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The Development Planning Unit
University College London



Community Development
Training Institute Tengeru

The Impact of Energy Use on Poor Urban Livelihoods in Arusha, Tanzania

R8321

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IN MEMORY OF

Isack Chimile

Past Principal CDTI

Who sadly did not live to see the completion of this work

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The successful completion of this study would not have been possible without the continued support, co-operation and generosity of many Tanzanians from a number of institutions and the community at large who gave significant amounts of their time to take part in interviews in Arusha or Dar-es-Salaam, and attend local workshops in Daraja Mbili and Kaloleni.

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EXECUTIVE SUMMARY

Background

There are very few micro level studies on energy use and the impact of energy on the livelihoods of the urban poor, despite the fact that urban families may spend a third or more of their income on energy. Furthermore, existing studies tend to address technological/economic issues, rather than social aspects of energy use and are quantitative rather than qualitative in approach.

This DFID funded study (R8321) was undertaken jointly by the Development Planning Unit, University College London (DPU), and the Community Development Training Institute (CDTI), Tengeru, and addresses this imbalance by examining the energy/poverty/gender relationships in two urban wards, Daraja Mbili and Kaloleni, in Arusha, Tanzania. The core team was supported by the staff of WODSTA (Women's Development of Science and Technology Association), a local NGO; Arusha Municipality employees at the urban and ward level; a virtual steering committee; and, most importantly, the women, men and children living in the two study wards.

Research focus

The study perceives poverty as multi-dimensional and uses a sustainable livelihoods framework to structure poor men's and women's perceptions of their condition. It acknowledges that urban poverty is qualitatively different from rural poverty and the significance of gender roles within a household. It accepts that energy has a significant role in improving the lives of the urban poor and sets out to clarify the nature of the transforming process. In particular, it tests the assumptions underlying two of the Millennium Development Goals (MDG 2 and 3).¹

Purpose

The research has two aims:

- to provide stakeholders (including policy makers, planners and implementers in the public and community sectors and poor people themselves) with an improved understanding of how access to energy impacts on the livelihoods of poor urban women and girls. In particular, to consider how changes in the energy decision-making process, and women's and girls' energy responsibilities, might affect their capacity to take advantage of educational opportunities (MDG2) and contribute to their greater empowerment and greater equality in the household (MDG 3); and

¹ Specifically the achievement of primary education and the promotion of gender equality and the empowerment of women

- to contribute to the improvement of the livelihoods of poor urban women and girls in Arusha by providing them with information on how to optimise their use of energy and to begin to strengthen their capacity to take part in the energy decision-making process.

Approach

The study is in two parts, the first is research focused and the second, practice based. The former sets out to test two hypotheses:

- *“time saved by using modern energy will result in women and girls having greater participation in educational activities”*; and
- *“access to modern energy will contribute to gender equality and women’s empowerment.”*

The second part of the study enabled residents in each of the two study wards to design an energy focused project that can contribute to the improvement of the livelihoods of poor urban women and girls in Arusha. The integration of research and practice is an important feature of this study. It resulted in the community residents feeling that their contribution to the research has already started to benefit their lives, which is rarely the case when research sees people merely as the object of study. The challenge now is to ensure the long-term sustainability of these interventions.

In testing the hypotheses the study adopted a 'gendered social processes' perspective. Specifically it was concerned with processes relating to livelihoods, resources, knowledge and rights that can be perceived either to enhance or constrain energy use for men and women. It examines micro-level evidence about the use of energy and the energy decision making process and compares the situation in poor and non-poor male and female headed households.

The fieldwork was undertaken in six streets, three in each of two urban wards, Daraja Mbili and Kaloleni in Arusha, Tanzania. The study sampled 60 households in each ward in order to compare the energy role, responsibilities and rights of women in poor and less poor households. Daraja Mbili is generally poorer compared to Kaloleni, both in the overall level of public services and the situation of individual households.

