction is affected by access to reliable and sustainable supplies of energy for productive activities. Thus, slum dwellers' access to energy resources for productive activities must be taken into consideration in national and local policy discourses.

ENERGY ACCESS AND PRODUCTIVE USES IN SLUMS

Justified by the fact that access to energy is an effective tool to sustain poverty reduction initiatives, policy formulation and implementation must ensure that energy resources are available, accessible, affordable and acceptable to stakeholders. It follows therefore that productive uses of energy depend on many factors including availability, accessibility, affordability and acceptability of the form of energy service in question.

The Slum Dwellers' Access to Energy Resources

There is a knowledge gap on slum dwellers' access to energy for productive activities. This knowledge gap is the result of the location of the slums. In Ghana, the majority of settlements that are classified as 'slums' are located in the cities and therefore energy access in these slums are usually aggregated with general access in the urban areas (AMA, 2010; KMA, 2006, PDG and GHAFUP, 2006). The instances that have been made to assess the vulnerable groups' access to energy resources for productive activities considered the urban poor in general but not specifically the slum dwellers (Ghana Statistical Service, 2007).

According to the Ghana Statistical Service (2007) in the 5th Ghana Living Standards Survey (GLSS 5), the main sources of lighting for households in Ghana are kerosene and electricity, both at 49 per cent. Electricity is the main source of lighting for urban households (79 per cent). More than half of the households (54 per cent) use woodfuel as the main cooking fuel. Charcoal ranks second (31 per cent). In urban areas, 53 percent of households use charcoal for cooking. A larger proportion of urban households (20 per cent) use gas for cooking than rural households (9.5 per cent). However, in Accra the proportion of households using gas is relatively high (34.5 per cent), compared to other areas of the country (Ghana Statistical Service, 2008). Vital as these data are, they underscore the claim that little attempts have been

made to disaggregate access to energy resources for productive activities on the lines of groups (high/middle/low income or slum dwellers and dwellers in formal communities).

Even though electricity access rates in the urban areas are higher, disaggregating this by standard of living and income levels (Figure 2.2) shows that access rates are quite low for the urban poor. The percentage of the urban poor at the lowest level of the income quintile that had access to electricity in 2005/2006 was 44 per cent, whereas 88 per cent of those at the highest level of the income quintile had access to electricity (Ghana Statistical Service, 2008). This clearly reveals that there is disparity in access to electricity between the rich and poor in urban areas. The case for electricity may be similar to that of LPG. Though disaggregated on people's economic standing, AMA (2010) argues that there are pockets of poverty in all parts of the metropolis (including affluent residential areas like Airport, East Legon and Dzorwulu, all in Accra). Thus, the data presented on the urban poor's access to energy resources for productive activities do not reflect the slum dwellers' access but the urban poor in general.

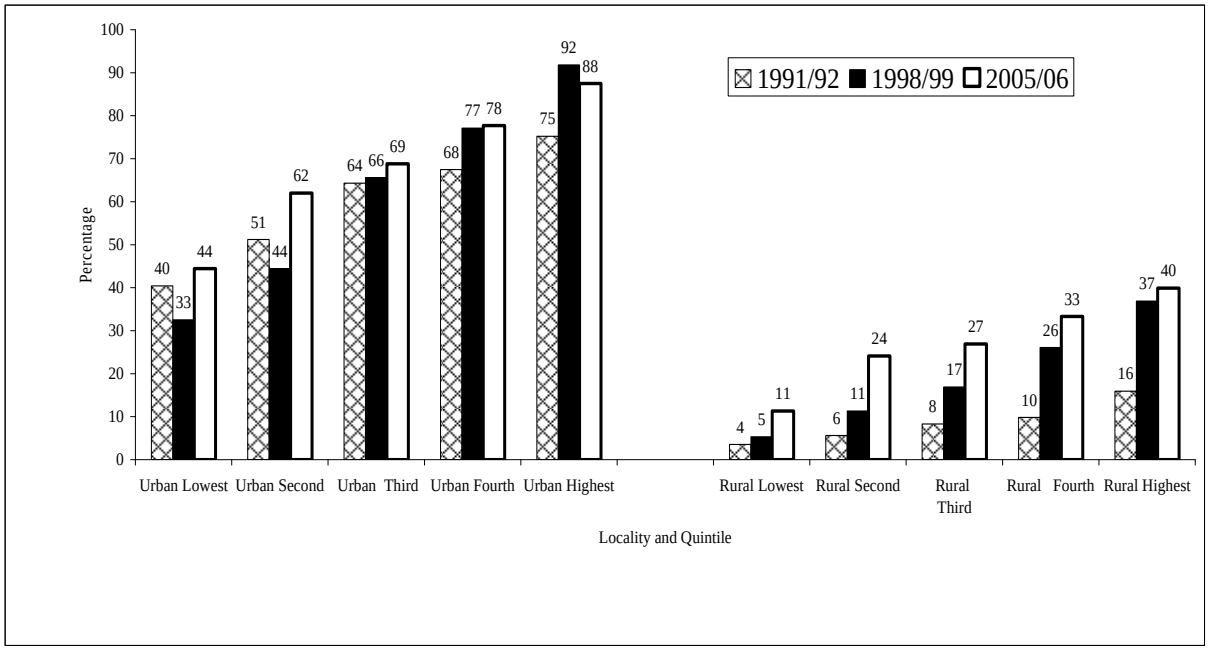

Figure 2.2 | Percentage of households using electricity, by locality and standard of living quintile

Source | Ghana Statistical Services, 2008.

Specifically, slum dwellers in Ghana face several challenges in acquiring electricity connection from the utility companies (ECG and NED). Their poverty status serves as a barrier to their demand for electricity connection besides the reluctance of the utility companies to supply electricity. However, the slum dwellers in Ghana use all possible means to acquire electricity which often lead to evasion of tariffs and congestion on transmission lines.

Productive Uses of Energy in Slums in Ghana

The conceptual understanding and knowledge base linking energy and productive uses have expanded over the past decade. Traditional understanding emphasizes direct income generation as the primary goal of productive uses of energy (FAO, 2000; IDS, 2001).

Information on Productive Uses of Energy (PUE) initiatives in Ghana is not readily available. However, it is known that the Ministry of Energy (MOE) in 2005 conducted feasibility study on productive uses of electricity in the Keta District in the Volta Region of Ghana. The study considered options for the use of electricity to enhance income-generating activities, these included:

- Irrigation and organic farming
- Vegetable processing
- Fish cold storage facilities and ice production
- Brick, tiles and ceramic industry
- Aquaculture and vegetable farming
- Salt mining and refinery

An interview with the Head of Renewable Energy at the Ministry of Energy[6] indicates that the study was done in collaboration with the Keta District Assembly and was meant to be incorporated into their development plans. On the part of the Ministry of Energy there has been no formal follow-up activity, although the Renewable Energy Department of the Ministry of Energy reported that access to electricity improved productivity and hence incomes and standard of living in the district. Many vegetable farmers started cultivating all year round and began exporting their vegetables to the neighbouring country, Togo.

Some of the productive uses of energy by the slum dwellers at both the household and enterprise levels in Ghana include, food processing, boiling of hot water for commercial bathhouses (see Plate 2.1), food production for sale, domestic based enterprises such as laundry services, welding and carpentry workshops, and many more as indicated in Table 2.5.

Plate 2.1 | Water heating for commercial bathhouse business at Old Fadama in Accra

[6] Wisdom Ahiataku-Togobo, Head of Renewable Energy , Ministry of Energy, Ghana

Table 2.5 | Energy-Dependent Enterprises in Slums in Ghana

SN.	ENTERPRISE	ENERGY USAGE
1.	Bathhouses (showers)	Firewood for heating water; electricity and kerosene for lighting.
2.	Chop bars/food vendors/Restaurants	Firewood, charcoal and LPG for cooking; electricity and candles for lighting, kerosene for lighting and/or starting fire
3.	Petty retail shops/Hair salon	Electricity or/and generator –petrol or diesel for lighting and freezing.
4.	Scrap metal works	Oxyacetylene torches for cutting metals into smaller pieces for ease of transportation to sales points
5.	Grinding mills/factories/sawmills	Electricity and gas oil for milling or sawing
6.	Herbal preparation	Firewood, charcoal and LPG for boiling concoctions; kerosene for lighting and/or starting fire; candles for lighting.
7.	Tailoring/Forex bureaux/mobile phone call	Electricity or/and generator –petrol or diesel for sewing and lighting
8.	Vulcanising	Electricity for lighting and compressed gas for refilling of tyres
9.	School	Electricity for lighting; fuel wood, charcoal and LPG for cooking.

Source | Adopted from PDG and GHAFUP, 2006.

Table 2.5 reveals that the traditional energy forms (e.g., charcoal and firewood) are the predominant energy types used for productive activities by the urban poor including the slum dweller (Ghana Statistical Service, 2007).

The National Energy Plan (NEP) has the following strategies regarding the use of biomass:

- Improving production and promoting the efficient use of biomass in the short term, while increasing regeneration;
- Switching from the use of biomass to alternative sources of energy
- Promoting the production and use of improved and more efficient biomass utilisation technologies
- Promote the use of alternative fuels such as LPG as substitute for fuel wood and charcoal by addressing the institutional and market constraints that hamper increasing access of LPG in Ghana

The dominance of traditional forms of energy for productive activities in the slums is explained in the next section of the report. Section 2.8 reviews the policy direction of stakeholders' slum upgrading policy direction and its impact on access to energy for productive uses within Ghanaian slums.

ENERGY ACCESS POLICIES, PROGRAMMES AND PROJECTS FOR SLUM DWELLERS

This section looks at some of the specific energy policies or decisions in major development policy frameworks prepared to facilitate Ghana's development agenda towards a middle income economy, and aimed at enhancing slums' access to energy resources. These policy documents and frameworks include the Ghana Poverty Reduction Strategy (GPRS I), Growth and Poverty Reduction Strategy (GPRS II), Strategic National Energy Plan (2006 – 2020), National Energy Policy (2010 – 2015) and Energy for Poverty Reduction Action Plan. The development priorities reflected in the programmes and projects of local Planning Authorities, specifically the Kumasi Metropolitan Assembly (KMA) and the Accra Metropolitan Assembly (AMA) from 2003 to 2009 as well as the operations of Civil Society Organisations working with slums were reviewed. The intent was to examine the extent to which secondary stakeholders consider the slum dwellers' access to energy as fundamental.

Energy Policies for the Urban Poor in GPRS I and II

The objective of the Government of Ghana in GPRS I regarding energy access was to develop reliable and affordable energy delivery systems that promote the development of basic infrastructure to support economic activities. The goal was to ensure reliable supply of high quality energy services for all Ghanaian homes, businesses, industries and the transport sector. Specific projects earmarked for the realisation of the goal include the West Africa Gas Pipeline, the Bui Dam, expansion of the Takoradi Thermal Plant, woodlots development and promotion of renewable energy technologies (Government of Ghana, 2003). These projects targeted everyone and every sector of the economy. Though the goal has positive implication for slums due to their location in the urban system, their difficult access (which stems from the high cost of energy and non recognition of the slum settlements) to modern energy is still unresolved.

Despite the introduction of the lifeline tariff to ensure affordability of electricity for low income users (Government of Ghana, 2003) its moderate impact on the urban poor including the slum dweller is an issue without counter-arguments. Ardayfio-Schandorf (2009) noted that the lifeline policy strategies have had an unanticipated impact on poor households in the urban areas, but these are households with permanent and legal tenure. Due to the fact that poor urban households live in compound houses (with several households) that have common electricity metres, their consumption pattern tend to be very high, putting them (collectively) in a different category other than the lifeline category. The housing types found in the slums are not permanent ones, many of which are temporary wooden shacks and thus do not make them eligible to apply for electricity connection. The reality is that the poor living in slums but have permanent and legal addresses and tenure are able to secure electricity connections from the utility companies. They in turn extend electricity connection illegally to households who need electricity but do not meet the eligibility criteria set by ECG. This behaviour underscores the haphazard electricity connection in the slums. Additionally, with several households connected to a common meter, their consumption pattern is assessed to be high which disqualifies them from benefitting from the lifeline policy. Furthermore, the policy strategies overly concentrate on electricity consumption to the neglect of the other energy resources (such as biofuels and LPG) consumed by the households and enterprises in Ghanaian slums (see Table 2.5). Any efforts to improve economic activities with efficient energy will be the beginning of getting them to move out of such unhealthy living environment.

Energy Policies for the Urban Poor in SNEP, NEP and EPRAP

A review of the policy priorities in SNEP and NEP revealed that a 100% electricity coverage is targeted for all households (low, middle and high income; rural and urban) by 2020. Additionally, urban households' and commercial establishments' dependence on wood fuels for cooking is to be reduced to 40 per cent by 2020, with LPG as the alternative to be promoted.

The Energy for Poverty Reduction Action Plan (EPRAP) was prepared for the Ministry of Energy by KITE, an energy and environment local NGO, at around the same time that SNEP was prepared. The goal of EPRAP was to provide a roadmap for the targeted delivery of energy services to support productive activities to achieve national development poverty reduction goals and strategies outlined for the implementation of seven key areas under the GPRS II (Ministry of Energy, 2006). The seven sectors are agriculture, small and medium enterprises, health, education, water and sanitation, communication and technology and households.

The overall objective of EPRAP is to help focus attention on the energy needs of the poor and the underserved during the implementation of the GPRS II and beyond. In order to meet projected energy demands, EPRAP made a lot of pro-poor recommendations such as grid extension to fish landing and

freezing facilities, establishment of woodlots and transfer of improved technology for charcoal production, promotion of access to LPG in rural and poor peri-urban/urban communities, promotion of improved cook stoves in households, and wind pumps for irrigation, multi-functional platforms for agro-processing, and others.

Unlike SNEP and NEP, EPRAP has been specific in the necessary actions that need to be taken in order to improve energy access for productive activities in slums and other poor areas. It specifically mentions the promotion of LPG and improved cook stoves in poor peri-urban and urban communities which includes the slums. Thus, the Ministry of Energy has available an action plan that targets the energy needs of urban slums, but the issue is whether the government will adopt this action plan for implementation. Both the SNEP and EPRAP have not been formally adopted by government as policy documents. It is hoped that the NEP would be formally adopted by government in the immediate future. EPRAP, however, like SNEP and NEP did not have any specific interventions that could enhance the slum dwellers' purchasing power for the energy supply, and the recommendations for productive uses energy even at the national level have not been followed by action. This is important where the GPRS II is stressing cost recovery in energy supply and delivery.

Energy Programmes and Projects by Other Stakeholders

Programmes of the Energy Commission and Private Companies

The Energy Commission and the Ministry of Energy (and the erstwhile Energy Board) have over the years undertaken a number of initiatives in the area of biomass energy production and use for households. In charcoal production, a pilot project was undertaken by the erstwhile National Energy Board in the late 1980s to demonstrate and adopt an improved charcoal production technology for use by charcoal producers. Under the project, charcoal production trials were carried out on 3 kilns. The kilns were the earth mound, steel kiln and Casamance kiln. Charcoal producers were provided with training on the use of the improved kilns.

At the end-user side, efforts at promoting the use of efficient cookstoves included the promotion of efficient firewood and charcoal cookstoves such as "Ahibenso" and "Gyapa"[7]. An interview with one of the officials of the Energy Commission that was involved in this project said;

> "*As part of the project implementation, 6 types of improved charcoal stoves were identified and subjected to laboratory tests. Out of these 3 were selected for field testing in 300 households. The Ahibenso stove which made savings of 40% of charcoal used over the traditional coalpot was found to be the most efficient and affordable. The Ahibenso stove was thus adopted for promotion.*"[8]

The use of improved cooked-stoves for productive activities is challenged by high initial cost of the stoves relative to the traditional ones common to poor households. For example, the failure of Ahibenso improved charcoal stove was linked to the redrawal of Government subsidy.

The promotion of the "Gyapa" cook stoves by Enterprise Works and Toyola, both private companies, is also challenged by high initial cost of the improved stoves (Energy Commission, 2010). Although there are no specific strategies targeted at the dissemination of efficient cookstoves in slums, their access to

[7] Gyapa and Ahibenso are trade names of the improved cook-stoves
[8] Key informant interview with Energy Commission staff

efficient energy technologies for productive activities is limited (or sometimes discouraged) by the high cost of the technologies in addition to the unavailability of custom-designed interventions to facilitate their access.

The support mechanisms over the years have included:

- Financial support to entrepreneurs to facilitate mass-production of the stoves
- Waiving of import duty on galvanised metal used for the fabrication of the stoves (in order to make them more affordable to the general public).
- Credit facilities for manufacturers and distributors
- Training of artisans in the fabrication of the Ahibenso stove
- Media campaign to promote the benefits of the improved stoves.

Financial support was therefore not directly to households, but went to support reduction in the cost of key factors of production and supply.

Programmes of Action of District Assemblies

In order to solicit national support for local level development interventions, the Metropolitan, Municipal and District Assemblies (MMDAs) are expected to identify programmes and projects in line with the pillars of the GPRS (I & II). Thus, MMDAs are expected to take cognisance of the slum upgrading policies in their medium term programming to upgrade slums in their areas of jurisdiction (Government of Ghana, 2003; NDPC, 2006; NDPC, 2009). A review of AMA's MTDP 2006 – 2009 and 2010 – 2013 revealed that AMA is committed to ensuring reliable and effective supply of electricity to all parts of the metropolis. AMA is embarking upon street lighting projects with the ultimate objective of enhancing security and to promote tourism in the metropolis. The provision of the street lights affects all areas of the metropolis including the low income communities. However, the non-legal attribute of some of the slums (Old Fadama) exempts them from such interventions.

Similarly, in its development plan (2006 – 2009), KMA acknowledges that slum mushrooming in Kumasi require immediate response. KMA thus has a major development objective to "upgrade slums in the Metropolis" under the Slum Upgrading Facility (SUF). The slum upgrading projects specifically linked to energy access include inner city street lighting, waste to energy project, electricity to slums and permits to investors to establish fuel (LPG and kerosene) stations in slums. Furthermore, KMA has designated sites for the burning of wood for charcoal in the metropolis with the aim of adequately serving the energy needs of the inhabitants. It is obvious from these objectives that the intentions of the local governments are not necessarily targeted towards energy for productive use for economic growth. The focus is more on street lighting to ensure security in the cities, which ultimately will enhance tourism because once the cities are secured at night, tourists will patronise it as income generating activity.

CSOs IN GHANAIAN SLUMS

Most slums in Ghana do not have legal entitlements to the land they live on. Due to this, the slum dwellers are not recognised as important components of the urban system, hence the continued underdevelopment of their settlements. Worse of all, the slum dwellers receive eviction threats from authorities on continuous basis which prevents them from developing such settlements. Some civil society organisations (CSO) (such as People Dialogue Ghana in partnership with Ghana Homeless People's Federation, Women in Slums Economic Empowerment Ghana and Disaster Volunteer of Ghana, among

others) are playing advocacy roles on behalf of the slum dwellers. Their mandate is to find solutions to the insecure tenancy, housing and poverty problems in deprived communities. The CSOs have been vibrant in the area of education and capacity building, health, environment (water and sanitation), housing, disaster control and savings schemes. A synoptic review of the operations of the CSOs reveals that the slum dwellers' access to energy for productive activities is lacking in the CSOs' programmes of action. Thus their operations are in tandem with state institutions' slum upgrading policies which have overly-concentrated on strengthening the physical planning of urban settlements and ensure the enforcement of planning regulations (NDPC, 2005). The initial kick-off meeting with stakeholders including the urban slum dwellers indicated that energy needs and concerns of the slum dwellers had never been considered in any of their deliberations and so they have never presented such needs and concerns to the CSOs that work with them.

SUMMARY OF LITERATURE AND LESSONS LEARNED

Generally, the review demonstrates that improving access to energy has the tendency to reduce poverty and enhance development. The policy review has been very useful in that it has pointed out the gaps in national and local policies regarding the focus on energy services as the fulcrum for economic development and poverty reduction. It also points out where the national and local governments' interest in energy services are. Although there are elaborate national policies with broad goals that are well spell out, they have long term objectives of improving energy access for every citizen. This therefore blurs the picture as to how the poor, particularly those in urban slums, could easily be targeted to benefit from these policies when in fact the urban poor settlements are marginalised and unrecognised by the planning authorities. The policies therefore may not be all encompassing as they may appear.

Energy for productive uses is seen from a higher level and larger scale of production, which again has the tendency to leave out micro and marginal informal enterprises that the poor are engaged in. Both the GPRS I and II state the need to provide high quality energy services for productive uses to boost rural and urban development, which therefore includes all economic activities in slums. The development of these slums however makes it impossible for the formal government institutions to extend services to these places and hence their alienation from benefiting from the policies. The review showed that the development of slums in most cities in developing countries is the result of rapid urbanisation that emanates from continuous and increasing trends of rural-urban migration. This is also true for Ghana, with the concentration of slums in the urban areas. The inhabitants of these slums are saddled with several socio-economic and environmental problems due to their marginalisation and exclusion from formal development planning. The city authorities at the kick-off meeting that was held as part of this study mentioned that their activities are limited to legal areas/premises and facilities, which therefore do not include slums. Subsequently, a notable characteristic of slums is their difficult access to basic life-sustaining services. Despite these challenges, the slum dwellers play indispensable roles in the development of the urban areas. The significant roles stem from their engagement in a wide range of economic activities to earn a living. Thus, the slums are home to several economic activities that range from manufacturing to urban agriculture. These economic activities depend on energy, in one form or the other, to be effective and efficient. Energy therefore contributes significantly towards the sustainable development of enterprises operated by the urban poor and to reduce poverty one needs to invest in improved modern energy services for the poor that can enhance their economic performance.

The review further shows that there are no specific policies in the Ghana that focuses on the energy needs of slums in the country. The review shows that even the local government medium term development plans do not make reference to energy in relation to its productive uses. The two local governments (AMA

and KMA) were concerned with security and hence the emphasis on street lights. The local governments were concerned about improving local economy relying on tourism as the focus and therefore seeing security in the cities as one major concern where if improved could enhance local tourism.

Key institutions responsible for planning and service provision in Ghana, have over the years not engaged urban slum dwellers in their planning processes and some of them have worked in isolation to ensure that their policies complement each other. For example, the Town and Country Planning Department of the Accra Metropolitan Assembly indicated that they do not consider Old Fadama (the most populous slum community in Ghana) as a legal settlement and therefore it is not eligible to benefit from any development intervention. Similarly, the Electricity Company of Ghana do not consider Old Fadama as a statutory planning area and so will not extend electricity to this community. What this implies is that slums will continue to lack the basic services required to facilitate their poverty reduction. Policies therefore appear to be too broad and not taking into account the multi-sectoral requirements that could better benefit citizens including the urban poor.

The scoping study therefore demonstrated that the significant contributions the slum dwellers make to local economic development. The link between energy and the sustainable development of the enterprises located within the slums and operated by the poor slum dwellers would also be unveiled. Knowledge of the link between energy and sustainable economic development in the slums will inform the nature of interventions required to enhance economic activities in the slums for sustainable poverty reduction. Thus, the scoping study is to furnish key development stakeholders with empirical facts which would argue for the inclusion of the poor slum dwellers in the planning process.

In conclusion, the review showed that energy policies do not specifically target slum dwellers, who are engaged in various economic activities. These economic activities are often unaccounted for in official statistics. Most of the activities are however energy dependent. Therefore, development of energy policy should recognise slum residents as an active interest group/actor. Until service providers and city authorities begin to accept slum dwellers as an integral part of the urban space, they will continue to obtain energy from various sources (mostly illegally) for their economic activities. Addressing this anomaly will mean recognising and making provisions for energy needs of slum dwellers to enhance their productive activities in the municipal services provision strategy, which will require a collaborative effort on the part of all stakeholders.

3 | HOUSEHOLDS AND ENTERPRISES ENERGY SUPPLY AND UTILISATION

This chapter presents data from the Field Survey on energy supply and utilisation by households. Chapter three is presented in two parts. The first section begins with an overview of household characteristics with emphasis on household size, age and sex distribution, dependency ratio, educational levels and places of origin. The presentation of the household characteristics also includes household occupation, income and expenditure as well as savings. Households' income and expenditure levels were used to estimate households' propensity to save which in turn was used as an indicator of households' ability to adopt modern energy forms for productive activities.

Following the household characteristics is a situational analysis of the energy supply and usage patterns of households in the three slums. The energy situation of households in this section highlights the type of energy used by households and the purpose for which they are used; the factors that affect the type of energy used by households; the cost of energy and expenditure as a proportion of total households' monthly expenditure and the energy conversion equipment. The other areas of emphasis are the challenges affecting the supply and utilisation of the various energy types; and the way forward towards the deployment of safe and modern forms of energy by the slum dwellers.

HOUSEHOLD CHARACTERISTICS

The household characteristics studied under this section include age of household members, household size, places of origin of heads of households and their educational levels.

The age-structure of households in the three slums differs from the national population structure as presented in Table 3.1. About 29.7% and 69.9 % of the inhabitants of the three slums were aged between 0 - 14 years, 15 – 64 years, respectively, while 0.4% were 65 years old and above. At the national level the populations aged between 0 - 14 years constituted 41.3%, those aged 15 - 64 years constituted 53.4% and those aged 65 years formed 5.3% of the population (Ghana Statistical Service, 2005). It is observed that people aged 65 years and above form an insignificant proportion of the entire population of slum dwellers. The Ghana Statistical Service has noted that migrants in the cities, especially Accra, prefer to go back at old age to avoid the high cost of living (Ghana Statistical Service, 2005).The dominance of the active-population over the inactive population is reflected in the Age Dependency Rate (ADR) of 43.1% (see Annex 1) which differed significantly from the national average of 87.1%. The slums' ADR was slightly close to the Greater Accra Region's ADR of 58.7.

Table 3.1 | Age Distribution of Household Members by Slum

AGE GROUPS (IN YEARS)	SLUMS						AVERAGE
	OLD FADAMA	%	AMUI DZOR	%	AKWATIA LINE	%	
0-14	387	28.9	493	30.0	137	30.1	29.7
15 – 64	952	71.0	1129	68.8	318	69.9	69.9
65 and above	1	0.1	19	1.2	0	0.0	0.4
Total	1340	100.0	1641	100.0	455	100.0	100.0

Source | Field Survey, 2010.

As presented in Table 3.2, household sizes approximating 3.0 for Old Fadama, 4.0 for Amui Dzor and 3.0 for Akwatia Line, were below the national average of 5.1 for the year 2000 and 4 members for the year 2008 (Ghana Statistical Service, 2005; 2008).

Table 3.2 | Household Size, by Slum

Household Size	Slums						Average
	Old Fadama	%	Amui Dzor	%	Akwatia Line	%	
1	99	22.0	44	9.8	35	21.9	17.9
2	90	20.0	63	14.0	43	26.9	20.3
3	83	18.4	105	23.3	30	18.8	20.2
4	97	21.6	138	30.7	21	13.1	21.8
5	57	12.7	38	8.4	17	10.6	10.6
6	10	2.2	24	5.3	7	4.4	4.0
7	5	1.1	17	3.8	4	2.5	2.5
8	4	0.9	12	2.7	1	0.6	1.4
9	3	0.7	3	0.7	1	0.6	0.7
10	2	0.4	5	1.1	0	0.0	0.5
11	0	0.0	1	0.2	1	0.6	0.3
Total	450	100.0	450	100.0	160	100.0	100.0

Source | Field Survey, 2010.

A comparative analysis revealed that security of land tenure enjoyed by residents of Amui Dzor may be a contributory factor to their larger household sizes. About 1.2% of the population at Amui Dzor were aged 65 years and above, moreover Amui Dzor had the highest average household size among the three slums. Table 3.2 depicts that 47% of the households at Amui Dzor had membership sizes of less than 4 members (the national average). Whereas about 60.4% and 67.6% of households in Old Fadama and Akwatia Line, respectively, had total membership sizes of less than 4 members.

The absence of people aged 65 years and above at Akwatia Line and Old Fadama may be due to the constant threat of eviction by the Metropolitan Assemblies, AMA and KMA, respectively. The data show that only the economically active population with some of their family members were able to resettle in Akwatia Line after the demolition of the structures in May, 2007 under the Kumasi Metropolitan Assembly's decongestion exercise.

About 65% of the household heads originated from the Northern Region[9] of Ghana as presented in Table 3.3. Ghana Statistical Service has observed that Ashanti and Greater Accra Regions are among the most favoured regions for internal migrants in Ghana (Ghana Statistical Service, 2005). Surprisingly, the Northern Region is not among the top five regions identified by the Ghana Statistical Service in terms of migration to Ashanti and Greater Accra Regions. The five regions are Upper West (31%), Volta (28%), Central (27%), Eastern (25%) and Upper East (24%). Again it has been noted that economic reasons (employment opportunities in the cities) underpinned household heads' decision to migrate to the cities from the Northern and other regions of the country (Ghana Statistical Service, 2008).

[9] Ghana has ten administrative regions of which the Northern Region is one of the three poorest regions in the country.

Table 3.3 | Regions of Origin of Household Heads, by Slum

Region	Slum						Average
	Old Fadama	%	Amui Dzor	%	Akwatia Line	%	
Greater Accra	7	1.6	86	19.1	4	2.5	7.7
Eastern	14	3.1	37	8.2	0	0.0	3.8
Central	6	1.3	17	3.8	0	0.0	1.7
Western	6	1.3	9	2.0	0	0.0	1.1
Volta	24	5.3	70	15.6	1	0.6	7.2
Ashanti	5	1.1	19	4.2	1	0.6	2.0
Brong Ahafo	7	1.6	7	1.6	7	4.4	2.5
[10] Northern	321	71.3	151	33.6	144	90.0	65.0
Upper East	32	7.1	35	7.8	3	1.9	5.6
Upper West	28	6.2	19	4.2	0	0.0	3.5
Total	450	100.0	450	100.0	160	100.0	100.0

Source | Field Survey, 2010.

Figure 3.1 shows that about 36% of the household heads had never had any formal education, whereas 17.3% indicated that they started but never completed basic education. Furthermore, about 25% and 15% of the household heads had completed JSS/JHS/Middle and SSS/SHS, respectively, while about 5% completed technical/vocational education. Household heads with tertiary educational backgrounds accounted for only 1.7% of the total number of household heads in the three slums.

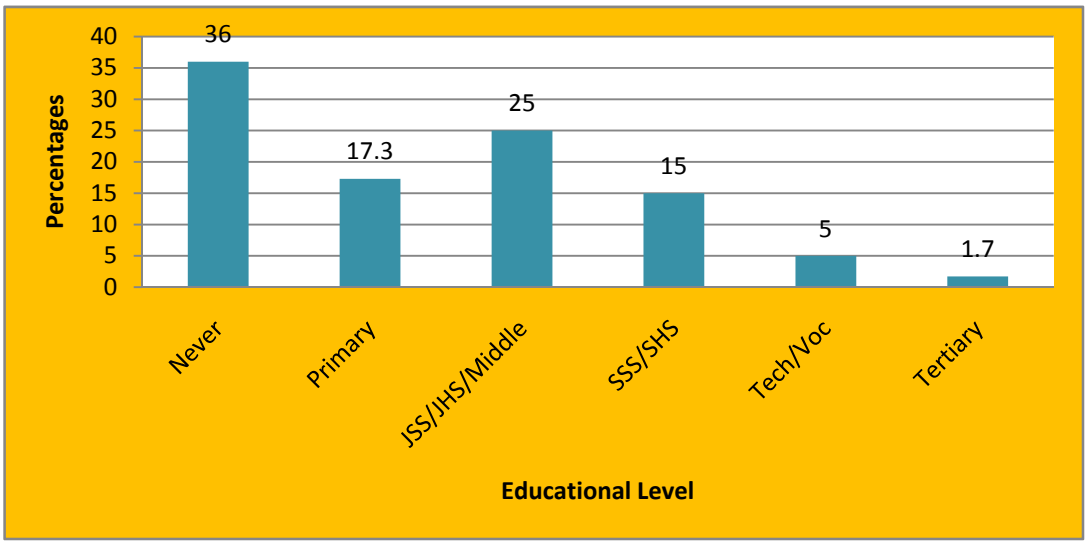

Figure 3.1 | Educational levels of household heads, by community

The low educational levels of the household heads in the three slums have influenced the type of occupation they could be engaged in. Many of them were unskilled labourers and therefore were engaged in employments that have flexible entry and exit requirements as discussed under subsection 3.3.

[10] Muslim population in the Northern Region is 58.1

OCCUPATIONAL STATUS OF HOUSEHOLD HEADS

Employment levels in the three slums were generally high, averaging about 98% compared to the urban employment rate of 95.7% in Ghana (Ghana Statistical Service, 2008). The artisanal small scale sector of the local economy employed 49.7% of household heads, while service and agricultural sectors employed 49.6% and 1.3%, respectively, as presented in Table 3.4. Thus, the artisanal small scale sector as the prime-mover of the local economy plays an indispensable role in employment creation in the slums. The artisanal small scale sector comprised of economic activities such as collection and sale of scrap metals[11] which employed about 48% of the labour force in Akwatia Line, The other small scale artisans working in the slums include self-employed individuals engaged in the manufacture of traditional coal pots, repairs of cellular phones, carpentry and repairs of electrical appliances.

The scrap metal subsector was apparently attractive to the economically active male population because of the free entry and exit, an attribute of almost all informal sector activities in Ghana (King, 2011). Among the unskilled male population of the slum dwellers therefore, the collection, processing and sale of metal scraps is a vibrant economic activity.

The agricultural sector's contribution to employment creation in the slums was insignificant relative to the other sectors. This is not surprising because of unavailability of farm lands in the urban settings, coupled with the unfavourable land tenure system. The above notwithstanding, on the average, 1.3% of those interviewed were into agriculture as self-employed individuals, with the majority of them from Old Fadama. Those with access to farmland were engaged in vegetable gardening (dominant in Old Fadama) and domestic animal rearing (in Akwatia Line). Exotic vegetable[12] farming in the cities is one of the lucrative economic activities a few unskilled individuals opt for.

Table 3.4 | Household Heads' Occupation, by Sector and Slum

SLUM	SECTOR OF EMPLOYMENT					
	ARTISANAL SMALL SCALE	%	SERVICE	%	AGRICULTURE	%
Akwatia Line	81	51.9	74	47.4	1	0.6
Old Fadama	194	43.3	243	54.2	11	2.5
Amui Dzor	226	51.8	206	47.2	4	0.9
Average	-	49.0	-	49.6	-	1.3

Source | Field Survey, 2010.

The service sector of the local economy was dominated by petty retail activities (such as sale of confectionaries), food preparation and vending (22.1%), running of public bathhouses (3.6%). Head portage is another economic activity some slum dwellers engage in within the service sector. This was dominant in Akwatia Line and Old Fadama because of their proximity to the central business districts (CBDs) of Kumasi and Accra, respectively. This activity is often dominated by women. It employed 3.7% and 6.8% of the female population in Old Fadama and

[11] Scrap metal dealers buy and sell scrap metals after adding value to what they buy. Adding value to the scrap metals entails breaking, remoulding and selling to wholesalers and traditional cook stove manufacturers within the same communities.

[12] Exotic vegetables are the non-traditional vegetables such as lettuce, carrots, cabbage that hotels and restaurants are interested in and so there is a large market in the cities for these types of vegetables.

Akwatia Line, respectively. Head portage as a form of employment partly explains the choice of settlements for unskilled migrants in the cities

HOUSEHOLD INCOME AND EXPENDITURE LEVELS

The analysis of household income and expenditure includes the income and expenditure of all household members who earn income. This information was provided by the household head in consultation with the other income earning members of the household as part of the data collection process. The analysis of household income and expenditure is used to assess households' capability to adopt modern forms of energy to support their productive activities.

Household Income Levels

The survey findings show that an average of 27.0% of households earned monthly incomes below GH¢290, 24.6% earned between GH¢290-450, 22.6% earned between GH¢451-700 and 25.8% earned above GH¢700, (which were the four quartile income groupings for the data analysis) in all three slums as indicated in Table 3.5. Further analysis of household earnings revealed a mean monthly household income of GH¢459.2[13] per month (equivalent to US$323.4). With the average household size of three persons, the household income per capita was GH¢5.3 (equivalent to US$3.7) per head per day. The mean household income of GH¢459.2, is higher than the national monthly household income of GH¢101.4. Furthermore, the household income per head is higher than the national poverty line of US$2.0 per day**.** However, with an average household size of 6 (informed by the average household size of the three regions in northern Ghana where majority of the respondents migrated from, the per capita income reduces to GH¢2.5 (US$1.8) (see sub section 3.4.2).

Table 3.5 | Household Monthly Incomes, by Slum

SLUM	INCOME QUARTILES							
	1ST QUARTILE < GH¢290	%	2ND QUARTILE GH¢290 – 450	%	3RD QUARTILE GH¢451 – 700	%	4TH QUARTILE >GH¢ 700	%
Akwatia Line	50	32.1	26	16.6	29	18.6	51	32.7
Old Fadama	88	20.6	151	35.4	108	25.3	80	18.7
Amui Dzor	125	28.2	97	21.8	107	24.1	115	25.9
Average	-	27.0	-	24.6	-	22.6	-	25.8

Source | Field Survey, 2010.

Household Expenditure Levels

The study identified that expenditure levels in all three slums were higher than the national monthly household expenditure. Data from the survey showed that the average household monthly expenditure (including remittances) was GH¢243.6 for all three slums. The mean monthly expenditure for the three slums was higher than the mean national household expenditure of GH¢160 but related well with the

[13] As of 28th October, 2010, the official Bank of Ghana Cedi to US Dollar rate of exchange was US$1.42.

Greater Accra Region's[14] average of GH¢242.3 where two of the slums are located (Ghana Statistical Service, 2008)

The study used two scenarios to estimate the mean monthly household expenditure per capita. In the first scenario, the study used the mean household size of 3 persons as the basis for the assessment. It was noted that the mean monthly expenditure was about GH¢81.2 per person which was about 51.2% higher than the national mean monthly per capita expenditure of GH¢53.7 (Ghana Statistical Service, 2008). A further analysis revealed average daily consumption expenditures per person of GH¢2.5 for Old Fadama, GH¢2.7 for Amui Dzor and GH¢3.4 for Akwatia Line.

In the second (worse-case) scenario, the study assumed the number of dependents to be six (based on the average household size of the three regions in northern Ghana[15] from where about 65% of the migrants originated) as the basis. Using this scenario, the study identified the mean monthly expenditure per capita to be GH¢40.6 which was about 32% lower than the national mean monthly household expenditure per capita of GH¢53.7 (Ghana Statistical Service, 2008). A further analysis revealed an average daily consumption expenditure per person of GH¢1.4.

Table 3.6 | Household Expenditure Level, by Slum

SLUM	EXPENDITURE QUARTILES							
	1ST QUARTILE < GH¢290	%	2ND QUARTILE GH¢290 – 450	%	3RD QUARTILE GH¢451 - 700	%	4TH QUARTILE >GH¢ 700	%
Akwatia Line	14	8.7	30	18.8	52	32.5	64	40.0
Old Fadama	157	35.3	96	21.6	85	19.1	107	24.0
Amui Dzor	96	21.6	136	30.6	122	27.5	90	20.3
Average	-	21.9	-	23.6	-	26.4	-	28.1

Source | Field Survey, 2010.

Due to the impact dependents had on household expenditure per capita, the study assessed how often transfer payments (remittances) were made by the household heads. The analysis revealed that transfer payments (remittances) averaged GH¢280 per annum but were higher than the national urban households' average of GH¢136. The remittances however accounted for only 6.2% of households' expenditure; a finding which related well with Tutu's claim that transfers from internal migrants are generally low (Tutu 1995 cited in Wouterse, 2010) compared to remittances from outside the country.

The survey further identified that 15% of the household heads remitted once a year whilst 12% of them remitted twice a year. About 15% of the household heads were uncertain about the number of times in a year they remitted since they only did so only when their dependents in their places of origin requested for financial support. The remaining 58% of household heads had never remitted their dependents claiming that they did not earn enough to enable them to remit.

[14] Greater Accra Region is 97.7% urbanized and cost of living is relatively higher in Accra than other parts of the country.
[15] The three northern regions in Ghana are Northern, Upper East and Upper West Regions.

Household Savings Potential and Actual

A comparative analysis of household income and expenditure levels revealed that households in all the three slums made enough incomes to enable them save (see Annex 2). Persons in Old Fadama, would thus be able to save GH¢2.7, Amui Dzor and Akwatia Line, GH¢2.6 and GH¢2.0 per day, respectively. Considering households' ability to save, which is evident in the high monthly incomes over expenditures, an average of 39.9% of the households saved with both formal and informal financial institutions in all three slums. Specifically, about 57.0%, of households in Akwatia Line, 38.1% in Old Fadama and 24.5%, in Amui Dzor, saved their excess incomes (as shown in Table 3.7) with various financial institutions or groups. The considerably low patronage of both formal and informal financial institutions by the slum households corresponds with the general apathy of Ghanaians to save with financial institutions of any kind. Ampah (2009) argues that the low (13.3% of GDP) gross savings in Ghana between 2001 and 2009 is the result of the low patronage of financial institution services.

Table 3.7 | Heads of Households' Savings with Financial Institutions/Groups, by Slum

SLUM	SAVINGS			
	SAVE	%	DON'T SAVE	%
Akwatia Line	90	57.0	68	43.0
Old Fadama	169	38.1	274	61.9
Amui Dzor	106	24.5	326	75.5
Average	-	39.9	-	60.1

Source | Field Survey, 2010.

The data show that the remaining 60.1% of the household heads in the slums who did not save with any financial institution kept their surplus moneys in their houses (48.2%) or with people they trusted (mostly their employers) within the slums (11.9%). The practice of keeping money at home is the "cause of the incessant burglary reports in Akwatia Line", a respondent explained.

The survey also identified that household heads saved their surplus incomes for two major reasons. These are for future security during old age (73.4%) and to acquire property of any sort (16.3%). The study identified that majority (81.8%) of the household heads who saved did so with formal banking institutions (such as the Ghana Commercial Bank and the Agricultural Development Bank). Household heads who mentioned "future security" as reason for saving, underscored their preference for the mainstream banks. A household head mentioned that the above-stated mainstream banks stand a "low chance of collapse due to their long years of banking experience and perceived high capitalisation." The remaining 18.2% saved with non-banking financial institutions dominant among which were the savings and loans groups such as the First National Savings and Loans (9.6%), "susu" (3.2%) and "Adashi" (2.4%).