The study was participatory and primarily qualitative in approach, although it also proved possible to collect quantitative data. It incorporates inputs from a variety of stakeholders including the residents of the wards and the research team and uses a range of tools including, semi-structured interviews, case-studies, focus group discussions, key informant interviews, and four groups of workshops.

Findings

Of the three 'modern' fuels – electricity, LPG, and kerosene – used, electricity is the fuel aspired to by all four categories of households (male and female headed, poor and non-poor). However, its expense, and the quality of supply means that poor households either cannot afford to use it or, where they can, have to severely limit its use and even non-poor households, nearly all of whom are connected to electricity, use it relatively sparingly. Households are often not willing to use gas which they perceive as unsafe because of past accidents. Kerosene, the most easily available fuel, is popular for cooking and lighting amongst all the household groups.

Charcoal is the most popular 'traditional' fuel. It is used by nearly all households for some cooking and, in poorer households, for ironing.

The study found that households, poor or non-poor, do not make exclusive use of one fuel, nor is only one fuel type used for only one activity. Instead, for a mixture of practical and cultural reasons, households use a mixture of modern and traditional fuels.

There is evidence that women, in so far as they can, mix their use of fuels in order to save cooking time, although using a variety of fuels is only one of four time saving strategies. The other three are; cooking in larger quantities, buying fuel in larger quantities, and changing to a different type, or number, of cooking stoves. However, the shorter time spent on daily activities in non-poor households (where there is greater use of modern fuels) compared with poor households suggests that the time saved each day would often be relatively short, unless all households could have access to reliable and affordable electricity for all activities. In view of Tanzania's current electricity supply situation and the relative poverty of the households this is unlikely in the short to medium term.

Less than a third of women in Kaloleni, and a fifth in Daraja Mbili, expressed a desire to take-up an education or education related activity (including girls having more time for homework or mothers helping children with homework), with any time saved as a result of using modern fuel. This compared to a half of women in Kaloleni and two thirds in Daraja Mbili who would aim to undertake an income generating activity, (perhaps not surprisingly in households that are lacking in income and assets). Moreover, in the study area, access to education is not just restricted through lack of time. Lack of money to spare for education, cultural constraints, and lack of educational opportunities are also factors that need addressing if women and girls are to benefit from improved and increased access to education.

Daraja Mbili and Kaloleni have conservative attitudes to gender roles, responsibilities and rights. The generally accepted paradigm, as in Tanzania as a whole, is one in which men are seen as the bread winners and household decision makers while women are responsible for reproductive tasks and are subservient to men. Nevertheless, despite this stereotype, decision-making patterns in households vary, with a

greater likelihood of more educated households tending to make joint decisions.

There is evidence that the energy decision-making process falls into three parts. Thus while men are most likely to make decisions about expenditure on household appliances women are most likely to decide on the type of cooking stove to be used, unless the stove falls into a price category which is more than they are allowed to spend, in which case they will defer to their husbands. Decision making about the type of energy to be used is less clear cut, with men sometimes making the decision and sometimes the decision being made jointly.

There is anecdotal evidence that men are more willing to share in energy related tasks when the process is easier, cleaner and quicker. So the use of modern fuels would appear to be the ideal if there is to be a more equal sharing between men and women of household energy related tasks. Unfortunately, for the reasons discussed earlier, households in the study area, in the short and probably medium term, are likely to have limited access to electricity the most desired of modern fuels. Nevertheless it is the contention of this report that greater gender equality and women's empowerment in the energy process can be achieved through making energy a focus of community interest and working with men and women to increase their knowledge and understanding of the performance of various fuels and how best to use them.

Conclusions

In relation to the first hypothesis it can be concluded that, in the study area, if women and girls had improved access to modern energy they would be willing to use it and thus save time. However in the current context it is unlikely that more than a third, and perhaps as low as a fifth, of women would be interested in using any time they saved for education or education related purposes. Constraints other than energy used – lack of money to spare for education; cultural constraints; and lack of educational opportunities - also need consideration if women and girls are to benefit in educational terms from improved access to modern energy.