A comparative analysis of households' capacity to save in the three slums revealed that households in Amui Dzor were less inclined to save with only 24.5% currently saving with mainstream banks and non-banking financial institutions. The data also revealed that the remaining 73.5% of household heads were discouraged from savings because of the scepticisms they held with the operations of the financial institutions and 'susu' groups. Though not unique to Amui Dzor, about 85% of the household heads who did not save claimed that "some financial institutions and mostly susu collectors do abscond with clients' savings."

ENERGY SUPPLY AND UTILISATION BY HOUSEHOLDS IN THE SLUMS

The study identified that the slum dwellers used a wide range of energy forms for several purposes including lighting and cooking for their domestic activities. This section is therefore presented in two parts namely, energy for lighting and energy for cooking.

Household Energy for Lighting

Electricity was the dominant modern energy form used by 95.1% of households in Old Fadama and 90.0% and 79.4% of households in Amui Dzor and Akwatia Line, respectively as presented in Figure 3.2. The findings of the study show that access to electricity by households in the three slums is high (an average of 88.2%) relative to the national average of 66% as of 2010, urban areas' average of 79% and the Ministry of Energy's target of 80% by 2015 (Ghana Statistical Service, 2008; Government of Ghana, 2010).

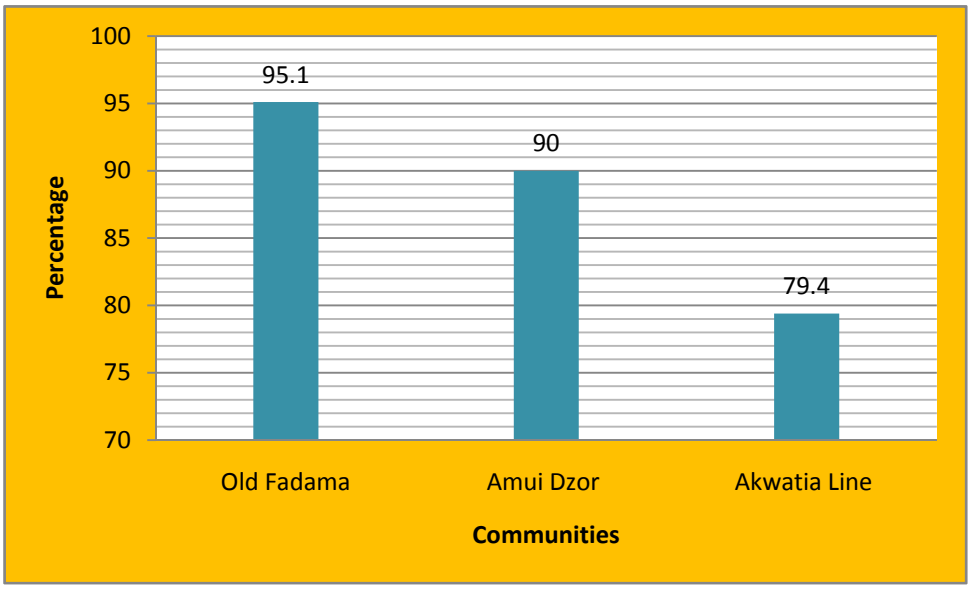

Figure 3.2 | Proportion of households with Access to electricity by slum

Further analyses show that an average of 56.4% of the households acquired their electricity connection from the Electricity Company of Ghana (ECG) and thus had electric meters. Though 'illegal', the remaining households (43.6%) acquired their electricity connections from their neighbours, and sometimes directly from electricity poles erected in the slums. The major reason for the illegal electricity connections in Old Fadama and Akwatia Line was household heads' inability to provide building permits or police certification to make valid their applications for electricity connection from ECG (TEC/ESMAP Kickoff meeting, 2010). In elucidating this claim, the study probed further and identified that 92.1% of the inhabitants of Amui Dzor community - where there is security of tenure - had electric meters as presented in Table 3.8. Only 36.3% of the inhabitants of Old Fadama had electric meters and Akwatia Line, 10.2%. Thus, despite insecurity of tenure access to electricity is highest in Old Fadama because of the ease of acquiring electricity through illegal connections. Household heads in Old Fadama paid amounts ranging from GH¢20 to GH¢30 for electricity connection from unapproved sources, whereas they would have paid an average of GH¢200 for appropriate and legal connection from ECG. They also pay a monthly consumption rate of GH¢5 to the illegal and unofficial electricity providers in the slum. This illegal connection of electricity in the slums is referred to as 'by-pass', a jargon that is understood by the slum dwellers.

Table 3.8 | Availability of Electric Meters in Dwelling, by Slum

Slum	Availability of electric meters in dwelling					
	Available	%	Unavailable	%	Total	%
Old Fadama	155	36.3	272	63.7	427	100.0
Amui Dzor	373	92.1	32	7.9	405	100.0
Akwatia Line	13	10.2	114	89.8	127	100.0
Average	-	46.2	-	53.8	-	100.0

Source | Field Survey, 2010.

The study estimated the potential revenue loss to the Electricity Company of Ghana caused by the "illegal" use of electricity by households in the three slums. Premised on the assumption that the quantity of electricity consumed by each household was not more than 50 KWh (life line tariff band in Ghana as a pro-poor intervention), the study estimated the monthly losses to ECG to be GH¢72,684.5 for Old Fadama, GH¢304 for Amui Dzor and GH¢1083 for Akwatia Line as presented in Table 3.9. Thus, the total annual losses to ECG were estimated at GH¢872,214 and GH¢3,648 for illegal electricity connection in Old Fadama and Amui Dzor, respectively and GH¢12,996 for Akwatia Line, (see Annex 3 for details).

Table 3.9 | Estimated Annual Electricity Losses to ECG, by Slum

Slum	Number of Households	Proportion of households with access to electricity %	Number of households with access to electricity	Proportion of households connected illegally %	Number of households connected illegally	Estimated monthly tariffs (GH¢)	Estimated annual tariffs (GH¢)
	A**	B	C= (B*A)/100	D	E= (D*C)/100	F = (E*GH¢4.75)	G = F*12
Old Fadama	25260	95.1	24,022	63.7	15,302	72,684.5	872,214
Amui Dzor	900	90.0	810	7.9	64	304	3,648
Akwatia Line	320	79.4	254	89.8	228	1,083	12,996.

* Used the lifeline tariff structure of less than 50 KWh with a rate of 9.5Gp per KWh
** Refer to Annex 3 for the calculation of the total population for each of the 3 slums.
Source | Field Survey, 2010.

The use of electricity for lighting purpose in the three slums is not influenced by the income levels of the respondents as a cross-tabulation between electricity use and households' income levels revealed little variance among the proportions of households that used electricity in the four income groups. Whilst 25.3% and 24.8% of electricity users earned respective incomes of less than GH¢290 (first quartile) and between GH¢290 and GH¢450 (second quartile), 23.3% and 26.8% of them earned incomes of between GH¢451 and GH¢700 (third quartile), and above GH¢700 (fourth quartile), respectively (refer to Table 3.10). With average annual household income of GH¢5,510.4, which was identified to be three-times higher than the average annual household income in Ghana of GH¢1,217, it presupposes that households in the three slums could afford electricity connection legally or through the appropriate channel. The issue of illegal electricity connections therefore is not about affordability for the slum dwellers but the location of such households, which are considered as illegal settlements.

Table 3.10 | Access to Electricity an Household's Income Level, by Slum

Income Quartiles	Slum						Average
	Old Fadama	%	Amui Dzor	%	Akwatia Line	%	
Below GH¢290	117	27.4	82	20.2	36	28.3	25.3
Between GH¢290 – 451	95	22.2	147	36.3	20	16.0	24.8
Between GH¢451-700	103	24.1	104	25.7	26	20.2	23.3
Above GH¢700	113	26.3	72	17.8	45	35.5	26.5
Total	428	100	405	100	127	100	100.0

Source | Field Survey, 2010.

Similarly, a cross-reference made between households' income and ownership of electric meters revealed no relationship except at Akwatia Line where ownership of electric meters increased with income levels as presented in Table 3.11. About 69% of electric meter owners at Akwatia Line earned incomes within the fourth income quartile (above GH¢700).

Table 3.11 | Cross-Tabulation between Income Levels and Electric Meter Ownership, by Slum

Slum	First quartile		Second quartile		Third quartile		Fourth quartile		Total	%
	Below GH¢290	%	Between GH¢290 – 450	%	Between GH¢451-700	%	Above GH¢700	%		
Old Fadama	42	28.2	29	19.4	39	26.2	39	26.2	149	100.0
Amui Dzor	77	21.9	127	36.1	89	25.3	59	16.8	352	100.0
Akwatia Line	0	0.0	2	15.4	2	15.4	9	69.2	13	100.0
Total	119	23.2	158	30.7	130	25.3	107	20.8	514	100.0

Source| Field Survey, 2010.

The survey further identified that about 9.5% and 2.3% of the households in the slums used kerosene and candle, respectively, as their main forms of energy for lighting because they did not have electricity connection in their dwellings (bearing in mind that as mentioned earlier, not all households in the slum had access to electricity). Dry cells however were used by about 30.5% of households as alternatives to their main energy forms for lighting (i.e., using touch lights). The dry cells were also used in radios.

It is important to stress that even though many households in the slums have access to electricity, the supply is not regular, and hence the need for alternative sources of energy for lighting.

Table 3.12 | Proportion of Households which Used Other Energy Forms for Lighting, by Slum

Other energy types used for lighting	Slum						Total
	Old Fadama	%	Amui Dzor	%	Akwatia Line	%	
Candle	13	54.2	6	25	5	20.8	24
Kerosene	46	45.5	51	50.5	4	4.0	101

Source | Field Survey, 2010.

Some of the residents of Akwatia Line and Old Fadama use dry cell batteries and kerosene for lighting purposes because of the threats of eviction they receive from local authorities (AMA and KMA) that make it almost impossible for them to have all their basic needs that could make life comfortable though they

could afford them. For instance, all the structures at Akwatia Line were demolished on 26th May, 2007 under the KMA's[16] decongestion exercise. A resident of Akwatia Line is quoted as saying...

> *"A week after my house including my home-based enterprise was connected with electricity at a cost of about GH¢200, all the structures in the community were demolished by KMA. I have since resolved to use energy types that do not require large amounts of money."*

The affected households in Akwatia Line prefer to use kerosene, dry cell batteries and candle which do not require high financial outlay. A further probe revealed that the structures that were without electricity connections were rented out to head porters (kayayee) who found solace in such temporary structures because of the unavailability of other accommodation options and the temporal and seasonal nature of their work. Some of the porters go back to their places of origin during the farming season and others come to the big cities only for a short while to raise funds for other investments back at home.

Both candle[17] and kerosene[18] posed health risks to the slum dwellers especially the children and the aged due to the smoke emission associated with their use (see DHAN Foundation, 2006). The data revealed that kerosene and candle use posed health risks to 22.5% of households with children under 5 years in the three slums that used kerosene and 2.0% candle of households with children under 5 years in the three slums. This observation was made through a cross-reference made between the use of kerosene and candle with the number of households whose membership included children (under 5 years old) as presented in Table 3.13.

Table 3.13 | Cross-Tabulation of Kerosene and Candle Use with Ages of Household Members, by Slum

Number of Households	Energy types used for lighting by Slum									
	Kerosene			Total	%	Candle			Total	%
	Old Fadama	Amui Dzor	Akwatia Line			Old Fadama	Amui Dzor	Akwatia Line		
Under 5 years	110	119	10	239	22.5	16	3	2	21	2.0

Source | Field Survey, 2010.

Households' Expenditure on Electricity

In legally connected households, the monthly electricity bills depended on the kilowatt hours of electricity used per month which in turn depended on the capacity of electrical appliances used by the households. Furthermore, households' income levels were major determinants of the type of electric appliances they use. Premised upon these assumptions, the survey investigated the electrical appliances used by households which were cross-examined with their income levels.

From the survey, households in the three slums used a wide range of electric appliances which included television sets (72.2%), radio (48.6%), sound systems (36.2%), digital, versatile disc players (45.6%), refrigerators (18.7%), electric heaters (24.2%) and electric ovens (0.7%). The others were electric stoves

[16] The Kumasi Metropolitan Assembly is one of the 170 local governments in Ghana and the second largest metropolis in the country.
[17] Candles contain lead in their wicks. Studies have shown that the central nervous system of children and the aged are particularly sensitive to lead. Some of the most damaging neuropsychological effects of lead poisoning of young children include learning disabilities, reduced psychometric intelligence and behavioural disorders. These effects have been associated with chronic low-level exposure to lead and are believed to be irreversible (American Chemical Society, 2010).
[18] Burning kerosene also cause eye, nose and throat irritation (DHAN Foundation, 2006).

(0.5%), electric sewing machines (2.36%), rice cookers (2.7%) and electric irons (26.1%). Other appliances they had are electric fans (59.7%), electric cookers (1.9%) and computers (5.1%).

An analysis of the data showed that the ownership of electrical appliances in the slums was fairly equal among the households across the four income groups. For example, high energy consuming electric appliances such as refrigerators, electric heaters, electric ovens, electric stoves, electric irons, electric cookers and rice cookers, were owned by households within every income group as presented in Table 3.14. Hence, household incomes did not influence ownership of electrical appliances in the slums.

Table 3.14 | Household Ownership of Electrical Appliances Cross-Referenced with Income Levels

Appliances	Income Quartiles (GH¢) of Households in Percentages			
	1 Below 290	2 Between 290-450	3 Between 451-700	4 Above 700
Television	22.8	28.8	24.5	24.0
Radio	22.8	29.9	25.4	21.9
Sound system	23.3	26.7	22.0	28.0
DVD	20.5	26.2	22.8	30.5
Refrigerator	15.3	27.1	26.2	31.4
Electric immersion heater	20.7	27.0	21.6	30.6
Electric oven	20.0	30.0	20.0	30.0
Electric stove	14.3	14.3	57.1	14.3
Electric sewing machine	12.5	12.5	50.0	25.0
Rice cooker	15.6	18.8	25.0	40.6
Electric iron	19.9	25.1	24.4	30.6
Electric fans	21.9	28.5	23.4	26.2
Electric cooker	9.1	27.3	31.8	31.8
Computer	22.6	22.6	17.0	37.7

Source | Field Survey, 2010.

Table 3.15 also shows that the ownership of high-energy consuming electrical appliances (refrigerators, electric heaters, electric ovens, electric stoves, electric irons, electric cookers, electric heaters and rice cookers) was highest in Amui Dzor and least in Old Fadama, which suggests that security of tenureship may also be very critical in the acquisition of material property among the poor. An average of 14.0% and 9.0% of the households in Amui Dzor and Akwatia Line, respectively owned electrical appliances and 9.3% owned these appliances in Old Fadama.

Table 3.15 | Number of Households with High-Energy Consuming Appliances, by Slum

Electrical Appliance	Slum					
	Old Fadama	%	Amui Dzor	%	Akwatia Line	%
Refrigerators	73	16.2	142	31.6	14	8.8
Electric immersion heaters	88	19.6	76	16.9	58	36.3
Electric ovens	5	1.1	5	1.1	-	0.0
Electric stove	1	0.2	5	1.1	1	0.6
Electric irons	105	23.3	183	40.7	23	14.4
Electric cookers	8	1.8	12	2.7	2	1.3
Rice cooker	14	3.1	16	3.6	2	1.3
Average	-	9.3	-	14.0	-	9.0

Source | Field Survey, 2010.

Electric immersion heaters were the commonest appliances most households had in the three slums.

In an attempt to explain the reason for the ownership of the wide range of electrical appliances, the survey assessed the households' monthly electricity bill as a percentage of the total monthly incomes and expenditures. It emerged that households in Old Fadama paid an average of GH¢8.2, and those of Amui Dzor paid an average of GH¢14.8 while households of Akwatia Line paid an average of GH¢7.0 as their monthly electricity bill. The findings indicated that the electricity bills constituted 9.6% and 4.6% of the monthly expenditures of households within the first and second expenditure quartiles, respectively. Further, the electricity bills constituted 3.1% and 2.0% of the monthly expenditures of households within the third and fourth expenditure quartiles, respectively, as indicated in Table 3.16. Though electricity bills paid by households in Amui Dzor were highest, it constituted an average of 7.3% of their total monthly expenditure. Thus, households' electricity bills as percentages of their expenditures were low, compared to the national average expenditure of 9.5% on electricity (Ghana Statistical Service, 2008). Perhaps, not having access to electricity through the legal and appropriate channel could explain why expenditure on electricity among the slum households is cheaper than the national average. In addition, interviews with some key informants who were also residents in the slums indicated that staff from ECG connive with some of the residents in the slums to tamper with the meters thereby preventing them from reflecting the true consumption of electricity in these slums. The following comments from the overall boss of ECG support the above.

> *"I feel sad that elements in corporate Ghana should involve themselves in illegal connection of electricity,' Mr. Gakpo lamented...'He said the connivance of some ECG officials in the illegal connection of electricity made it difficult to detect the illegal connection. They use ingenious ways of stealing electricity with the connivance of our staff,' Mr. Gakpo said" (http:/www. myZongo.com, 13/04/2010).*

Table 3.16 | Cost of Electricity as a Proportion of Monthly Incomes and Expenditures, by Slum

Quartiles	Total Household Monthly Expenditure A			Monthly Cost of Electricity (GH¢) B			Cost of electricity as a percentage of total monthly expenditure (%) C = A*100)/B		
	Old Fadama	Amui Dzor	Akwatia Line	Old Fadama	Amui Dzor	Akwatia Line	Old Fadama	Amui Dzor	Akwatia Line
1	80.7	90.6	89.8	7.6	12.1	5.3	9.4	13.4	5.9
2	182.1	177.5	193.7	7.9	12.4	5.1	4.3	7.0	2.6
3	302.4	296.7	309.4	8.1	14.7	6.0	2.7	5.0	1.6
4	595.1	543.4	581.3	9.2	20.0	11.7	1.5	3.9	0.7

Source | Field Survey, 2010.

A further probe revealed that the fixed electricity rates paid by 41.7% of households to their illegal suppliers in the three slums (that were illegally connected) could be the major reason for the ownership of high energy-consuming electrical appliances. The fixed rate paid by households was not determined by their electricity consumption level (measured in kilowatt hours) but by the discretion of the electric meter owners as indicated in Table 3.17.

Table 3.17 | Determination of Households' Electricity Bills, by Slum

Terms of Payment	Slum							
	Old Fadama	%	Amui Dzor	%	Akwatia Line	%	Total	%
Credit meter	104	10.9	132	13.9	25	2.6	261	27.4
Pre-paid meter	73	7.7	215	22.6	4	0.4	292	30.7
Fixed rates	247	25.9	55	5.8	95	10.0	397	41.7
Others	-	0.0	0	0.0	2	0.2	2	0.2
Total	424	44.5	402	42.3	126	13.2	952	100.0

Source | Field Survey, 2010.

Households' Energy for cooking

Charcoal use accounted for 73.9% of households' total energy-mix for cooking at the domestic level as presented in Table 3.17. Similarly, the use of firewood and sawdust accounted for 10.6% and 0.5%, respectively of the total energy-mix for domestic cooking.

Table 3.18 | Household Fuel for Cooking, by Slum

Cooking fuel	Slum						Average
	Old Fadama	%	Amui Dzor	%	Akwatia Line	%	
LPG	10	2.2	57	9.6	3	2.1	4.6
Kerosene	42	9.0	80	13.4	12	8.5	10.3
Charcoal	365	78.7	383	64.4	111	78.7	73.9
Firewood	46	9.9	71	11.9	14	9.9	10.6
Biomass (sawdust)	1	0.2	4	0.7	1	0.7	0.5
Total	464	100.0	595	100.0	141	100.0	-

Source | Field Survey, 2010.

Firewood was also used as cooking fuel by the slum dwellers. About 9.9% of households in Old Fadama, 11.9% of households in Amui Dzor and 9.9% of households in Akwatia Line used firewood as cooking fuel. The use of biomass (charcoal, firewood and sawdust) as cooking fuels in the three slums is higher than the biomass used for cooking by the average Ghanaian population (63%) (Ghana Statistical Service, 2008; Government of Ghana, 2010). A cross-tabulation between firewood use and the presence of a home-based enterprise revealed that majority (about 74%) of households that used firewood operated home-based enterprises (such as food-vending) (see Table 3.19).

Table 3.19 | Household use of Firewood Cross-Tabulated with Presence of Home-Based Enterprise in Dwelling in the Slums

Slum	Number of households using firewood					
	Both enterprise and domestic levels	%	Domestic levels only	%	Number of households using firewood	%
Old Fadama	32	69.6	14	30.4	46	100
Amui Dzor	37	52.1	34	47.9	71	100
Akwatia Line	14	100	0	0	14	100

Source | Field Survey, 2010.

The survey identified only coal pots of different types (as depicted by Plates 3.3 and 3.4) as the equipment used by households for the conversion of charcoal to heat energy for cooking at home.

Plate 3.1 | A traditional rim stove

Plate 3.2 | A metallic cooking stove

Firewood, however, was converted by traditional three-stone stoves (92%) and "improvised stoves" from iron rods (8%)

Plate 3.3 | A three-stone stove used by households in the slum

Despite Government's aim to encourage the use of modern cooking fuels such as LPG (modern energy) with the intent of forestalling deforestation, the contribution of LPG to the total household cooking fuel mix was 4.6% in the three slums (see Table 3.18), far below the urban average of 20% (Ghana Statistical Service, 2008; Government of Ghana, 2010). The situation is further compounded by the preference households have for charcoal relative to the modern forms of cooking fuel as presented in Table 3.20. It emerged that a total of 48.1% of the households prefer to use charcoal for cooking as a precautionary measure against the frequent fire outbreaks associated with the use of firewood in slums in Ghana and the high cost associated with LPG and electricity. The study identified that housing types dominated by wooden shacks which accounted for 83.7% of all dwellings in the three slums (Akwatia Line - 89.4%, Old Fadama - 76.4% and Amui Dzor - 85.3%), make the housing structures susceptible to fire. Furthermore, most households considered the initial cost of LPG stove and cylinder as expensive and therefore used biomass.

Table 3.20 | Households' Preferred Energy Types for Cooking for the Slums

Most preferred energy type	Slum						Average
	Old Fadama	%	Amui Dzor	%	Akwatia Line	%	
Electricity	155	23.6	69	9.5	95	31.6	21.6
LPG	90	13.7	139	19.0	103	34.2	22.3
Charcoal	370	56.4	421	57.7	91	30.2	48.1
Woodfuel	33	5.0	68	9.3	9	3.0	5.8
Kerosene	8	1.2	33	4.5	3	1.0	2.2
Total	656	100.0	730	100.0	301	100.0	100.0

Source | Field Survey, 2010.

Table 3.20 indicates that relative to the proportion of households which used the various forms of energy for cooking, a higher proportion of households would prefer to use electricity and LPG as fuels for cooking given the chance. For instance, whilst only 4.6% of the households in the three slums used LPG, 22.3% (an increase of about 380%) would prefer to use LPG as cooking fuel at the domestic level. Additionally, 21.6% of the households would prefer to use electricity for cooking at home. Interestingly, the preference for electricity as household cooking energy is highest in Akwatia Line and Amui Dzor, where the determination of electricity bills for most households is not dependent on the kilowatt hours of electricity they consume per month (see Table 3.17) and therefore the households have little idea as to how expensive it is to use electricity for cooking.

A further analysis revealed that the deployment of LPG and electricity as modern cooking fuels to the slum dwellers can be enhanced by the high cost (19.4%), harmful (13.7%), time-wasting (39.3%) and unhealthy (18.4%) perceptions associated with charcoal use as held by the households in the three slums (see Table 3.21).

Table 3.21 | Problems Associated with the Use of Charcoal in the Slums

Problems	Slum						Average
	Old Fadama	%	Amui Dzor	%	Akwatia Line	%	
Expensive	68	15.4	118	23.0	28	19.7	19.4
Harmful	89	20.1	60	11.7	13	9.2	13.7
Time wasting	196	44.3	221	43.2	43	30.3	39.3
Unavailable	6	1.4	8	1.6	9	6.3	3.1
Unhealthy	81	18.3	102	19.9	24	16.9	18.4
Other	2	0.5	3	0.6	25	17.6	6.2
Total	442	100.0	512	100.0	142	100.0	-

Source | Field Survey, 2010.

Monthly Expenses on Household Cooking Fuels

It emerged from the study that households' monthly expenditure on the various cooking fuels was highest for firewood (GH¢42.9) and least for sawdust (GH¢4.9) as presented in Table 3.22. Households' monthly expenses on firewood were highest because of the use of firewood at both household and enterprise levels. About 74% of the households which used firewood (see Table 3.19) did so for food preparation at both household and enterprise levels and thus inflated the expenditure on firewood at the household level though charcoal was the predominant cooking fuels that households used.

Table 3.22 | Household's Monthly Expenditure on Cooking Fuels

Slum	Cost of Energy (GH¢)				
	Charcoal	Firewood	Kerosene	LPG	Sawdust
Old Fadama	30.7	61.8	5.2	11.3	10.0
Amui Dzor	15.9	19.4	5.1	21.9	4.8
Akwatia Line	21.4	47.6	6.0	49.4	0.0
Average	22.7	42.9	5.4	27.5	4.9

Source | Field Survey, 2010.

Households' daily expenditure on charcoal in the three slums ranged from 50Gp to GH¢1.5. Though prices of charcoal were the same in the three slums, their weights differed. Samples of charcoal taken from vendors revealed that 50GHp worth of charcoal weighed 1.3kg in Old Fadama, 1.5kg in Amui Dzor and 1.9kg in Akwatia Line. The slums access to charcoal could perhaps account for these differences as Akwatia Line seems to be located closer to charcoal [19]production areas compared to Amui Dzor and Old Fadama.

Households' monthly expenditure on charcoal in Amui Dzor was the least (GH¢15.9) because about 80% of the households purchased charcoal in bulk, mostly in bags (with average weight of 50kg) at a cost of GH¢10 and which could last for approximately three weeks. However, majority of the households in the other two slums purchased small quantities from retailers at costs ranging between 50Ghp and GH¢1.5 as mentioned above. Furthermore, though the prices of retailed charcoal were the same, they were heavier in weight in Akwatia Line (1.9kg for 50GHp than Old Fadama 1.3Kg).

As explained in Table 3.19, of the households that use firewood, most of them (69.6% in Old Fadama, 52.1% in Amui Dzor and 100% in Akwatia Line) used firewood for cooking both at home and in their enterprises. The survey identified that the said households in Old Fadama and Akwatia Line bought firewood daily at a cost of GH¢2 and GH¢1.50, respectively. This underscores the high average expenditure on firewood. Firewood in Akwatia Line relative to that of Old Fadama was cheaper because of the closeness of the community to saw mills where leftovers were sold out as firewood to the public. Kumasi is known for its timber and wood industry

[19] Techiman, Atebubu and Nkoranza (see KMA Medium Term Development Plan 2006 – 2009)

4 | ENERGY SUPPLY AND UTILISATION BY ENTERPRISES IN THE SLUMS

Chapter four highlights energy supply and utilisation patterns in enterprises. It is preceded by a general overview of the enterprises selected for the study. The overview includes the types of enterprise; enterprise owners' reasons for business establishment; sources of start-up capital; number of workers employed; registration status; and the regime for payment of taxes. Regarding the enterprises' energy supply and utilisation pattern, the areas of emphasis include the types of energy and the purpose for which they are used in the enterprises; energy-conversion equipment; the enterprises use and cost of energy. The other areas considered in this chapter are the challenges facing the supply and utilisation of the various energy types, and the way forward towards the deployment of safe and modern forms of energy by the enterprise owners operating within the slums. This chapter is based on qualitative data gathered from the stand alone enterprises operating within the three slums.

CHARACTERISTICS OF THE ENTERPRISES

Using the six criteria for selecting enterprises[20] as mentioned in the methodology, a total of 88 enterprises were purposively selected for the enterprise survey as presented in Table 4.1. Due to the lack of private bathhouses in most dwellings in the three slums, inhabitants had no choice but patronised the public bathhouses at fees ranging from 20GHp and 25GHp for bathhouses providing cold and warm water, respectively. A few video centres were operated in the three slums as places of entertainment and hairdressing saloons were vibrant beauty enterprises for the slum dwellers. The petty retail shop operators offered for sale all kinds of goods including toiletries, beverages, drinks, milk, bread, confectionaries, and many more to the inhabitants of the slums. Similarly, food preparation and vending enterprises offered cooked food for sale to the slum dwellers and the cities at large. It was observed that having adequate space was a luxury in the three slums as shown in Plate 4.1 and even the space for sleeping was inadequate for the residents. Thus, access to extra space for household activities such as cooking was impossible for the majority of the slum dwellers.

[20] Ghana Statistical Service (2006) considers firms with less than 10 employees as small scale and those with more than 10 employees as medium and large sized regardless of the sector.

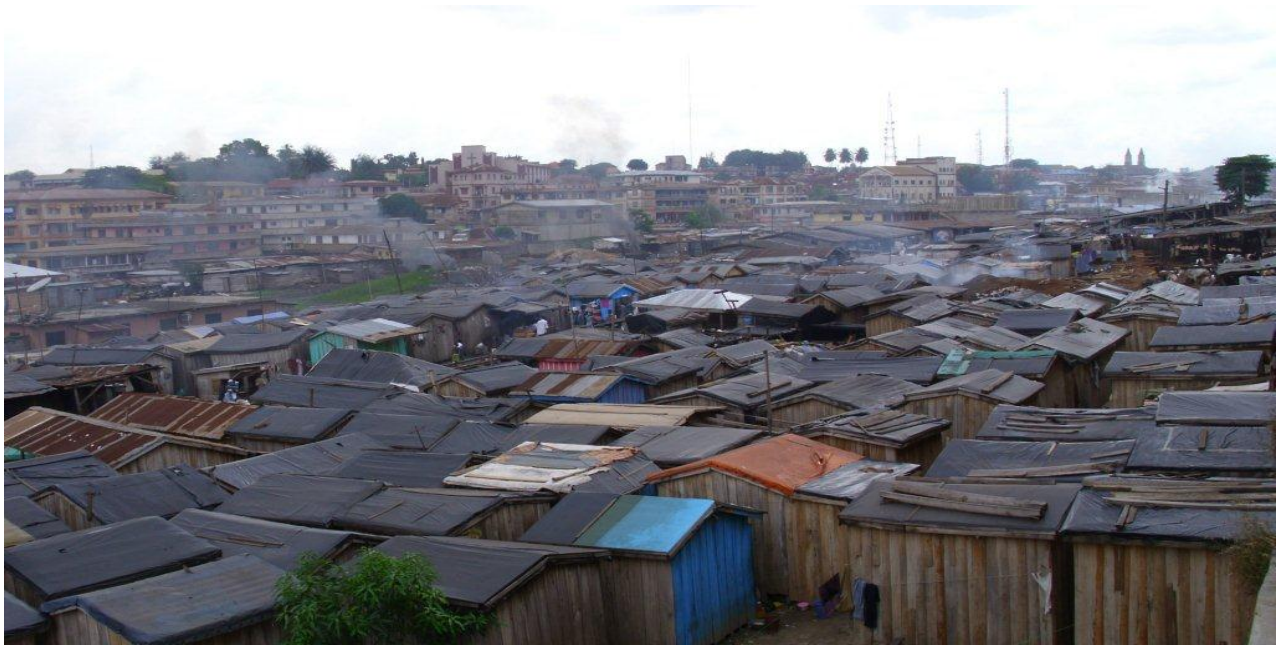

Plate 4.1 | Housing structures are very closely packed

The products offered for sale by the fish and meat mongering small scale enterprises included smoked fish and meat, the bakeries sold bread and other pastries while the groundnut paste production enterprises produced bulk quantities of groundnut paste for sale. These are all enterprises that rely on energy sources to operate. The scrap metal dealers added value to scrap metals by remoulding/reshaping some of their goods when necessary, for use by companies as raw materials.

Table 4.1 | Number of Enterprises Selected from each Slum

CATEGORY OF ENTERPRISE	SLUM						TOTAL	%
	AMUI DZOR	%	OLD FADAMA	%	AKWATIA LINE	%		
Public bathhouses	6	6.8	10	11.4	5	5.7	21	22.6
Petty retail shops	4	4.5	5	5.7	0	0.0	10	10.8
Food vending	9	10.2	8	9.1	5	5.7	22	23.7
Chop bars	4	4.5	6	6.8	2	2.3	12	12.9
Fish and meat mongering	3	3.4	0	0.0	0	0.0	3	3.2
Groundnut paste	5	5.7	0	0.0	1	1.1	6	6.5
Bakery	3	3.4	0	0.0	0	0.0	3	3.2
Hair salon	0	0.0	2	2.3	0	0.0	5	5.4
Video centre	0	0.0	5	5.7	0	0.0	6	6.5
Scrap metal dealers	0	0.0	0	0.0	5	5.7	5	5.4
Total	34	38.6	6	40.9	18	20.5	88	100.0

Source | Field Survey, 2010.

The enterprises in the study slums were owned by men and women. The study showed that 28.5% of household heads in the three slums were women and the rest, who form the majority, were men. Gender differences in employment were distinct in the slums, following the pattern of gender roles for men and women in the country. While the men were into activities such as metal scrap collection and remoulding, and service provision such as running of bathhouses, repair of watches, mobile telephones and many

more, the women were into hair dressing, cooking and sale of food, running of small shops, baking and processing of fish, meat and groundnut, as well as other forms of food processing (refer to Plates 4.2, 4.3, and 4.5). Each gender respected the role of the other and there were no conflicts between who does what in the slums. It was common to find the women working in the heart of the slums while the men had their enterprises located at the fringes of the slums due to the nature of the jobs they do. The bathhouses were however located in the heart of the slums like the enterprises of the women.

Beneficiaries of the Services of the Enterprises in the Slums

The survey identified that the services provided by the enterprises operating within the slums were significant not only for the inhabitants of the slums but also households and enterprises living elsewhere in the three cities. In fact, in depth interviews with some of the food vendors showed that a number of the street food vending activities close to the slums were produced in the slums, suggesting that slum dwellers have clientele base outside the slums. The data showed that traditional cook-stove operators (that fall within scrap metal work) produced traditional cook-stoves that were sold to general public, while food preparers and vendors cooked food for sale. The fish and meat mongers processed them for sale within and outside the slums and the groundnut processors also processed it into paste for sale within and outside the slums. Whilst the bakers produced to serve both the inhabitants living within and outside the slums, the scrap metal dealers collected and remoulded scrap metals to feed manufacturing industries in Accra and Tema. Thus, not only are the enterprises significant sources of livelihood to the slum dwellers but also important sources of commodities for the urban economy as a whole because the benefits of these enterprises have a wide scope of beneficiaries living outside the slums.

Reasons for Establishing in the Slums and Start-up Capital

Economic reasons were the major reasons for the establishment of the enterprises within the slums. The businesses in the slums, as the case is with almost all informal economic activities, is characterised by "free entry and exit"[21]. It emerged from the study that the predominant source of capital for the establishment of enterprises in the three slums was personal savings (89.8%) as presented in Figure 4.1. About 3.4% of the enterprise owners established their businesses with funds from personal savings complemented with credits from friends and relatives. The two dominant sources of start-up capital, (i) personal savings and (ii) assistance from relatives for business establishment in the three slums were not unique as they were in tandem with the main sources of capital, (household savings - 60% and assistance from relatives or friends - 20%), for the establishment of non-farm enterprises in Ghana (Ghana Statistical Service, 2008).

[21] Free entry and exit – neither does the establishment follow laid-down procedures or require huge financial outlay. The enterprise owners can decide at anytime to discontinue operations.

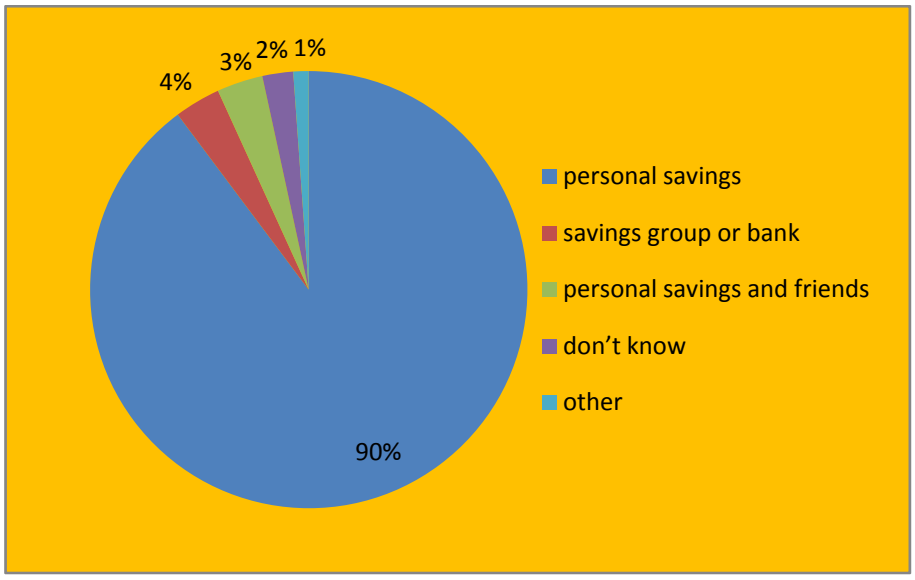

Figure 4.1 | Sources of capital for enterprise establishment

Besides the dominant use of personal savings for business establishment in the slums, the study identified that only 34.1% of the owners of enterprises had acquired training before establishing their enterprises. Owners of the small scale bakeries and hairdressing salons acquired their expertise informally through apprenticeship before the establishment of their businesses. However, only about 24% and 33% of the owners of food preparation and vending, and fish and meat mongering enterprises had acquired training from their superiors before starting their businesses. These are informal enterprises in Ghana that normally do not require any training before entry, but learning takes place on the job. The owners of all the other enterprises capitalized on the business opportunity created by demand for their services to earn their livelihoods, which is evident in the quotation below.

> *"Many households needed places to take their shower. Seeing the economic potential in this, I established the enterprise to provide their needs. Realising how lucrative the business is, other households have entered causing an influx of public bathhouses in Old Fadama."*

The establishment of the enterprises has created employment opportunities for the labour force of the three slums (Annex 5). These enterprises employed an average of three employees. However, groundnut paste production and food preparation and vending enterprises could employ as many as 16 and 20 employees, respectively. The latter are enterprises that are labour intensive.

Despite their significance in employment creation, about 70.5% of the enterprises in the three slums were unregistered, which again is not unusual of informal economic activities in Ghana. Dominant within the group of unregistered enterprises were the bathhouses, the petty retail shops, food preparation and vending enterprises, fish and meat mongering and groundnut paste production enterprises. The video centres were registered with the Copyright Society and the bakeries with the responsible Metropolitan/Municipal Assemblies. The major reasons for the low level of registration of the enterprises as given by the enterprise owners were "unnecessary" (57.7%) and the "obliviousness on the part of the enterprise owners on where and how to register" (36.5%) (see Figure 4.2).

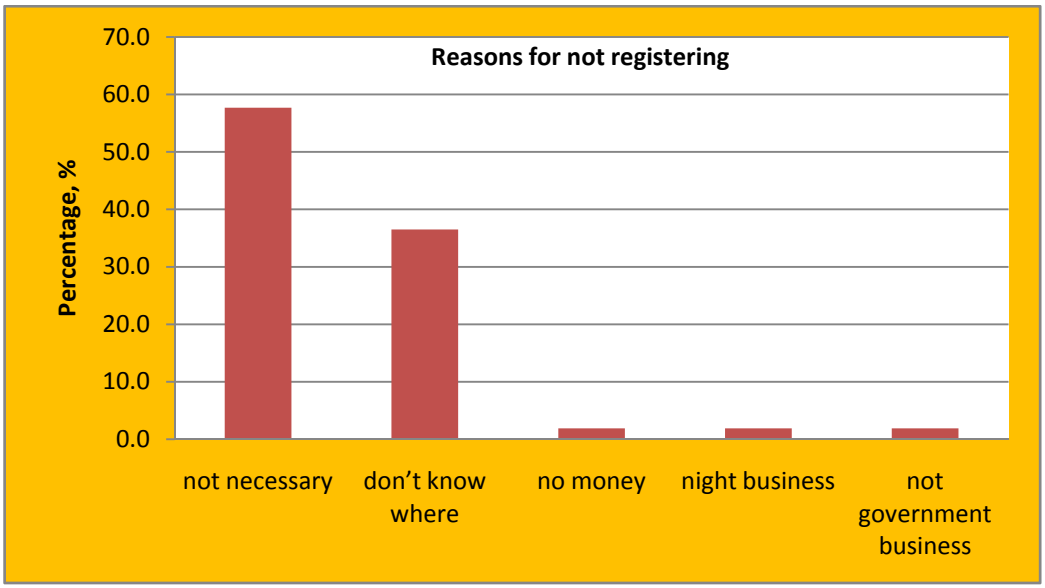

Figure 4.2 | Reasons for non-registration of enterprises

Due to the low level of registration of enterprises in the three slums, payment of taxes is low among the enterprises. The study identified that about half (55.7%) of the enterprises paid tax in the forms of tolls to the Metropolitan/Municipal Assemblies (KMA, AMA, ASHMA) and copyright fees to the Copyright Society. The payment of the tolls to the local assemblies was limited to the enterprises which were operated outside Old Fadama and Akwatia Line. For example, food preparers and vendors, and fish monger who sold their commodities (food and smoked fish) outside the two slums paid tolls to the local assemblies. Thus, the land tenure problems of Akwatia Line and Old Fadama affect the collection of tolls by the Kumasi Metropolitan and Accra Metropolitan Assemblies. However, the survey identified that some of the enterprise owners in Akwatia Line paid rents to the Ghana Railway Authority for the occupation of their lands.

The copyright tax paid to the Copyright Society is an acknowledgement of the intellectual property rights held by film producers for the films/movies used by the video centre operators. The payment of the copyright tax was justified by an enterprise owner who argued that;

> *"payment of the tax legalises our operations. Non-payment of the tax saves us the GH¢6,000 fine I would pay if convicted by a court for using pirated films."*

The study observed that enterprises which paid taxes were skewed in favour of Amui Dzor because of the security and legality of tenure of land.