To achieve effective and sustainable changes in the household energy process and hence energy roles, responsibilities and rights, and thus move towards *gender equality and women's empowerment*, it will be necessary, in view of the existing cultural paradigm, to work with both women and men. Further, because of the unique energy-use *fingerprint* in each locality it is necessary for any changes to be context sensitive. Two sets of issues have been identified which, if changed, could lead to the use of more efficient time saving energy not only by women but also by men and others in the home. The first is concerned with increasing the knowledge and understanding of the performance of various fuels and how best to use them. The second relates to changed approaches around energy in the community and government sectors.

The practice outcome of the research

In a very short period of time it has proved possible for two communities to establish interventions which will, if sustained, contribute to improving the lives of poor households, especially women and girls, in Daraja Mbili and Kaloleni.

The way ahead

The research highlights the need for more data on the amount and cost of energy used for each domestic activity. Such information is needed to advise households on how best to manage household energy budgets. Careful energy management is particularly important for poor households who are currently spending about a third of limited income on energy.

In view of the relatively limited research on the energy, poverty, gender relationship in urban areas, and the context specific nature of this study, there is a need for further follow-up research in other towns both within and outside Tanzania, possibly in west and southern Africa and a country outside Africa to assess the generic application of the findings.

The performance of the two interventions should be evaluated. If they are having a positive influence on energy management in Daraja Mbili and Kaloleni they should be widely publicised and other communities enabled to adopt this approach so that they can also benefit.

TABLE OF CONTENTS

Sections	Page
Acknowledgements	iv
Executive summary	v
List of acronyms, definitions and Swahili terms	xi
1 Introduction	1
1.1 Background	1
1.2 Approach	1
2 Research focus	4
2.1 Introduction	4
2.2 Urban poverty, energy and gender	4
3 Study context	9
3.1 Introduction	9
3.2 Location, demography and administration	9
3.3 Economy	10
3.4 Socio-economic conditions and services	10
3.5 Other services	12
3.6 Poverty	14
3.7 Energy	14
3.8 Gender	16
4 Methodology	19
4.1 Introduction	19
4.2 Research component	20
4.3 Practice component	25
4.4 Conclusions	26
5 Research findings	29
5.1 Introduction	29
5.2 Study context – Daraja Mbili and Kaloleni	29
5.3 Comparison of Daraja Mbili and Kaloleni samples	32
5.4 The study findings	35
6 Practice component	56
6.1 Introduction	56
6.2 The process	56
6.3 The outcomes	58
7 Conclusions and the way ahead	64
7.1 Introduction	64
7.2 Conclusions	64
7.3 The way ahead	67

APPENDICES

A1	Matrix of energy and the Millennium Development Goals
A2	An energy focused social processes matrix
B	Sustainable livelihoods framework

C	National and Arusha city context
D1	Semi-structured interviews
D2	Key informants
D3	Case study guidelines
D4	Participants in focus group discussions
D5	Transect walks observation guidelines
D6	Full list of workshop participants
D7	Structure of sample
D8	Press release and cuttings
D9	Students' field trip TOR
E1	Primary school exam places and secondary places awarded
E2	Estimated number of livestock kept in Kaloleni
E3	Family size
E4	Case studies' Assets
E5	Energy uses: focus group discussions
E6	Fuel and appliances costs in Arusha
E7	Decision making in male headed and female headed
E8	households
E9	Kaloleni – amount of time spent on cooking beans using
E10	charcoal
E11	Kaloleni – amount of time spent on cooking beans with firewood
E12	Kaloleni – Amount of time spent on boiling water for tea using
E13	kerosene
E14	Kaloleni – Amount of time spent on boiling water for tea using
	electricity
E15	Daraja Mbili - amount of time spent on cooking beans using
	charcoal
	Daraja Mbili - Amount of time spent on boiling water for tea
	using kerosene
	Daraja Mbili - Amount of time spent on boiling water for tea
	using electricity
	Controlled experiment
F1	Kaloleni – ward intervention
F2	Daraja Mbili – ward intervention
F3	Kaloleni – comparison of fuels on set cooking task
F4	Kaloleni – analysis of stoves
F5	Daraja Mbili – comparison of fuels on set cooking task
F6	Daraja Mbili – analysis of stoves