Enterprise Energy Supply and Utilisation

The study identified that the enterprise owners in the slums used a wide range of energy forms for several purposes including lighting, freezing, cooking, baking and heating as presented in Appendices 5 and 6.

Energy Types and Services Provided

The study identified that all the provision shops used electricity not only for lighting purpose but also for freezing to preserve their beverages and other perishable commodities. Subsequently, the petty retail shops used electricity for lighting their shops and for running their refrigerators for freezing purposes (see Appendices 5 and 6).

Food vending enterprise owners used diverse energy forms for multiple purposes. The survey observed that food preparation and vending enterprises which run their enterprises at night used electricity, kerosene and candle for lighting purposes to sell their food. The use of electricity for lighting purposes was limited to the food preparation and vending enterprises which operated in permanent structures. Kerosene and candle use was not limited to any category of food preparation and vending enterprises as the study identified that all the enterprises used them (kerosene and candle) for lighting purpose in times of power outages. Furthermore, the food preparation and vending enterprises which operated on table-tops and installs, used kerosene and candles for lighting when dusk falls. These enterprises used electricity and kerosene lamps for lighting.

The food preparation and vending enterprises used firewood and charcoal in traditional stoves and coal pots, respectively, for the preparation of food (see appendices 5 and 6). The survey identified that the food preparation and vending enterprise owners preferred to use firewood for cooking some of the local dishes (such as 'banku, tuo zaafi[22], rice, fried and boiled yams, fufu, etc.), some of which the preparation required vigorous stirring and therefore the local cook stoves are preferable for that. Further, cooking large quantities of food requires the use of large cooking pots and again the traditional cook stoves preferred for cooking large quantities of food. A further probe revealed that firewood was considered as the most efficient energy type relative to LPG and charcoal that were the other energy types that could be considered by the enterprise owners.

The response below from a food vendor who employed about 20 workers in Old Fadama is used to elucidate the perception held by enterprise owners about firewood.

> *"Firewood cooks faster than any other energy type I have come across. LPG and charcoal can serve the same purpose but at a higher cost which will increase my operational cost."*

Another food vendor also indicated that:

> *"Firewood is readily available because of our proximity to the saw mills in the community. We are assured of a constant supply at affordable cost."*

The survey also identified that food preparation and vending enterprises which provided service to not more than 100 customers in a day used charcoal for the preparation of soups and stews. The reason given was that:

> *"Smoke from the firewood soils the taste of the soups and stews. The bad taste of the food triggers complaints from customers. Hence, I use charcoal to prepare my stews."*

[22] Banku and tuo zaafi are local maize meal dishes prepared by people from the Volta and northern regions, respectively but the preparation differs from each region.

Electricity and firewood were the major energy types used by the groundnut paste production enterprises for running their businesses. The study observed that electricity was used for lighting purposes at all times by the groundnut paste enterprises at Akwatia Line but was used only when dusk fell at Amui Dzor. The study further observed that the groundnut paste enterprises in Amui Dzor, were operated as home-based enterprises and thus used the same electricity for both domestic and business purposes. The groundnut paste production enterprise in Akwatia Line, which by the National Board for Small Scale Industries' employment criterion could be described as medium-scale enterprise because it employed about 16 workers, used electricity for lighting purpose throughout the day. The need for cleaner energy options in the enterprise was explained by the dark environment caused by the smoke accumulation as shown in Plate 3.2.

Plate 4.2 | Smoke from firewood engulfs the working area

Firewood was used to process groundnut to desirable forms. The groundnut paste enterprise owners depended on firewood to boil water to soak the groundnuts and to set fire for roasting them. The enterprise owners in Akwatia Line used LPG to roast groundnut in the dry seasons when the nuts had little moisture content. The main energy conversion equipment identified in the enterprises was the traditional stoves and groundnut roasters. The traditional stoves were used to boil water whilst the roasters converted firewood and LPG to heat energy to roast the groundnuts (see Plate 4.3).

Plate 4.3 |Processing of groundnut using local roasters

Public bathroom operators used firewood, believed by them to be most efficient, to heat water to serve customers who requested for warm water to shower. Firewood was used to heat water using metallic barrels and traditional cook stoves (see Plate 3.4).

Plate 4.4 | Firewood is used to heat water for use in commercial bath houses

The public bathroom enterprise owners used electricity to light up their premises in the evenings (see Appendices 5 and 6). Water heating was done at all times (wet and dry seasons) at Akwatia Line and Old Fadama but was done only in December and early parts of January each year when the temperatures could drop below normal temperature levels (between 15 and 18 degrees Celsius) in Amui Dzor. The

water-logged environment occupied by the inhabitants of Akwatia Line and Old Fadama partly accounted for the inhabitants' desire for warm water because these places are cooler.

The fish and meat mongers used firewood to smoke fish and meat, using a special type of stove manufactured by local artisans from metallic drums as depicted in Plate 4.5 Fish and meat smoking was done in the open and in the day time. Thus, the enterprise owners did not require any form of lighting to operate their enterprises.

Plate 4.5 | Smoking of fish and meat are done in the open

An example of the firewood conversion equipment used by the fish and meat mongers is shown in plate 4.6 and 4.7.

Plate 4.6 | Firewood Stove for Fish Smoking

Plate 4.7 | A home-based enterprise

The survey observed that bakers used LPG as the main energy type in their enterprises with LPG ovens as the energy conversion equipment. In the case of the scrap metal dealers, petrol and kerosene were identified as the major energy types used for their operations. These two energy types are used to set insulators ablaze in order to expose their metallic contents which they are interested in. It emerged that the scrap metal dealers also used LPG to cut bulky scrap metals into portable sizes for onward sale to manufacturing companies.

The hairdressing enterprises depended on electricity to operate. The energy conversion equipment seen in hairdressing enterprises were hair dryers and electric bulbs for the conversion of electricity to lighting and heat energy, respectively. The heat energy converted by the hair dryers were used to dry the hairs of customers who were mainly women and children living within the slums.

The survey identified that the main energy forms used by the video centre operators were electricity and petrol, as the primary and secondary energy forms used. Electricity was used to run televisions sets, VCD, DVD and satellite dishes (DSTV dishes). Petrol is used during power outages to run generators which are always on the standby.

The data showed that 97.6% of enterprise owners intended to replace the energy conversion equipment currently in use when they are obsolete. The remaining 2.4% indicated their intension to replace the energy-conversion equipment with slightly-used ones.

Problems/Challenges Associated with Supply and Use of Current Energy

The study identified that enterprise owners and household heads regarded the supply of kerosene, firewood, charcoal and LPG as regular. General shortages in Ghana, at certain times, affect their operations. It emerged that the supply of LPG to the bakery and groundnut enterprises at Amui Dzor and Old Fadama, was irregular. Similarly, the supply of electricity was irregular. Electric power supply was characterised by interruptions and low currents. During the key informant interviews, community leaders disclosed that:

"A day has never passed without power outage. As for low current, it is a ritual in Akwatia Line."

Recounting her frustration, a hairdresser operating in Akwatia Line also had this to say:

> *"During days of low current, my customers patronise the services of other hairdressers who may have normal power supply or generators."*

The study identified that low currents and power outages were pervasive in Old Fadama and Akwatia Line due to illegal electricity connections. ECG, thus, does not know the quantity of electricity required by the inhabitants and that the supply is inadequate to provide for the needs of the households and enterprise owners in the three slums. Enterprises such as hair salons, petty retail stores and video centres were the major businesses that were affected by inadequate power supply thereby leading to irregular power supply.

The households and enterprises which used firewood perceived its usage as harmful due to the emission of smoke. The worse affected enterprises were food preparation and vending, public bathhouses and fish and meat mongering enterprises. Many of the enterprises indicated that the problem is worsened with the onset of rain as it becomes not only difficult to start but also produce very thick smoke. Smoke and excessive heat from the combustion of the fuels used in the enterprises were also major worry to many owners of enterprises, particularly the public bathhouses, food preparation and vending and the groundnut paste enterprises which used firewood.

Preferred Energy Types and Reasons for Preference

Recounting the frustrations the enterprise owners go through for the supply and use of the various energy forms, the study observed that most of the enterprises preferred alternative sources of energy.

Linked to its intermittency, video centre operators, provision store owners and hair salons owners expressed their desire for improvement in the supply of electricity. To them, there are no other alternatives that are better than electricity. They argued that the use of kerosene and diesel-powered generators are far more expensive than electricity. The enterprise owners who had no electric meters would want ECG to relax their conditions to enable them acquire their own electric meters.

The owners of the food preparation and vending enterprises and public bathhouses expressed their desire for alternatives that could supply uninterrupted power and are affordable. Due to the hazardous smoke emission and excessive heat associated with firewood use, the food preparation and vending enterprises as well as public bathroom operators wished for alternative sources of energy that produce no or less smoke and are affordable. Asked to describe the type of energy they want, a food vendor in Akwatia Line said:

> *"I cannot continue to use firewood due to the hazardous smoke and heat. I need an alternative because I think I cannot continue to be in business in the next few years due to health problems which I am likely to suffer from the exposure to smoke and heat."*

Another bathroom operator in Amui Dzor indicated that:

> *"I have decided not to heat water again because I will have no other option than to use firewood. A friend who was hospitalised recently has been advised by the medical doctor to stay away from fire because if she did, she would die. Apparently, she has contracted a disease from her constant exposure to smoke and heat."*

Owners of the bakeries preferred to use LPG to any other fuel but wished for a constant supply. Some food preparation and vending enterprises expressed their desire to use LPG because they believed it would cook faster and would be easy to use, but the supply is not regular.

Factors Affecting the Deployment of Modern Energy Forms

Majority of the enterprises indicated their willing to use modern forms of energy for their various business needs. Their willingness to accept and use these modern forms of energy was, however, tied to some conditions that had to be met. These are issues related to how economical and cheap these modern forms of energy would be, the regularity of the supply and whether they were likely to reduce the health hazards associated with the current energy types. Affordability is therefore critical for the adoption

Prospects for the Adoption of Modern Energy Forms

Of all the enterprise owners interviewed in the three slums, an average of 65.9% saved part of their revenue as shown in Table 4.2. The case of Old Fadama was highest with 75.0% of enterprise owners saving, whereas Amui Dzor and Akwatia Line recorded 61.8% and 61.1%, respectively of enterprise owners who saved.

Table 4.2 | Savings Attitudes of Enterprise Owners

Slum	Savings			
	Save	%	Don't Save	%
Akwatia Line	11	61.1	7	38.9
Old Fadama	27	75.0	9	25.0
Amui Dzor	21	61.8	13	38.2
Average	-	65.9	-	34.1

Source | Field Survey, 2010.

Enterprise owners in the three slums gave varying reasons for saving a certain percentage of their income, dominant amongst which were the fact that they wanted to accumulate wealth (32.1%) and to secure the future of their businesses (42.8%). Enterprise owners saved an average amount of GH¢134 per month in the case of Akwatia Line, GH¢ 278 and GH¢ 199 per month in the cases of Old Fadama and Amui Dzor, respectively.

The tendency of operating with support from financial and non financial institutions was assessed as enterprise owners were made to indicate if they had received or were receiving such types of supports. The major reason for not going in or requesting for financial support from financial and non-financial institutions was the fact that 41.7% of the enterprise owners in Akwatia Line did not have immediate needs for loans, while 60.0% of owners of enterprises in Old Fadama and 31.3% of Amui Dzor indicated same. Further, 25.0% of enterprise owners said they were unable to access loans (25.0%) for one reason or the other.

In discussing solutions to challenges faced by the enterprises, 44.5% of enterprise owners in Akwatia Line were comfortable with the work they were doing and would prefer to be supported with capital to enable them expand their enterprises. Similarly, 57.5% of owners of enterprises in Old Fadama and 22.5% of enterprises owners in Amui Dzor said the same.

5 | SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

Following from the analysis and discussions of the survey data in chapters three and four, this chapter summarises the major findings from the study. Based on the identified challenges affecting the supply and utilisation of various energy forms for the support of the slum dwellers' productive activities, the chapter recommends for the deployment of safer and modern forms of energy for the support of productive activities in the slums. The major findings of the study have been grouped under the objectives the scoping study sought to achieve.

SUMMARY OF FINDINGS

The overall objective of the scoping study was to obtain an insight into the potentials and challenges of slums in Ghana regarding access to modern energy services and income generation from productive activities. The findings of the study are summarised under the specific objectives of the study.

The Characteristics of Slum Dwellers

The study identified that the slum dwellers were mostly migrants. About 65% of them migrated to the cities from the Northern Region of Ghana. The major reason underpinning their migration was economic. Consequently, about 70% of the population of the slums were within the economically active age-group (15 – 64 years) with a relatively low age-dependency rate of 47%, made up of mainly family members and siblings. The low age-dependency rate relative to the national age-dependency rate of 87% suggests less economic burden on the economically active age group among slum dwellers in the three slums. Further, the low economic burden is substantiated by the fact that only 42% of the migrants remitted, a finding which supported Tutu's claim that transfers from internal migrants are generally low (Tutu 1995 cited in Wouterse, 2010).

The findings of the study show that the average household size of the three slums was 3 members and was observed to be lower than the national average household size of 5.1 members. The slum dwellers preferred to have their children/wards living with their grandparents in their places of origin, a phenomenon caused by the insecurity of abode/tenure, which was identified as the result of constant threat of eviction received from local government authorities.

According to the findings of the study, educational levels of household heads in the slums were generally low. Compared to the national average of 48.1%, the survey identified that the proportion of household heads in the slums that did not complete basic education was higher (53.1%). Additionally, whilst 25% of the heads of household had completed basic education (JSS/JHS), only 15% of them had completed secondary education. While about 5% of the heads of household had completed technical/vocational education, only about 1.7% of them had acquired tertiary education.

Main Livelihood and Income Generation Activities of Slum Dwellers

Due to the low educational levels[23] of the inhabitants of the slums, the majority of them were employed in the informal sector as unskilled labourers, which was opened to free-entry and exit. The small scale enterprises and service sectors were the major contributors to employment, engaging respectively 52% and 46% of the slum dwellers.

The small scale enterprises were dominated by scrap metal collection and processing in the three slums. The scrap metal dealers provided the raw material needed in metal industries located in Tema and Accra, the industrial hub of Ghana. The scrap metal dealers employed about 48% of the labour force in Akwatia Line.

Dominant within the service sector were the public bathhouses, food preparation and vending, head portage and petty retail shops. The agricultural sector in the slums was made up of mainly vegetable gardening at Old Fadama and backyard livestock rearing at Akwatia Line.

Productive Uses of Energy in the Slums

The survey identified that various forms of energy were used for several purposes at both domestic and enterprise levels. It emerged that electricity was the major modern energy type for lighting at both the domestic and enterprise levels. About 88.2% of the slum households used electricity for lighting purposes at the household level, which is higher than the national urban average of 79% and the Ministry of Energy's target of 80% by 2015 (Government of Ghana, 2010). Electricity was also used for lighting purposes by the enterprises. These are the public bathhouses, petty retail shops, food preparation and vending enterprises, groundnut paste production enterprises, bakeries, hair salons and video centres. Most of the above enterprises used electricity as a source of power for purposes including freezing, hair drying, grinding, milling and lighting.

Biomass was the major energy form used for cooking at the household and enterprise levels. The use of biomass accounted for 84.5% of the total household energy fuel mix and was observed to be higher than the national average of 63%. Charcoal accounted for about 74%, firewood, about 12% and saw dust, 0.5% of household cooking fuel mix in the three slums. Similarly, enterprises such as the public bathhouses and food preparation and vending enterprises depended largely on firewood. Only one groundnut paste production enterprise at Akwatia Line used LPG, the modern energy form. The groundnut processors said they prefer using the LPG during the dry season when groundnut is very dry and therefore little energy is needed to roast it as compared to the rainy season or soon after harvest when the groundnut is not dried enough .More energy is needed to roast the groundnuts when it is not dried enough and in this case the processors prefer to use firewood. All the 3 bakeries that were covered in the survey and were found at Amui Dzor, used LPG for baking. Kerosene, petrol and LPG were identified as the energy forms used by scrap metal dealers for extracting metals from insulators, and for cutting and welding metals to preferred sizes.

The Slum Dwellers' Relationship with Utility Service Providers

The study revealed that building regulations of the country constrains access to electricity in the slums. The majority of households in the slum did not have building permits. This is a prerequisite for households

[23] Literacy level for Northern Region of Ghana is 44% for men and 26% for women.

to apply for electricity services as indicated in chapter 2. Consequently, though about 88% of the slum dwellers used electricity for various purposes, the electricity connections were not through the appropriate channel and therefore considered as illegal source of supply. ECG is concerned about the illegal connections throughout the country as it constitutes a great loss to the company. Households and enterprise owners tapped their electricity supply from individuals who were able to acquire electricity connection from ECG. Hence, only about 36% of the inhabitants of Old Fadama and 10.2% of Akwatia Line had electric meters, evidence that the connection was done by ECG. As a result of the illegal source of electricity, electricity bills that households and enterprise owners paid were not determined by the quantity of electricity consumed, but by the discretion of electric meter owners. Consequently, an average of about 42% of the households in the three slums paid fixed rates of electricity consumed.

The proportion of electricity bill as a percentage of total household expenditure was not more than 7.3%, which is about 30% lower than the national average expenditure of 9.5%. The difficulty of having access to electric meters through ECG and the continued use of electricity illegally caused ECG to lose annually estimated amounts of GH¢872,214 at Old Fadama, GH¢3,648 at Amui Dzor and GH¢12,996 at Akwatia Line. Putting all these together, ECG looses from these households studied an amount of GH¢888,858[24] annually. This presupposes that a complete census in these three slums would have shown a huge lose of money to ECG annually due to illegal connections. Evidence from the kick-off meeting however shows that the slum dwellers are willing to pay the legal fees, which is 9.5 pesewa per kilowatt hour of electricity consumed by a poor[25] household.

The study observed a mutual relationship between the slum dwellers and the Ghana Water Company Limited (GWCL) as the latter has extended its transmission line into the community. The public bathhouses had direct connection from the GWCL and paid fees ranging from GH¢150 – 200 per month. The public bathhouse enterprise owners in turn supplied the inhabitants with their water needs through vending.

Energy-Conversion Equipment Used at Household and Enterprise Levels

The survey findings show that households used a wide range of electrical appliances for several purposes, besides the electric bulbs they used for lighting. Electrical appliances such as television sets, radio sets, sound system, DVD, sewing machines, rice cookers, irons, fans, refrigerators, immersion heaters and electric stoves were some of the electrical appliances that households used. A further probe revealed that the use of high energy consuming equipment in the three slums was the result of the payment of low monthly electricity bills and therefore the real cost of energy consumed is unknown to the slum dwellers.

Traditional cook stoves were the predominant energy conversion equipment used for the conversion of firewood into heat energy by the owners of public bathhouses and food preparation and vending enterprises. The enterprises were using energy equipment such as LPG ovens, hair dryers, TV sets and local barrel ovens in the running of their businesses.

Challenges with the Supply and Utilisation of Energy for Productive Activities

The study identified that electricity supply in the three slums is characterised by frequent interruptions. Power outage emerged as the major problem affecting the productive use of electricity in the slums,

[24] As at the time of data collection the Cedi – US dollar exchange rate was GH¢1.42 to US$ 1.
[25] These poor are defined as those who consume not more than 50 kilowatt hour of energy per month.

followed by 'low current'. The consequence of the frequent power interruptions is evident in the frequent breakdown of electrical appliances and its associated cost implications for the households and enterprises. This problem is however not unique to only the slum dwellers. They are common national problems.

Petrol and LPG were bought from fuel filling stations. Kerosene was, however, bought from retailers who run their firms as home-based enterprises. Users of these energy forms (LPG, petrol and kerosene) complained of difficult access to them due to general shortage that hits the country occasionally. Another major limitation is the continuous increases in these energy types, resulting in increasing cost of operations. Thus, the households and enterprise owners considered LPG, petrol and kerosene as expensive.

The study identified that biomass (firewood, charcoal and sawdust) was always available in the slums and hence more convenient for the slum dwellers and easily accessible. However, whilst charcoal use was considered time wasting, firewood was said to be harmful to the eyes due to the emission of smoke. The study was however unable to determine the extent of harm caused by the smoke from firewood.

Potential for Energy Substitution and Efficiency Improvements

Linked to the identified problems with the supply and utilisation of the various forms of energy, 22.3% of households in the three slums would prefer to use LPG while 21% would prefer to use electricity as cooking fuel at the domestic level. The households and enterprise owners expressed their desire for alternative energy forms that will maximise their utility relative to the current sources. The study identified that affordability and durability of the alternatives are key for effective deployment.

The average household monthly income for the slum dwellers was GH¢459.2 (US$323.38). The daily minimum wage in Ghana is GH¢3.8 (US$2.67). The salary of a worker who lives on the minimum wage is GH¢95 (US$66.9) per month (for working for 25 days a month), which is about a quarter of the average monthly income the slum dwellers earn. This suggests that the slum dwellers are earning relatively better incomes than wage workers in the country. An analysis of the inhabitants' income and expenditure levels revealed that households are capable of saving. Whilst household monthly incomes averaged GH¢459.2 (US$323.38), their monthly expenditure averaged GH¢243.6 (US$171.54), suggesting that they would be able to save if they so desire.