LIST OF ACRONYMS, DEFINITIONS AND SWAHILI TERMS

AFREPREN	African Energy Policy Research Network
AMC	Arusha Municipal Council
ARI	Acute Respiratory Infection
AUWSA	Arusha Urban Water Arsha Urban Water and Sanitation Authority
BAT	Business Awareness Training
CAMRTEC	Centre for Agricultural Mechanism and Rural Technology
CBD	Central business district
CDO	Community Development Officer
CDTI	Community Development Training Institute
CFS	Consolidated Fund Service
CHAPOSA	Charcoal Potential in Southern Africa
DFID	Department for International Development
DPU	Development Planning Unit
FAIDA	Adult business education centre/consulting firm in enterprise development
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GoT	Government of Tanzania
HBS	Household Budget Survey
HEP	Hydro Electric Power
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome
HDI	Human Development Index
IGA	Income Generating Activity
IMF	International Monetary Fund
ITDG	International Technology Development Group
KCMC	Kilimanjaro Christian Medical Centre
LPG	Liquefied Petroleum Gas
MCHO	Municipal Community Health Officer
MDG	Millennium Development Goal
MEMKWA	Special 'catch up' primary school programme for children entering school over the age of 7 years
MMOH	Municipal Medical Officer of Health
NEP	National Energy Policy
NGO	Non-Governmental Organisation
PEDP	Primary Education Development Plan
PPA	Participatory Poverty Assessment
PPP	Purchasing Power Parity
PRIDE	Promotion of Rural Initiatives and Development Enterprises
PRSP	Poverty Reduction Strategy Paper
SAP	Structural Adjustment Programme
SDP	Social Development Practice
SEDA	Small Enterprise Development Agency
SEECO	Sustainable Energy and Environment Consultancy Company Limited (subsidiary of TaTEDO)
SIDA	Swedish International Development Agency
TANESCO	Tanzanian State Electricity Agency
TAS	Tanzanian Assistance Strategy
TAOMC	Tanzanian Association of Oil Marketing Companies
TaTEDO	Tanzanian Traditional Energy Development and Environment Organisation
THDR	Tanzania Human Development Report
TOR	Terms of Reference
UCL	University College London
UNCHS	United Nations Commission on Human Settlements
UNDP	United Nations Development Programme
VCR	Video Cassette Recorder

WB World Bank
WHO World Health Organisation
WODSTA Women's Development Science and Technology Agency

Energy transition The replacement of 'traditional sources' of energy with 'commercialised' fuels of increasing efficiency.

Energy ladder Represents the fuel types that might be used by households as their prosperity increases. A typical household Energy Ladder for cooking will progress from traditional fuels (in order: dung, crop residues, wood, charcoal and coal) to modern fuels (in order: kerosene, LP and electricity)

SWAHILI TERMS

faida : profit
jiko : charcoal stove
kibatari : a wick lamp which uses kerosene and is often made from used cans
karaboi : similar to a *kibatari*
kibati : a women's saving group
machingas : street vendors who do not have a permanent site and walk around to avoid paying tax
upatu : a women's savings groups where the group save together
vitenge: garment worn by women made from a piece of cloth rather like a wrap-around skirt.

1. INTRODUCTION

1.1 Background

There are very few micro level studies on energy use and the impact of energy on the livelihoods of the urban poor, despite the fact that urban families may spend a third or more of their income on energy. Furthermore, existing studies tend to address technological/economic issues, rather than social aspects of energy use and are quantitative rather than qualitative in approach.

This DFID funded study (R8321) undertaken jointly by the Community Development Training Institute (CDTI)¹, Tengeru, and the Development Planning Unit, University College London (DPU),² addresses this imbalance by examining the energy/poverty/gender relationships in two urban wards, Daraja Mbili and Kaloleni, in Arusha, Tanzania. The core team was supported by:

- the staff of WODSTA (Women's Development of Science and Technology Association); a local NGO, who were responsible for designing and implementing two community workshops;³
- Arusha Municipality employees at the urban and ward level;
- a virtual steering committee; and
- most importantly, the women, men and children living in the two study wards.