Using ability to adopt safer and modern energy forms as a criterion in assessing the effective deployment of safer and modern energy forms, the study concluded that the high propensity to save is an opportunity for their deployment. The average incomes observed to be above the poverty lines implied that the enterprise owners would be able to afford their basic life sustaining needs including energy.

Facilities that Exist for Savings and Credit for Community Development

With a high propensity to save, the study identified that the inhabitants patronised the services of diverse financial institutions. Most enterprise owners saved their moneys with the mainstream banking financial institutions such as the Ghana Commercial Bank and Agricultural Development Bank. The fact that some of the slum dwellers could save with formal banking institutions which normally the poor would shy away from suggests that the slum dwellers are earning incomes that make it possible for them to save with the above formal financial institutions. About 18.2% of the inhabitants patronised the services of non-banking

financial institutions dominant among which were the savings and loans groups such as the First National Savings and Loans (9.6%), "susu" (3.2%) and [26]Adashi (2.4%). People's Dialogue Ghana, the main local NGO that has been working with the slum dwellers, have also organised them into savings groups which is managed by the members. Amui Dzor has 2 such savings groups, made up of 800 members, Old Fadama has 8, made up of over 1000 members and Akwatia Line has 4 but those at Akwatia Line are not very active. The membership of these savings groups are in the poorest quintile of the income ladder.

As long as slum dwellers continue to earn decent income from the economic activities they are engaged in in the slums, evictions would continue to be difficult to carry out successfully because the people will always come back as was observed in Akwatia Line so long as they can earn a decent income from what they do there.

Organisation of Societies, Leadership and Power Structures Prevailing in Slums

Diffusing the widely held perception that the slums are ungovernable and are thus the havens for criminals, the study identified that each of the ethnic groups found in the three slums had a leader who is conventionally responsible for peace and security. It is also the responsibility of the leaders of the ethnic groups to coordinate the efforts of their members to flush out criminals from the slums. Members of the ethnic groups uphold the non-written principles that they are expected to abide by as long as they live in the slums.

Lack of Education and Awareness Among Slum Dwellers

The findings show that about 53% of household heads interviewed had primary or no education. Of the 53%, 36% had no formal education. A number of the enterprise owners said they prefer to use firewood to charcoal because it burns faster. The above is indicative of the fact that lack of education and limited awareness surrounding the health and financial benefits associated with cleaner, efficient and legal energy access pose an obstacle to demanding efficient and legal energy forms for the three slum communities. Lack of awareness can perpetuate resistance to behaviour change as was found in the case of India (TERI, 2010), such as shifting energy consumption patterns to cleaner, less polluting energy resources. It can also hinder the process of changing habits and behaviours towards selecting or investing in energy efficient appliances or making the decision to finance clean energy costs, particularly when the slum dwellers are financially capable of making such a shift. Shifting to modern energy forms including the use of improved cook stoves can only be a reality when the awareness is created about the benefits of using the modern and efficient energy forms through awareness creation programmes.

RECOMMENDATIONS

Increasing Access to Legal and Reliable Supply of Electricity for Productive Uses

Although access to electricity is high in the slums (88.2%), about 43.6% of households are illegally connected to the national electricity grid with the result being an estimated annual loss of GH¢888,858 to ECG. The objective of any intervention should be to increase access to legal electricity connection in the slums. The ECG, the local government bodies and CSOs (e.g., PDG, etc) should open dialogue with the

[26] This is when a group of people decide to contribute money that is kept safe by one of the contributors and at the end of an agreed period, one of the contributors takes the accumulated contribution. The cycle ends when every member of the group has been served and a new decision is taken by members whether or not to continue. Most often, the cycle continues.

leadership of the slums to explore means of collaborating as is being done by other service providers such as the Ghana Water Company, to create a win-win situation which will see the dwellers of slums getting electricity through the official (or semi-official) channel. Such a consultatively agreed mechanism will help reduce the revenue losses to ECG. Also, energy conversion equipment with the capacity of storing energy such as rechargeable lamps and solar lamps should be promoted for use in households so as to reduce risks associated with unhealthy illegal connections.

Increasing Access to Modern Liquid and Gaseous Fuels in the Slums

The survey identified that about 9.5% and 2.3% of the households in the slums used kerosene and candle, respectively, as their main forms of energy for indoor lighting. The proportion of households in the slums that used LPG was 4.6%. The use of the kerosene and candle for indoor lighting had health implications[27] for households. Furthermore, with the increasing prices of oil and related fuels, there is the need to identify other alternative energy forms. As such, biogas from human excreta in the KVIPs and other wastes that are abundant in the slums can be tapped and converted for use in homes and enterprises. A comprehensive project viability analysis should be conducted by organisations such as the Energy Commission, The Energy Center, AMA, ASHMA, KMA and other stakeholders like the private companies and NGOs to develop the biogas potentials (e.g., saw dusts and other domestic and commercial waste) of the slums. A similar initiative has been undertaken in some states in India (Patna, Bihar and New Delhi) by the Sulabh International Social Service Organisation. Here, public toilets were linked with biogas plants and effluent treatment systems for the total recycling and reuse of human wastes. This led to the people having access to clean fuel, with manure as a by product being used to improve land fertility (TERI, 2010). This biofuel project implemented in slum communities similar to those studied in Ghana resulted in overcoming barriers of illegality and demand to provide electrical connections in two slum communities. In addition to the biofuel project, there were campaigns to empower the slum dwellers in their negotiations with the government and utility as well as by educating the people on the benefits of legal electrical connections. These could also be done in the slum communities in Ghana that have demonstrated the existence of organised groups that can take up this responsibility and the fact that there are presently existing NGOs working with them.

Improving End-Use Efficiency of Biomass and Electricity Use in the Slums

The efficiency of coal pots and traditional three-stoned cook stoves, being the major energy conversion equipment used by the households and enterprise owners, ranged from 18-21%. These cook stoves must undergo technological transformation to firstly maximise the use of energy from burning fuels and secondly, to reduce the risks they pose to users and the environment. They must also be cost effective if the slum dwellers and the general public are to patronise them. Consequently, institutions such as the Ministry of Energy, The Energy Center and the Energy Commission of Ghana must be engaged to develop more efficient energy conversion equipment which increase productivity whilst minimising fuel consumption.

On efficient cook stoves promotion, the owners of the artisanal informal activities in the slums could be identified and trained to manufacture improved cook stoves once the scientific institutions are able to design appropriate technology for that. The National Board for Small Scale Industries (NBSSI) which has the mandate to perform such functions in the country, could liaise with the NGOs working with the slum dwellers (e.g., PDG) to work closely with the artisans to improve their skills in improved cook stove

[27] These include risks related to the health of the slum dwellers and fire outbreaks.

production. Others that can assist in the promotion of the improved cook stoves are Gender and Energy Network (GEN) and the Ghana Regional Appropriate Technology Service (GRATIS). The potential in the slums is that they have abundant supply of scrap metals which could serve as a sustainable source of raw materials. This could be a major source of decent employment since the cook stoves would serve the needs of not only the slum dwellers but also the general urban population.

The slum dwellers should also be introduced to the use of Compact Fluorescent Lights (CFL) to ensure the efficient use of electricity for lighting purposes

Improving the Physical Environment of the Slums

Due to the significant role played by the slum dwellers in the urban economy and by their strategic location at the heart of the cities, the local governments are required to recognise them as a subset of the urban economy and upgrade the settlements. There must therefore be collaboration among all stakeholders concerned with the development of cities[28] (such as the Ministry of Local Government and Rural Development, Ministry of Works and Housing, the Town and Country Planning, ECG, Ghana Water Company, NGOs, etc.) to recognise the need to upgrade the slums into decent environments. These stakeholders should collaborate to help improve the conditions of the people living in slums because each has a role to play to make this work. The process should begin with the Town and Country Planning Department designing a comprehensive layout to guide the slum upgrading process. Lessons could be learnt from ASHMA that is currently benefitting from the Slum Upgrading Facility through the NGOs for the upgrading of slums in Ashaiman. With lessons from the housing units built by the Federation of the Urban Poor in Amui Dzor, the Federation could be assisted to build decent housing units for members.

Development of the Enterprises in the Slums

The study has shown that slum dwellers are like any active economic individuals in the country and therefore exceptions should not be made to marginalise them in any economic development. Many of the small scale enterprises found in the slums sustain the residents and any effort to improve their enterprises should include providing them with improved and affordable energy efficient technologies because the study has shown that the slum dwellers rely on energy to run most of the vibrant enterprises found in the slums. Increasing their profit margins through access to improved energy equipment will indirectly compel the slum dwellers to move out of the slums. The proposed interventions would require the collaboration of many actors to assist with policy and finance, among others. The agencies required to be involved in developing the enterprises in the slums include the Ministry of Trade and Industry, Association of Ghana Industries, NBSSI and NGOs.

The slum dwellers control and manage small scale enterprises, which the study has proved their profitability. These enterprises could be supported with credit facilities to enable them to move to other locations. Cost of doing business in the slum is low and therefore attractive to the slum dwellers. This must be a lesson for policy makers when providing funds to support small scale enterprises.

[28] It was noted at the kick off meeting held to commence the study that key stakeholders concerned with the development of cities do not discuss the development of slums in their meetings. They also do not discuss productive use of energy in poor urban settlements.

CONCLUSION

This study demonstrates the nexus between slum dwellers and energy for productive uses. The study has shown that the slum dwellers are economic beings that have migrated to the cities to earn a living and to be integrated into the urban economic system. Consequently, the slum dwellers play significant roles in the urban economy as a system. Their roles range from the supply of the food needs of the growing urban population, provision of scrap metals for industrialisation, and the supply of labour for the development of the urban system. The slum dwellers are identified with economic activities such as artisanal scrap metal work, groundnut paste production, fish and meat mongering and food preparation and vending whose output end up in the urban economy for use not only by the slum dwellers but also residents in the endowed areas of the urban setting.

Despite the significance of their roles, they have been linked to all manner of vices which are often underscored in discourses regarding the slum dwellers. They are thus considered as nuisance with the first strategy to address the perceived problem lying in their eviction. All these have culminated into the disregard for and non-recognition of the slum dweller first as a citizen of Ghana with a right to decent abode according to the constitution of the country, and then as an important stakeholder in the urban economic systems. The non-recognition of the slum dwellers has also culminated in their low access to basic life-sustaining commodities which include but not limited to energy to support their productive activities. Subsequently, though access to electricity is higher than the national average, illegal electricity connection is rampant. The results have been economic losses to ECG through the illegal electricity connections.

The findings of the study have also shown that slum dwellers are not a group of people targeted to benefit from certain interventions such as improved cook stoves introduced to enhance productive activities at both the domestic and enterprise levels due to their location. The perception that the slum dwellers are poor has also been found to be relative. However their exclusion from energy and other interventions can partly be blamed on the assumption that they are poor. The survey results have, however, diffused this widely held and long-aged perception. It is a right therefore that slum dwellers are treated as important components of the urban population with a role to play in the urban environment. The slum dweller therefore must be recognised and accorded the same opportunities as all other inhabitants of the urban area. The recognition must begin with the need for comprehensive planning schemes to improve their layouts to support the use of modern and efficient energy forms. What slum dwellers require is awareness/sensitisation about the need to use modern and energy efficient technologies in their productive activities. Lessons from India show that through sensitisation, the illegality associated with electricity connection could also become a thing of the past because when the slum dwellers appreciate the importance of getting connected to a less cheaper source of energy and the cost illegal connections mean to the service providers, it becomes relatively easy to get them to adopt new forms of energy services.

Last but not least, a lot of learning and sharing has taken place through this scoping study. The Energy and Resources Institute (TERI) in India which was contracted to produce knowledge products shared some of its findings with the research team of The Energy Center and the team members from different backgrounds learnt from each other. People's Dialogue Ghana was involved in data collection and the training that preceded that. A number of the slum dwellers were also trained for data collection and some of them were later engaged to collect data. The initial kick-off meeting among stakeholders was an eye-opener for many of the key stakeholders in the cities. This meeting brought together stakeholders such as the ECG and the slum dwellers for the first time for sharing and learning. In conclusion therefore, the

scoping study has gone a long way to serve as an opportunity for learning and sharing among various stakeholders from different backgrounds.

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ANNEX 1 | EXPLANATIONS OF ESTIMATIONS

AGE DEPENDENCY RATE FOR THE SLUMS

Sometimes referred to as "demographic dependency ratio" or "total dependency ratio", the Age Dependency Ratio refers to the number of children aged 0 to 14 years plus the number of persons aged 65 years and above that economically depend on persons aged 15 to 64 years.

Age Dependency ratio is expressed as:

Age-Dependency Ratio =100 x (Population (0-14) + Population (65+)) / Population (15-64)
ADR = 100 X (29.7 + 0.4)/ 69.9
ADR = 100 X (20.1)/ 69.9
ADR = 43.1%

HOUSEHOLDS' CAPABILITY TO SAVE BY COMMUNITY

Households' savings capability is mathematically expressed as:

AY - AX

Where:

AY= Average Income per capita
AX= Average Expenditure per capita

COMMUNITY	MONTHLY INCOME PER CAPITA	MONTHLY EXPENDITURE PER CAPITA	EXCESS INCOME
Old Fadama	5.2	2.5	2.7
Amui Dzor	5.3	2.7	2.6
Akwatia Line	5.4	3.4	2.0

ESTIMATED LOSS TO ECG DUE TO ILLEGAL CONNECTION

Assumption | Electricity consumption levels did not exceed 50KWh per month (lifeline tariff band in Ghana) per each household.

Estimated Losses to ECG due to Illegal Connection

SLUM	NUMBER OF HOUSEHOLDS SAMPLED	PROPORTION OF HOUSEHOLDS WITH ACCESS TO ELECTRICITY %	NUMBER OF HOUSEHOLD WITH ACCESS TO ELECTRICITY	PROPORTION OF HOUSEHOLDS CONNECTED ILLEGALLY %	NUMBER OF HOUSEHOLDS CONNECTED ILLEGALLY	ESTIMATED MONTHLY TARIFFS LOST TO ECG (GH¢)	ESTIMATED ANNUAL TARIFFS (GH¢)
	A	B	C= (B*A)/100	D	E= (D*C)/100	F = (E*GH¢4.75)	G = F*12
Old Fadama	450	95.1	430	63.7	274	1301.5	15618
Amui Dzor	450	90.0	405	7.9	32	152	1824
Akwatia Line	160	79.4	127	89.8	114	541.5	6498

Fifty percent of the total number of households in Akwatia Line and Amui Dzor was sampled for the study. Thus, the total number of households in Akwatia Line was about 320 and Amui Dzor, about 900. The total number of households in Old Fadama however was 25,260.

In generalising the survey's findings to represent the whole community, the losses to ECG were computed below:

Slum	Number of Households	Proportion of households with access to electricity %	Number of household with access to electricity	Proportion of households connected illegally %	Number of households connected illegally	Estimated monthly tariffs (GH¢)	Estimated annual tariffs (GH¢)
	A	B	C= (B*A)/100	D	E= (D*C)/100	F = (E*GH¢4.75)	G = F*12
Old Fadama	25260	95.1	24,022	63.7	15,302	72,684.5	872,214
Amui Dzor	900	90.0	810	7.9	64	304	3,648
Akwatia Line	320	79.4	254	89.8	228	1,083	12,996.

Applicability of the criteria to the identified enterprises

Enterprises	Applicability of the criteria						Remarks
	1	2	3	4	5	6	
Bathrooms (showers)							Bathrooms (showers) meet the eligibility criteria set by the project. Thus, they are relevant to meeting the project objectives.
Chop bars							Though not peculiar to slums, the enterprise could provide useful answers to answer the research questions.
Restaurants							Though restaurants, just like the chop bars, are not peculiar to slums, they are energy-intensive enterprise and could provide useful answers to answer the research questions.
Provision store							Their strength lies in the easiness of entry and exit besides their dependence on several energy forms.
Scrap dealing							This is an important enterprise skewed to slums. Their methods of metal extraction pose health risks not only to the actors but also residents of the slums. Improving the methods used by the actors with better energy forms may be essential to reducing poverty.
Hair salons							Hairdressing salons' strengths lie with their role in human resource development through apprenticeship training. Continuous supply of energy may facilitate their roles in national development.
Grinding mills							Continuous supply of safe energy to the grinding mills could sustain the roles they play in the community as a system. Children and women would not have to travel long distance to grind their foodstuffs.
Factories							Though energy-intensive with high employment prospects, replicating the factories would be difficult due to the high investment cost.
Forex bureaux							Cumbersome registration process. Difficult entry by poor slum dweller. Thus replicability is challenged.

ENTERPRISES	APPLICABILITY OF THE CRITERIA						REMARKS
	1	2	3	4	5	6	
Petty trading							Would not yield useful results for the study since they do not use any form of energy.
Spare part shops							Spare part shops cannot be easily replicated and thus cannot facilitate the poverty. reduction objective of the project.
Tailoring							Tailoring shops would require continuous supply of energy to be very productive. However, the poor slum dweller may opt for the manual and less energy-intensive method of production. Hence the project may not impact them significantly.
Vulcanisers							Though with high employment prospects, their replicability is a challenge due to high initial cost of investment. This explains why there are only two of such enterprises in the community.
Animal farms							Animal farms are not energy-dependent enterprise and thus fall out of the project's scope.
Veterinary							Though they use energy for several purposes (lighting and freezing) entry by the poor slum dweller is difficult.
Herbal shops							Herbal shops are energy intensive enterprises worthy of study under the project.
Clothes shops							Clothes shops do not use any energy form and thus may not yield relevant results to answer the project objectives.
Filling stations							Though the filling stations may contribute to reducing the travel times of women and children in accessing energy forms such as kerosene, LPG, petrol, its investment cost limits the poor urban slum dwellers' entry into the enterprise.
Wood selling							Wood selling within the community facilitates household and enterprises' access to woodfuel, their promotion inhibits the deployment of modern forms of energy. The wood selling enterprises are not energy-dependent.
Charcoal selling							Charcoal selling, just like wood selling, inhibits the deployment of modern energy forms. The enterprises do not use any form of energy to operate.
Shoe repairs							These enterprises are not energy-dependent. Thus they fall outside the project's contextual scope.
Mechanics							The mechanics have the routine of repairing faulty vehicles. They do not use any energy form for to operate.
Electrical and electronic shops							The presence of the electrical shops may catalyse the project's attempt at promoting access to modern forms of energy including electricity. Despite this, the enterprises are not energy-intensive and thus may yield results of little importance to the project.
Mobile phone cards shops							These enterprises do not run on any form of energy.
Mobile phone call service (mobile-to-mobile)							The mobile phone services do not run on any form of energy.
Landline							The landline services do not run on any form of energy.
Schools							The schools do not operate during the day with little attention given to the various energy forms. Hence, answers elicited from them may not very useful for the study.

Enterprises	Applicability of the criteria						Remarks
	1	2	3	4	5	6	
Mosque							The mosques are not-for-profit entities and are outside the scope of the project.
Toilet							The toilet facilities depend on energy for to run especially at night. They are worthy to be studied.

Key:

1. Replicablility of intervention and potential impact on employment;
2. Health imperatives e.g., indoor air pollution;
3. Long-term prospects of enterprise (e.g., enterprises that thrive on an ongoing construction project will have to fold-up once the construction is over);
4. Potential effect of energy intervention on women and children;
5. Extent of energy usage by different types and also by quantity; and
6. Peculiarity of enterprise to slums.
7. Energy dependent

Type of Enterprises Surveyed

Enterprise	Number of employees	Type of energy used and purpose for which they are used	Energy conversion equipment
Public bathrooms	Range from 1 to 1 employees. Average 2.	Firewood: for heating water; Electricity: for lighting; Kerosene: for starting fire	Traditional three stoned stoves stoves moulded from iron rods
Provision stores	Average 1.	Electricity: for lighting and freezing Candle/kerosene: for alternative lighting	Refrigerators Electric bulbs Kerosene lanterns
Food vending	Ranged from 1 to 3. Average 4	Charcoal: Food cooking Firewood: for cooking LPG: for cooking Kerosene/fibre: for starting fire	Coal pots Traditional stoves LPG cylinders and stoves
Chop bars	Ranged from 4 – 20 Average 5	Charcoal: Food cooking Firewood: for cooking LPG: for cooking Kerosene/fibre: for starting fire	Coal pots Traditional stoves LPG cylinders and stoves
Fish and meat mongering	Average 1	Firewood: for smoking fish and meat	Stoves manufactured from drums Khebab stands
Groundnut paste	Ranged from 1 to 3	Firewood: For heating water to soak groundnut and for roasting groundnut	Traditional stoves
Bakery	Ranged from 2 to 4	LPG: For baking	LPG cylinders and ovens
Hair salon	Ranged from 1 to 4 Average 2 but mostly apprentices.	Electricity: For lighting and drying of hairs	Electric dryers Electric bulbs
Video centre	Ranged from 1 to 2 Average 2	Electricity : Lighting and video shows Petrol: alternative energy for lighting and video show	Television sets, Decoders Generators
Scrap metal dealers	Average 1	Petrol/kerosene: for burning insulators from metals LPG: for cutting and welding scrap metals	Welders

Source | Field Survey, 2010.