The research has two aims (figure 1.1 Box A):

1. To provide stakeholders (including policy makers, planners and implementers in the public and community sectors) with an improved understanding of how access to energy impacts on the livelihoods of poor urban women and girls. In particular, to consider how changes in the energy decision-making process, and women and girls' energy responsibilities, might affect their capacity to take advantage of educational opportunities (MDG2)⁴ and contribute to their greater empowerment and greater equality in the household (MDG 3),⁵and
2. To contribute to the improvement of the livelihoods of poor urban women and girls in Arusha by providing them with information on how to optimise their use of energy and to begin to strengthen their capacity to take part in the energy decision-making process.

1.2 Approach

In order to address these aims, as shown in figure 1.1, the study was structured in two parts. The first (Box B) was research focused and the second (Box C) practice based. The former set out to test two hypotheses:

¹ Dr. Florence Ghamunga, Theresia Elias, Godfrey Mnzava and Crescent Muhandi

² Dr. Sheilah Meikle and Patrice North

³ The objective of these workshops, which are discussed in figure 4.5 and chapter six, was to enable the study communities to identify and design an energy intervention that would contribute to their livelihoods.

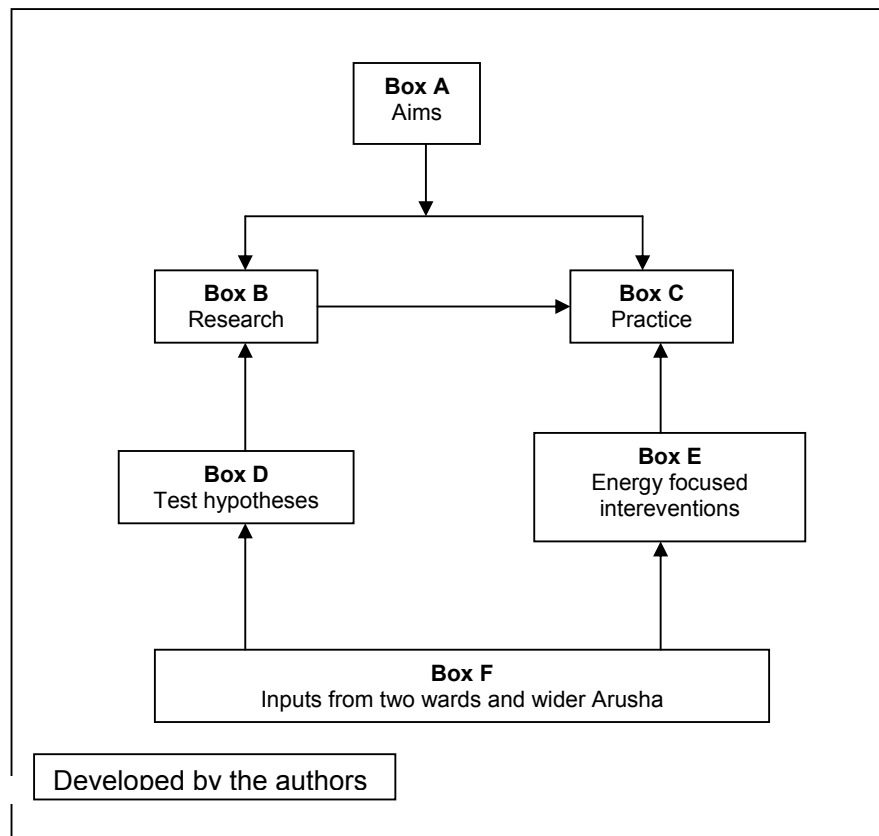
⁴ Millennium Development Goal

⁵ See Appendix A1

- “time saved by using modern energy will result in women and girls having greater participation in educational activities”; and
- “access to modern energy will contribute to gender equality and women’s empowerment.” (Box D)

The practice element of the project enabled residents of the two study wards each to design an energy focused project that can contribute to the improvement of the livelihoods of poor urban women and girls in Arusha (Box E). The entire project was informed by research material from the two wards and wider Arusha.