Type of Energy Used by the Enterprises

Enterprise	Type of Energy							
	Electricity	Firewood	Charcoal	LPG	Kerosene	Petrol	Dry cells batteries	Candles
Public bathrooms	21 out of 21	21 out of 21	-	-	4 out of 21	--	12 out 21	5 out of 21
Provision stores	10 out of 10	-	-	-	-	-	5 out of 10	5 out of 10
Food vending	15 out of 22	22 out of 22	22 out of 22	4 out of 22	14 out of 22	-	-	8 out of 22
Chop bars	12 out of 12	12 out of 12	12 out of 12	-	10 out of 12	-	9 out of 12	6 out of 12
Fish and meat mongering	-	2 out of 3	1 out of 3	-	-	-	-	-
Groundnut paste	3 out of 6	6 out of 6	-	-	6 out of 6	-	-	-
Bakery	3 out of 3	-	-	3 0ut of 3	-	-	3 out of 3	-
Hair salon	5 out of 5	-	-	-	-	-	4 out of 5	1 out of 5
Video centre	6 out of 6	-	-	-	-	3 out of 6	6 out of 6	-
Scrap metal dealers	-	-	-	2 out of 5	5 out of 5	5 out of 5	-	-

Cost of Electricity in Slums

Terms of payment	Slum		
	Old Fadama	Amui Dzor	Akwatia Line
Credit meter	17Gp/kWh	17Gp/kWh	17Gp/kWh
Pre-paid meter	17Gp/kWh	17Gp/kWh	17Gp/kWh
Fixed rates	GH5/Month per shelter	GH5/Month per shelter	GH5/Month per shelter
Electricity Connection Fees	GH20 -30/connection	GH20 - 30/ connection	GH20/ connection

ANNEX 2 | KICK-OFF MEETING PROCEEDINGS

KICK-OFF MEETING PARTICIPANTS

11th August, 2010
SSNIT Guest House Accra

Mr. Sam Anyan-Kusi (Cities Alliance)
Mr. K. Otu Danquah (Energy Commission)
Ms. Doris Tetteh (Town and Country Planning, Accra)
Mrs. Sabina Mensah (GRATIS, Tema/Women in Energy Focal Person, Tema)
Mr. Kojo Anane, People's Dialogue Ghana (PDG)
Dr. Esther Ofei Aboagye, Director, Institute of Local Government Studies
Ms. Yvette Bossman (World Bank ESMAP)
Mr. Abu Haruna, Old Fadama Community
Mr. Hawa Dauda, Old Fadama Community
Mr. Emmanuel Zonyrah, Amui Dzor Community
Ms. Janet Adu, Amui Dzor Community
Professor Abeeku Brew-Hammond (Acting Director, The Energy Centre, College of Engineering)
Professor Fred Akuffo (College of Engineering, KNUST)
Mr. David Ato Quansah (The Energy Centre, KNUST)
Mr. Amponsah Owusu (Planning Department, KNUST)
Dr. Rudith King (Centre for Settlement Studies, KNUST)
Mr. Timothy Oman, Planning Officer, AMA - 0246223248
Dr. Agyapong, Formerly of Min of Tourism, Accra - 0244942237
Alhaji Yahaya, Min of Water, Works and Housing, Accra - 0243251166
Mr. S.S. Agbeve, Ashaiman Municipal Assembly, Ashaiman - 0206713978
Mr. Luckman (Director, NBSSI) - 0244573382
Mr. Kojo Anane, PDG - 0243237191
Mr. Farouq Rabiu, PDG – 0264668855

PROCEEDINGS OF THE KICKOFF MEETING HELD ON 11 AUGUST 2010, AT THE SSNIT GUESTHOUSE CONFERENCE ROOM, ACCRA

1.0. Introduction

Slum upgrading is conceived as a crosscutting policy issue whose targets require an integrated, interdisciplinary and cross-sectoral approach to accomplish. With the ultimate objective of improving the slum dwellers' access to efficient energy technologies for productive activities, the TEC-ESMAP project's kickoff meeting brought together a wide range of urban development stakeholders. The multi-stakeholder participation in the discussion was intended to achieve two objectives. The first objective of the multi-stakeholder participation in the kickoff meeting was to introduce the project to the stakeholders. The stakeholders' understanding of the project was seen as a way of eliciting their support in order to be successful. Furthermore, the stakeholders were to be used as the platform to communicate the results of the survey to Governments (both central and local) in their planning to promote growth and reduce poverty especially among the urban poor. Secondly, it was to provide the

project team first-hand information from the stakeholders about slums. The first-hand information was on their policies, programmes, projects and activities that affect livelihoods in the informal settlements. The rationale was to avoid duplication of efforts and stress on the significance of coordination to achieve national development goals in an effective, coordinated and efficient manner.

- The participants in the kickoff meeting were from the following organisations;
- Electricity Company of Ghana (ECG)
- Energy Commission (EC)
- Institute of Local Government Studies (ILGS)
- Accra Metropolitan Assembly (AMA)
- Ashaiman Municipal Assembly (ASHMA),
- Ghana Regional Appropriate Technology Industrial Service (GRATIS)
- National Board for Small Scale Industries (NBSSI)
- People's Dialogue Ghana (PDG). The others were Ghana Federation of the Urban Poor (GHAFUP)
- Gender and Energy Network (GEN) and Slum Upgrading Facility (SUF).

2.0. Opening Remarks

Prof Abeeku Brew-Hammond stepping in for Prof E.O. Akuffo (the chairman of the occasion) revealed that the project intends to feed its results into the national policy processes on energy access in Ghana. This was premised on the fact that the policy objective of ensuring universal access to energy by 2020 required reliable data for planning. Thus, the survey was justified by the need to inform national and local authorities with empirical facts required for effective planning. He revealed that The Energy Centre (TEC) has set out to furnish national and local authorities with reliable data through projects such as the "Geographic Information System" and the "Energy Access for the Urban Poor" supported by the European Union Energy Initiative and Energy Sector Management Assistance Program (ESMAP), respectively. Activities such as the Energy Commission's Survey on Energy Consumption and the Ghana Statistical Service's National Population and Housing Census would be enhanced by the TEC-ESMAP project. Prof Brew-Hammond continued that adequate and reliable data for analysis required the active involvement of all stakeholders. Hence contributions on the kickoff meeting discussion table would enable the project understand how the slum dwellers' access to energy resources for productive activities are considered by the authorities in their planning and programming. The project's results could also provide a means of verifying progress made in Ghana's energy policy objectives. Energy policy objectives such as the rural electrification and the use of modern energy forms by at least 50 per cent of the Ghanaian populace by 2030 could depend on the project.

Ms. Yvette Bossman from the EWSMAP/World Bank also indicated that the project marks the first World Bank project that uses the "bottom-up" approach to planning. Unlike previous interventions whose designs were done by experts from the World Bank who had very little knowledge about local situations, this project was designed with the active involvement of the beneficiaries. The design began with a reconnaissance survey in Old Fadama which revealed the challenges the dwellers encounter in accessing modern energy forms. Challenges such as difficulty access to electricity (leading to haphazard electricity connections in the slums), the use of unimproved cooking stoves with their health implications, etc. were identified. The detailed survey would however reveal the nature of the problems and the potentials and opportunities available to address them. These would then inform the nature of interventions required to ameliorate the challenges.

Ms. Yvette Bossman mentioned that the project aims to build the capacities of stakeholders through partnerships to ensure local ownership of interventions in order to guarantee their sustainability. The partnering organisations include The Energy Center (TEC), People's Dialogue Ghana (PDG) and City Alliance. The bottom-up approach, she revealed, was developed through an "Expert Panel Recommendation" meeting held in Washington D.C. of which Prof. Akuffo was a member. The panel developed the concepts of "Learning by Doing", "Learning by Analysis" and "Learning by Sharing Knowledge" which informed the paradigm shift of the World Bank from "top-down approach" to "bottom-up approach". She argued that this concept feeds into the City Alliance's objective of introducing a national urban policy dialogue by making sure that authorities include energy in their discourses to fashion out ways of improving energy access to support national development agenda.

3.0. First Presentation by People's Dialogue Ghana (PDG)

Represented by Mr. Owusu Mensah, the Programmes Director, PDG presented a paper on the topic *"Economic Activities of Urban Poor Communities, the Case of Old Fadama"*. PDG's presentation emanated from a survey conducted in Old Fadama in 2005 that sought to identify the livelihood strategies of the urban poor. In the said study, PDG conceived an economic activity to mean "any activity that produces goods and services and generates income". PDG also defined the term "slum" by first acknowledging that there is no universally accepted definition of the term. Based on this, the UN-Habitat's (2003) definition was adopted. Thus a slum was defined to mean *"any residential area that lacks adequate access to water and sanitation, security of tenure, poor structural quality of housing, insufficient living area".* Preceding the presentation on the variety of economic activities in the community was the characteristics of the settlements. PDG disclosed that Old Fadama is the largest slum settlement in Ghana with a total population of about 79,684 people as of 2009. The community is composed of migrant workers and internally displaced persons who mostly hail from the northern Regions. About 65.9 per cent of the inhabitants are from the northern part of Ghana.

PDG revealed that the inhabitants of Old Fadama are engaged in a wide range of economic activities. The economic activities were grouped into three (3) main categories namely; manufacturing, urban agriculture and services. The economic actors operating within the manufacturing sector produce items such as cooking utensils, coal pots and LPG stoves that have high demand across all income groups within the Accra Metropolis. Tailoring, carpentry, construction, sachet water and pastry production are the other major economic activities that fall under the manufacturing sector of the micro economy. The inhabitants also play impeccable roles in the supply of the food needs of the growing population of the metropolis. Vegetable production and animal rearing were revealed to be major economic activities especially in Ashaiman supporting both men and women. Within the service sector are actors such as traders, transport operators, operators of telecommunication enterprises, operators of entertainment centres (video centres), auto mechanics, head porters and schools proprietors. The others were operators of bathhouses (showers) and communal toilets. PDG revealed the enterprises are heavily dependent on energy such as electricity, firewood, kerosene, charcoal, etc) for the sustenance of the livelihoods in the slums. The presentation concluded that due to the significant roles played by slum dwellers towards the overall development of the metropolis they must be considered as primary stakeholders in national energy policy discourses.

3.1. Post Presentation Discussions

Following PDG's presentation were questions from participants that sought clarification. The questions and responses are presented below:

With the intent of understanding how the community members are organised to render their support for development interventions, the first question from Prof Akuffo sought to understand the "governance structure of Old Fadama". It was identified that Old Fadama and the other slums fall within electoral areas and constituencies and that they exercise their franchise. Thus, members vote not only in presidential and parliamentary elections but also in the district assemblies' elections to elect leaders. Complementing the formal structures are informal ones organised along tribal lines. Leaders of such ethnic groups are required through informal arrangements to maintain peace and order among their groups. Hence, in order to elicit support for all interventions, such protocols have to be observed during community entry.

Kwame Asamoah from the Gender and Energy Network, Ghana wanted to know the "challenges engulfing women in Old Fadama in the use of energy". The response from Janet Adu, a resident of Amui Dzor and a member of GHAFUP, revealed that women in the slums are confronted with several challenges which include difficult access to electricity leading to illegal connections and frequent fire outbreaks. Madam Hawa added that firewood and charcoal used by several economic actors are expensive and difficult to come by at certain times (rainy seasons) of the year.

Bertha Amoateng from the Gender and Energy Network, Ghana sought clarification on the nature of farming residents of Old Fadama engage in. In his answer, Mr. Owusu Mensah indicated that vegetable production is the major farming activities the inhabitants engage in.

Mr. Ottu-Danquah from the Energy Commission was interested in knowing the "source of start-up capital for the slum dwellers" in the diverse economic activities they are engaged in. It was revealed that most of the enterprises are self-financed. In her contribution, Ms. Janet Adu added that GHAFUP has supported a lot of women to establish their own enterprises from members' contributions.

Mr. Anyan-Kusi from Cities Alliance cautioned participants not to consider "slum" to be a synonym to "urban poor". He argued that it is misplaced to think that all the urban poor people live in slums. He revealed that through Cities Alliance's consultations, it has come to the fore that the urban poor live in 'dispersed" and "semi-dispersed" dwellings. Citing examples of people that live at the railways stations and in uncompleted buildings, he reiterated the point that the urban poor is not only confined to the slums but also in several other areas that poverty reduction interventions should endeavour to capture.

Dr. Esther Ofei-Aboagye, the director of the Institute of Local Government Studies (ILGS) commented on PDG's presentation. She disclosed that urban agriculture which was highlighted by PDG in its presentation has gained currency in the Greater Accra Metropolitan Area by citing the Accra Working Group on Urban and Peri-urban Agriculture as a typical example. Hence, their energy needs could be enhanced by the project to render them efficient for urban poverty reduction. Secondly, she was interested in how the slum dwellers get paid for the services they render. Citing an example of proprietors of crèches that charge parents on daily basis, she suggested that a comprehensive analysis of the terms and mode of payments of the economic actors within the slums would contribute significantly to knowledge. She was also of the view that if the PDG's presentation had touched on "how much people pay for what services", the TEC-ESMAP project could have a fair view of "whether energy services are paid for or not" and "how energy services are paid for" by the slum dwellers, that is if they pay at all. She was expecting to have seen "herbal preparation" as an economic activity in Old Fadama since she believed most of the head porters lived on them as aphrodisiac. With reference to the ILO concept of decent work, she expressed her optimism that the TEC-ESMAP project could promote "decent work" in the sum settlements.

In her contribution to the discussion, Ms. Doris Tetteh, the Metropolitan Director of the Town and Country Planning Department (T&CPD), Accra, indicated that the adoption of the UN-Habitat's definition of the term "slum" is not appropriate. Her argument was underpinned by the indicators contained in the UN-Habitats definition which could render almost all communities in Ghana as slums. She recommended an operational definition that fits well in the context of Ghana and other developing countries. The Urban Development Unit of Ministry of Local Government and Rural Development's (MLGRD) definition that focuses on the "level of deprivation within a community" could be noted in any attempt at defining slums. She also touched on PDG's claim that slums are "holistic living environment", implying that there are diverse and mutually supportive activities that are undertaken by the residents just as any planned settlement. She added that these activities depend on energy such as electricity, fuel wood, charcoal, LPG and petrol. Her focus however was on the level of access to these energy forms. She expected to know the total households and enterprises' expenditure on these energy resources as a percentage of the total household and enterprises' expenditure. This, she believed, was vital for assessing the level of access to these energy forms. Still on access to forms of energy, Ms Doris Tetteh revealed that it is a policy of the Electricity Company of Ghana ECG) that without a formal building permit, request made for electricity connection would not be granted. She argued that this requirement affects adversely slums' access to electricity for productive activities. Additionally, the cost-sharing practice used by ECG for the extension of electricity to non-served communities is a limitation against the slums' access to electricity. Her argument was underpinned by the low income feature of the slums. Thus, the slum dwellers' difficult access to electricity is the cause of the indiscriminate "tapping" (illegal and illicit connection from one another) in the communities that endanger the lives of the inhabitants.

Access to LPG was another area Ms Doris Tetteh emphasised. She indicated that the densely populated environment of the slums would challenge the installation of LPG and petrol filling stations. This situation would challenge their access to these energy forms due to long travelling time. Additionally, since PDG said the inhabitants depend on woodfuel, she was interested in knowing the sources of that energy form, their reliability and their safe use. Storage of the energy forms such as LPG, petrol and woodfuel was also a matter of serious concern to Ms. Doris Tetteh. She concluded that since the slum dwellers are at a disadvantaged position with regards to access to and storage of the energy resources, the project should help address them. The health implications of the energy used by the slum dwellers must also be considered in policy discourses by all stakeholders, particularly District Assemblies and TEC.

4.0. Second Presentation by Mr. Ottu-Danquah from the Energy Commission

The Energy Commission represented by Mr. Ottu-Danquah presented a paper on *"Current Status of Biomass Demand and Supply, and Initiatives on Improved Cook-stoves".*

4.1. Biomass Demand and Supply

Mr. Ottu-Danquah indicated in the presentation that woodfuel accounts for about 60 percent of total energy consumption in Ghana. The high proportion of biomass in national energy-mix is the result of the abundant supply of biomass which covers about 20.8 million hectares of the landmass of Ghana. Due to this, about 90 percent of the total woodfuel supplies come from the natural forest whilst the remaining 10 percent is derived from sources such as logging and sawmill residues, and planted forests. It was further said that over seven (7) million tonnes of wood, mainly acquired from the natural forest, is converted to charcoal to supply the energy needs of the growing urban population and for export. To the dismay of participants, Mr. Ottu-Danquah revealed that charcoal production using the traditional earth-mound method is only 12.5 percent efficient. This, he explained, is a major cause of deforestation

in Ghana especially against the background that the preferred wood species are being depleted leaving producers with no other option than to extract raw materials from other non-conventional species in order to supply the energy needs of consumers. Shedding more light on this, Mr. Ottu-Danquah disclosed that less preferred wood species like Nim and Wawa are being used for charcoal production in major charcoal production areas like Kintampo, Nkoranza, Wenchi and Damongo. Additionally, producers travel long distances in search of wood to produce charcoal. Premised on the extent of deforestation resulting from charcoal production, the Energy Commission instituted a provisional regulation prohibiting charcoal production using wood directly from the open forest. The effectiveness however is another issue to be discussed as a major topic.

He revealed that with improved charcoal production technologies, charcoal yield could increase significantly and can be made cost competitive. While some improved charcoal technologies have been tested and demonstrated in pilot projects, the use of these technologies are limited owing to high initial cost of capital. For example, the improved carbonisation technologies are very expensive compared to earth-mound technology which virtually cost nothing. Furthermore, the seasonal charcoal producer considers the improved charcoal technology more time consuming due to the need to monitor regularly which keeps them away from their normal farming activity.

Another area of concern is the high level of pollution resulting from charcoal production. Mr. Ottu-Danquah is quoted as saying "when you visit where charcoal is produced, it generates a lot of dust and even in the transportation, there is a lot of dust including the places where charcoal is sold in the market". Touching on the transportation of charcoal to the urban consuming centres, Mr. Ottu-Danquah claimed that "many of the vehicles used for the transportation are relatively old and very often, overloaded posing great danger to other road users. This is mostly because there are no dedicated vehicles for the transportation of charcoal in Ghana as the case is for the transport of crude oil". He attributed the situation to the lack of regulations on the type of vehicles needed to convey the fuel to the urban centres for consumption and export.

4.2. Initiatives on Improved Cook Stoves

Not only is the traditional earth-mound method of charcoal production inefficient but also the traditional charcoal-conversion-technology. It was revealed that the traditional charcoal stoves (coal pots) have low efficiency which ranges between 18 percent and 21 percent. This implies that "when one puts 100kg of charcoal, only about 20 percent of it is converted into heat energy". Based on the inefficiencies of the traditional cook stoves, several efforts have been made to introduce improved cook stoves as well as encourage its use. For instance, the Ministry of Energy undertook a nation-wide promotion of the "ahibensu" improved cooked stoves, which had about 35 percent efficiency, in the 1990s. The strategy the Ministry of Energy adopted was to support artisans to produce the "ahibensu" cooked stoves. With this, a number of "ahibensu" stoves were introduced. Mr. Ottu-Danquah revealed that the strength of the "ahibensu" cooked stoves was its efficiency which could convert about 65 percent of the charcoal into heat energy, implying that the technology was faster in cooking compared to the traditional cook stoves. In addition, it was relatively safer to use as it "did not produce a lot of gasses". Despite these strengths, the promotional programme could not be sustained because of the withdrawal of the Ministry's assistance.

Two private companies obtaining funding from USAID eventually mushroomed to manufacture improved cook stoves. These two companies have been promoting a stove called "gyapa" which boasts of an efficiency level ranging between 38 percent and 41 percent. Despite its high cost compared to the

price of the traditional cooked stoves, over 100,000 stoves have been sold. The companies have also applied for a carbon credit meant to reduce the cost of the technology to ensure that the programme is sustained.

Mr. Ottu-Danquah concluded that efforts should be made to create awareness on the health implications of charcoal gas and promote the use of protective stoves for commercial and domestic purposes. He argued that the awareness creation and promotional programmes could reduce the extent of deforestation as well as reduce poverty among the slum dwellers (major users of charcoal). He further recommended the need to use protective masks in the sale of charcoal to avert the health implications. Additionally, enforcement of the safety regulations on the production, transportation and marketing of charcoal could help reduce some of the weaknesses in using biomass.

4.3. Discussions

Following the presentation, a participant wanted to know efforts in place to produce briquette from wood waste. This he believed could serve as an alternative to firewood and charcoal in order to limit the extent of deforestation in Ghana. In response, Mr. Ottu-Danquah disclosed that one company in Kumasi produced briquette some time ago (about one and half years ago) but the products are not in the market. Mr. Owusu Mensah argued that briquette producers should consider issues such as production, sustainability and usage. Thus, policies should address them.

5.0. Third Presentation by Mr. S.S. Agbeve, the Municipal Development Planning Officer, Ashaiman Municipal Assembly

Mr Agbeve provided the characteristics of the Ashaiman Municipality by highlighting its location within the context of other districts, the population characteristics, economic activities, housing situations in the slums, energy use and strategies to enhance energy use in the municipality.

5.1. Characteristics of the Municipality

The presentation revealed that the Ashaiman Municipality is located to the north of the Tema Metropolis and about 30km from Accra, the national capital. The Municipality is located on Latitude $5^0 42^1$ North and Longitude $0^0 01^1$ West. The Municipality's proximity to Tema and Accra enhances people's access to basic amenities. The Municipality has a high population growth rate of 4.6 percent with an estimated population of 226,381 in 2010 which is expected to rise to about 250,000 by 2013. The population growth rate is about 70.4 percent higher than the national population growth rate of 2.7 percent. Mr. Agbeve explained that the Municipality serves as dormitory to numerous workers who work in Tema (the industrial town) and Accra (the national capital). He noted that migration of people across the West African sub-region into the municipality is also a major factor accounting for the high population growth rate.

In terms of occupation and labour, Mr. Agbeve with reference to the Ghana Statistical Service's 2000 Population and Housing Census disclosed that about 50 percent of the economic active population (aged between 15 and 64) is employed mostly in the service and commerce sectors. Agriculture is also a prominent economic activity that depends largely on irrigation dam. Vegetable and grains are the main crops cultivated.

5.2. Slum Development in Ashaiman

The Development Planning Officer revealed that about 60 percent of the inhabitants live in slum areas defined to mean highly populated areas with inadequate and poor nature of life sustaining amenities. He disclosed that there are 23 communities in the Municipality out of which seven (7) are classified as slums. Mr. Agbeve said the Municipal Assembly through its slum upgrading policies in the Medium Term Development Plan hopes to upgrade the slums to enhance tourism. The slum communities are Tulaku Amui Dzor, the Night Market, Zongo Lacka, Taboo Line, Wobakajet, Taifa and the Valco Flat Areas.

Building materials are dominated by sandcrete and wood, constituting 85 percent and 15 percent, respectively. Roofing materials are predominantly metals sheets (90 percent), asbestos and other materials. Many of the houses are compound in nature where tenants occupy one or two rooms and share bathrooms and toilets. He disclosed that the nature of the houses coupled with poor drainage system pose grave health concerns for the population.

5.3. Energy Use in the Slum Communities

Several energy resources are used by the inhabitants of the slum communities. Electricity, which is a major energy type for about 95 percent of the inhabitants, is used for domestic, commercial and street lighting (security) purposes. LPG is used by about 80 percent of the inhabitants for both domestic and commercial purposes. The proportion of firewood in the slums' total energy mix is about 35 percent and is used mainly by food vendors like kenkey sellers, chop bar operators, fish smokers, etc. He further revealed that users of LPG supplement it with charcoal. Thus, about 95 percent of the inhabitants use charcoal for both domestic and commercial purposes. Though, kerosene and petrol are used by other enterprises and households, Mr. Agbeve disclosed that corn mills are the major users. At the household and enterprise levels, kerosene is used for domestic purposes in traditional lamps, kerosene lanterns and kerosene stoves.

5.4. Policies for Slum Upgrading

Mr. Agbeve disclosed that Municipal Assembly's policies, plans and strategies are pro-poor and pro-slums. This is justified by the fact that about 60 percent of the Municipality's population live in the slum areas. Hence, the pro-poor and pro-slum nature of the development interventions is meant to foster the growth and poverty reduction agenda of the Government of Ghana. The preparation of a 15-year vision document titled *"Socio-economic Development Blue Print for Accelerated Development of the Ashaiman Municipality - Vision 2025",* City Development Strategy and the Medium Term Development Plan (2010-2013) are evidence of the seriousness attached to the development of the slums by the Municipal Assembly.

Touching on energy, he said the Assembly intends to reduce the incidence of crime in crime-prone areas with the installation of street lights. The assembly hopes to sustain the benefits accrued from the street lighting with the establishment of a Maintenance Team who will undertake routine, periodic and emergency maintenance activities. The other strategies aimed at enhancing the inhabitants' access to electricity include; the extension of electricity to unreached areas, upgrading of the existing overstretched transformers and educating the community members on safe use of electricity. Mr. Agbeve revealed that the Municipality experiences LPG supply gap which is the result of the increased use of gas by the commercial drivers. The Assembly intends to recycle human excreta through the

construction of a number of public sanitation blocks and digesting systems to produce gas to augment the stock of LPG.

The Assembly also hopes to ensure the constant supply of firewood to the inhabitants by planting fast growing trees in and around Ashaiman to be done in collaboration with Environmental Protection Agency (EPA), Non Governmental Organisations (NGOs), Forestry Commission and the Department of Parks and Gardens. This policy would be complemented by activities to encourage the use of LPG for both domestic and commercial purposes in the Municipality.

Mr. Agbeve concluded that "the issue of energy in urban slum communities of Ashaiman is part of the integrated policies, plans and strategies of the Assembly". With reference to the nexus between access to energy and economic growth, the Assembly has never treated access to energy in isolation from other development interventions in its quest to promote growth and reduce poverty in the Municipality.

5.5. Discussions

A member wanted to know the Assembly's definition of slums. Mr. Agbeve responded that the Ghanaian definition for slum, is where consideration is given to "the proper access to facilities, how well the place is planned and how well development is controlled in terms of lay outs" was used. Kiosks and wooden structures as well as densely populated areas without access to basic infrastructure and facilities were considered as slums. Environmental sanitation problems and the livelihoods of the people also helped to classify the said communities as slums.

Another area of interest to a participant was how the Ashaiman Municipality could be developed to attract tourists as mentioned in his presentation. Mr. S.S. Agbeve responded that the Municipality is endowed with several attractive sites that can be harnessed as tourists' sites. He disclosed that the Municipality has several water spots that can serve as entertainment sites if properly developed. The slums themselves can be promoted to attract people into the Municipality on sight-seeing purposes. Tourism would be enhanced with the availability of the hospitality industry (hotels and restaurants) within the municipality.

6.0. Fourth Presentation by Mr. Steven Akuoku of ECG

Mr. Steven Akuoku is an economist in the Planning Division of ECG. He presented on the topic *"Operational Guidelines on Electricity Connections and meter Acquisitions".*

6.1. General Requirements for Acquisition of a Meter

Mr. Akuoku told the participants that electricity service provision by ECG is governed the Legislative Instruments 1816 and 1935. The Public Utility Regulatory Commission (PURC) is established to ensure ECG's compliance with the LIs. Mr. Akuoku disclosed that an applicant for electricity connection from ECG requires a set of completed application forms, an original identification card (ID) and a building permit from the district or municipal assembly (if it is a new service connection). He acknowledged that people living in slums are sidelined by ECG's requirement for a building permit since most of the slum settlements are illegal with no formal recognition. Besides these specific requirements, an applicant is required to meet these general requirements as specified below:

- First, an applicant has to acquire (buy) an application form from ECG. The applicant is expected to indicate the source of lighting and the electronic equipment he uses on the application form. This is to provide ECG an idea of the amount of energy the applicant needs.
- Upon receipt of the application form, an ECG official will be dispatched to inspect the applicant's premises to ensure that it conforms to the standards. The Official will then prepare an estimate of the total expenditure in the connection of electricity to the premises.
- Upon payment of the estimate, the applicant's application form will be handed over to a private contractor who will be required to connect electricity to the premise. Mr. Akuoku revealed that it takes about three (3) days to connect an applicant to the electricity grid if there is an electric poll right in front of the premises.
- However, if the applicant does not have a poll close to the premises, about ten (10) days would be required to complete the connection.

6.2. Electricity Connection to Poor Areas

Generally, ECG identifies the poor areas by considering areas that are dominated by compound houses (with families living in one unit) with members using one metre. The cost of electricity is always high in such areas though there is a subsidy to support poor users. Despite the subsidy, people in compound houses and slums who normally use one electric meter are pushed into the higher consumption bracket with the disguise implication that they can afford. Due to this, ECG has a policy to provide people in compound houses with separate meters. The requirement however is that for the application for a separate meter to be granted, the applicant must be consuming more than 300 kilowatt hours of electricity.

6.3. Discussions

The first question from a slum dweller touched on the restrictions posed on the slums access to electricity against the background that they are required to produce building permits whilst their occupation is illegal. This has prevented them from acquiring legal connections though several households have access to electricity in the community. He wanted to know what ECG can do to provide legal connections for a mutual gain in view of the fact that whether their status is recognised or not, they will connect to the electricity grid and continue to pay for the services they enjoy. Mr. Akuoku responded that the need for a building permit is necessary because ECG would be at a loss if a building which is connected is immediately pulled down due to its illegal status to the land. Consumers are not charged to pay for the meter in one instance but rather pay its cost over its lifetime. He argued that initially the "building permit requirement" was not considered. But due to the massive losses ECG experienced when slum communities were gutted down by fire, ECG was compelled to introduce building permit as a requirement. He however disclosed that inhabitants that acquired the meter before the building permit was introduced as a requirement have electricity. This explains why ECG officials go to the slum communities to collect bills.

The second questioner (Dr. Esther Ofei-Aboagye) wanted to know if ECG has any plans to generate electricity from pro-poor energy alternatives. She also wanted to know the nature of relationship existing between ECG and other supply organisations such as the District Assemblies, water and sanitation agencies, etc. Mr. Akuoku responded that ECG is a retailer of electricity and so does not generate electricity. The generation of electricity from other alternatives apart from hydro electric sources is outside ECG's jurisdiction. He however revealed that VRA generates electricity from thermal sources to complement HEP. The government intends to supply electricity from renewable energy

sources. However, the constraint is that power from such sources is expensive and deters investors. Touching on the relationship with the District Assemblies, Mr. Akuoku disclosed that there is a very good working relationship with them. District Assemblies pull down illegal structures to pave way for the installation of electricity polls by ECG.

The third questioner (Mr. Abu Haruna, one of the community leaders at Old Fadama) with experience from Old Fadama wanted to know why applicants in the community besides the general and specific requirements are required to pick an application form from the police in order to apply for electricity connection. He also expressed concern for the mounting of high tension polls within the community which he believed poses grave health problems. Mr. Akuoku, in his response, was oblivious of the application forms that are taken from the police. He therefore promised to see the slum dwellers to identify the way forward. Furthermore, he disclosed that the "high tension polls" mounted in the community were not erected by ECG but probably GridCo and so falls outside their jurisdiction.

The fourth questioner wanted a clarification on how ECG undertakes its monitoring exercises. Mr. Akouku in his answer revealed that every district has a monitoring team that goes round periodically to check faulty meters, illegal connections and any other reports about the connection.

7.0. Fifth Presentation by Anthony Selormey of NBSSI Greater Accra Region (GAR)

The Anthony Selormey was required to touch on income generating activities in the slums which the NBSSI is concerned about. He was thus expected to highlight the support NBSSI has given to enterprise development in slum communities. Dr Rudith King, informed by Mr. Ottu-Danquah's recommendation (that there should be support for the development of energy efficient stoves that can enhance income generating activities in the slum communities; education to reduce the health hazards from charcoal and firewood, etc) wanted NBSSI's presentation to shed light on its operations in that regard.

7.1. Overview of NBSSI's Operations

Mr. Anthony Selormey disclosed that NBSSI is operational in 110 districts out of the 170 districts in the country through the Business Advisory Centres (BACs). He indicated that NBSSI works with communities at the district level and does not make specific reference to slum settlements. NBSSI deals with small businesses which use varied forms of energy like firewood, charcoal, electricity, LPG, kerosene, petrol and many others. An observation made by NBSSI is that many small businesses use very crude and inefficient energy consuming equipment like the traditional stoves. He further revealed that modern forms of energy and energy efficient equipment are known to save cost and enhance the operations of entrepreneurs. He claimed that a study conducted about the effectiveness of LPG ovens indicated that users yielded between 50 percent and 70 percent gains over the traditional stoves they previously used in their enterprises. Underpinned by the fact that access to modern energy forms can contribute to enhancing the operations of micro and small scale enterprises, the NBSSI has trained some electricians in the Volta, Western and Eastern Regions in the installation of solar photovoltaic to extend electricity to remote and inaccessible areas. The use of solar energy for water pumping was identified by Mr. Anthony Selormey as an area that ought to be developed by NBSSI. The systems can also be used in agro-processing and circulating solar heat to dry pepper. However, the situation required huge investment which is often beyond the means of the micro and small scale entrepreneurs. The lack of sponsorship has also constrained the adoption of modern energy technologies.

7.2. Discussions

The first reaction was from a participant who wanted a clarification on what Mr. Anthony Selormey meant when he said the NBSSI have BACs in 110 districts in Ghana. In his response, Mr. Selormey indicated that the BACs are established to promote small businesses through training, advisory and counselling services, and any other promotional activities that will make micro and small scale enterprises innovative. He continued that the BACs were established in 110 District Assemblies based on the number of districts that existed at the time they were established. However, with the creation of the new district assemblies, NBSSI's operations are yet to be extended officially to cover the new areas.

The second reaction was also from a participant whose interest was to know the requirement an enterprise owner ought to meet in order to benefit from the activities of the NBSSI. In his answer, Mr. Selormey said there are no special requirements. Entrepreneurs "have to walk in" and they will be recognised and assisted. He however mentioned that beneficiaries are required to contribute to cost of training to show their commitment. "A commitment is not for paying purposes. It is just to ensure that you are really going to use the programme".

The third questioner was interested in NBSSI's sources of funds against the background that beneficiaries do not pay for the services rendered to them. In response, Mr Selormey indicated that NBSSI's activities are funded by the government through subventions. It also collaborates with development partners for funding to tackle specific issues. NBSSI works with other institutions that seek to promote the welfare of micro and small scale enterprises to achieve optimum efficiency. Recounting NBSSI's past experiences regarding the administration of funds, Mr. Selormey revealed that in the past, NBSSI organised its own credit schemes to support micro and small scale enterprises. However, the credit schemes could not be sustained because of repayment problems. Hence, what NBSSI does is to collaborate with institutions that are into credit administration to offer credit to the micro and small scale enterprises. The NBSSI has been in contact with commercial banks to identify people, training them and making them credit worthy to access loans for enterprise establishment. District Assemblies also have credit schemes established from their share of the District Assembly Common Fund (DACF) to promote micro and small scale enterprise development.

The fourth questioner was interested in knowing NBSSI's strengths. The subsequent response given by Mr. Selormey indicated that NBSSI strengths lie in their closeness to clients. Due to its closeness to clients, NBSSI is able to provide business development services that are in harmony with clients' needs. It is also able to facilitate the micro and small scale enterprises' access to credit facilities for business development. The enterprises are supported in the preparation of business plans which BAC does.

The fifth questioner wanted to know the categories of enterprises that make up NBSSI's clients. Mr. Selormey disclosed that NBSSI's clients are typically micro and small enterprises within the manufacturing (agro-processing, textile, wood processing, metal fabrication, etc.) and service sectors (mostly commercial). Agricultural activities are also supported by NBSSI. Dr. Esther Ofei-Aboagye challenged the NBSSI to develop a comprehensive strategy to engage District Assemblies and other stakeholders to ensure local economic development. She advised the NBSSI to learn lessons from good practices from other countries that could enhance micro and small scale enterprise development. She believed that the comprehensive strategy could increase the tax base of District Assemblies in support of fiscal decentralisation when small and micro small enterprises are developed.

8.0. Plenary Discussion

The first point made by Erica Osae from Slum Upgrading Facility was that authorities ought to prevent the formation of slums by responding quickly to their development needs. However, after they have been developed, attempts should rather be made to upgrade them rather than brand the inhabitants as criminals. She disclosed that the slum dwellers could be potential sources of revenue to the authorities if they are recognised as stakeholders in the development arena. For e.g., users of air conditioners and other electronic gadgets within the slums pay unrealistic tariffs (little amounts) due to the lack of conscious attempts to extend electricity to them. Acknowledging that the slum dwellers can contribute to their revenue generation capacity, the Ghana Water Company Limited (GWCL) and several other financial institutions (Barclays Bank, Uni-bank, etc.) have extended their services to the communities. She challenged ECG and NBSSI to learn lessons from that and introduce innovative ways of extending their services to cover the inhabitants within the slum settlements. Having extended their services to cover them, they should endeavour to build the capacity of the CBOs in order to protect facilities from illegal users.

Mr. Anyan Kusi argued that urbanisation should not be seen as a problem but rather a development challenge. He argued that no country has become a middle income economy without getting urbanised. Thus, urbanisation if properly managed could be a tool to catalyse the achievement of Ghana's middle income aspiration. This requires interventions by all stakeholders to include slum dwellers in the development bracket to erase the perception that the slums are nuisance. The interventions should emphasise their empowerment to enable them negotiate for service provision. Key informants in the slum communities should also be exposed to urban issues and the experiences of slums in other developing countries. He was optimistic that doing that will develop the slum dwellers to take charge of their own development. However, the effective implementation of the strategies is underpinned by planning where migrants can easily be hosted in their destinations to avoid the development of illegal settlements.

Prof Akuffo was interested in knowing if there are Members of Parliament and Assembly Members who provide leadership and help in service provision. This question was expected to shed more light on the governance structure of the slums. The response from Abu Haruna revealed that inhabitants of Old Fadama vote in both Assembly and Parliamentary elections. However, these leaders are "afraid to be in the community" for fear of not having answers to some of the concerns raised by the community members. Through several agitations, Old Fadama is presenting a candidate in the assembly elections. Besides, the formal structures, people's actions are regulated by ethnic group leaders who are revered by their members. These informal leadership structures are acknowledged by the formal ones. The formal governance structures use the informal ones as a medium of reaching out to the people at the grass roots.

Mr. Owusu Mensah in his contribution stressed on the need to have an operational definition of the term 'slums' in Ghana. This will help in the easy identification of the deprived slum communities to pave the way for proper planning. Abu Haruna believes the phrase "these people" often used by authorities is anti-development. The continuous use of the phrase puts the hardworking slum dwellers off and makes them feel hopeless. Thus, the need for an operational definition for Ghana should be complemented by respect and recognition for the dwellers.

NBSSI was admonished to assist CBOs within slum and deprived areas to take charge of their own development initiatives. Its enterprise development programmes can build the capacity of the dwellers

to reduce their poverty. The Ghana Federation of the Urban Poor (GHAFUP) which has shown the way forward by acquiring their own land for the construction of houses for members (through individual contribution) could be assisted to develop themselves. Artisans in the slums could also be assisted to develop their enterprises and earn gainful livelihoods.

Mr. Anthony Selormey re-echoed the need for the adoption of modern forms of energy to facilitate grass root development. This was underpinned by the economic gains enterprises make during a switchover to modern forms of energy. He suggested that attempts should be made to ameliorate the challenges posed by the high initial cost of investment in renewable energy technologies like solar photovoltaic. He argued that solar energy could be used to support irrigation farming in Ashaiman. Prof Akuffo added that there should be pilot projects to test the technical, economic and financial viability of such recommendations (solar and wind energy) and when proven to be viable, District Assemblies, NBSSI and the Energy Commission should endeavour to support their development. The findings from the pilot projects could also help irrigation farming in Anloga, Aflao and Denu to wean itself from electricity from the national grid.

Mr. Ottu-Danquah added that with awareness creation on the benefits of using modern forms of energy and energy-saving conversion equipment, consumers (including slum dwellers) would see the need to switch over to the use of modern energy forms. The health implications of the traditional energy forms would be minimised. This is because Madam Hawa indicated that people are glued to the traditional forms of energy because of their lack of understanding in the modern forms of energy. She believed that firewood and charcoal cooks faster than the other forms of energy. Hawa's argument, justified Mr. Ottu-Danquah's claim that serious sensitisation programmes are required to promote the use of modern forms of energy.

9.0. Concluding Remarks

The chairman of the occasion asked Dr. Rudith King to give the concluding remarks which were summed up as follows:

- There is no coordination among the agencies and other stakeholders in their quests to enhance the living conditions of the urban poor.
- National and City Authorities do not consider access to energy resources as a critical factor that would facilitate poverty reduction among the urban poor. Hence there are no specific energy policies to facilitate the development of the urban poor. For example, ECG does not have any specific pro-poor and pro-slum policies aimed at improving the slum communities' access to electricity. The requirement for building permit for new electricity connections imposes a grave challenge on the urban slum dwellers whose occupancy is characterised by insecurity due to fear of eviction. Similarly, the Ashaiman Municipal Assembly (ASHMA) perceived the existence of the informal settlements as nuisance and thus do not have any specific interventions aimed at enhancing their access to energy resources.
- There is a critical knowledge gap on the energy efficient technologies observed among the participants from the slum communities. The slum dwellers exhibited a preference for charcoal for domestic activities though its efficiency is understood to be as low as 18 percent.
- The knowledge gap in particular was to serve as the point of entry by the project. Thus the project's outputs are believed to have an impeccable implication for policy formulation and implementation.

Dr. Rudith King expressed the hope that the research findings would be presented to the participants on a similar platform when completed. This will provide them (the authorities) empirical justification to consider slum dwellers' energy issues in their programmes of action and action plans.

Ms Yvette Bossman was delighted to have seen more stakeholders on the discussion table. She expressed the optimism that the project would mark a significant milestone in the World Bank's energy programmes in the developing world. The chairman on behalf of TEC-ESMAP and the project team thanked the participants for honouring the invitation to participate in the roundtable discussion.