Figure 1.1: Research approach



The integration of research and practice is an important feature of this study. Although it set a challenging task it proved achievable and has resulted in the community residents feeling that their contribution to the research has already started to benefit their lives. The challenge now is to ensure the long-term sustainability of these interventions. The study process is considered in detail in sections 4.1.2 and 4.3.2 and figures 4.3 and 4.7.

In testing the hypotheses the study adopted a 'gendered social processes' perspective. Specifically it was concerned with processes relating to livelihoods,

resources, knowledge and rights that can be perceived either to enhance or constrain energy use for men and women.⁶

The study was participatory and primarily qualitative in approach, although it also proved possible to collect quantitative data. It incorporates inputs from a variety of stakeholders including the residents of the wards and the research team.

In summary, the study is concerned with:

- understanding how energy is used in poor urban households;
- understanding how poor women and girls can optimise their use of energy through the use of cleaner and more efficient energy;
- testing assumptions concerning the relationship between energy and the achievement of Millennium Development Goals (MDGs) 2 and 3;
- enabling poor women to develop an energy intervention that will contribute to the improvement of their livelihoods.

It examines micro-level evidence about the use of energy and the energy decision making process and compares the situation in poor and non-poor male and female headed households.⁷

The report is in seven parts, in addition to the executive summary; it also includes this Introduction; the Research Focus, Context, Methodology, two chapters of Findings and the Conclusions and Way Ahead. It also incorporates Appendices.

⁶ For more detailed information see ODA, A guide to social analysis for projects in developing countries, 1995, HMSO pp.35-49 or Appendix A2

⁷ The term 'female-headed household' posed difficulty since culturally it was not considered appropriate for a woman to be the head of a household.

RESEARCH FOCUS

2.1 Introduction

This chapter examines key issues pertaining to each of three interrelated bodies of knowledge: poverty, energy and gender, relevant to the research. It concludes by setting out the two hypotheses that are the focus of the study and by listing the research questions that are used to test these hypotheses.

As explained in the previous chapter the study tests the hypotheses from a social processes perspective.⁸

2.2 Urban poverty, energy and gender relationships

2.2.1 Introduction

Africa is urbanising at a rate of 4 per cent per annum.⁹ *Already 37 per cent of Africans live in cities and by the year 2030 this is expected to rise to 53 per cent.* (UN-Habitat: 03) Within these urban areas poverty is a growing phenomenon *with over 70 per cent of African urban citizens living in slums.* (Ibid) Tanzania with a population of 35.6 million in 2001 (HDI: 03), a third of which are currently living in urban areas is characterised as the most rapidly urbanising country in Africa (Sida: 98).

How poverty is understood determines the way researchers, policy makers and practitioners respond to it. This study acknowledges that *Poverty is a multidimensional phenomenon that can be 'conceived as absolute or relative, as lack of income or failure to attain capabilities. It can be chronic or temporary, is sometimes closely associated with inequity, and often correlated with vulnerabilities and social exclusion.* (Dessallien: 98,1) Any definition of poverty is incomplete unless it takes account of how the poor themselves perceive their condition. This study uses an urban livelihood framework to structure poor men and women's perception of their condition.¹⁰

Urban poverty is qualitatively different from rural poverty. *It is characterised by the dominance of the cash economy, increasing reliance on infrastructure and physical assets over the natural environment and increasingly fragmented social relations.* (Meikle and Bannister: 03)

There is a direct connection between access to modern energy and human, social and economic development. (UNDP: 92; Mbewe:00;) *Energy plays a **critical** role in underpinning the Millennium Development Goals (MDGs) and improving the lives of poor people across the world....The wide range of 'energy services'can have a major impact on facilitating sustainable livelihoods....and significantly reducing poverty.* (DFID:02, p1)

Energy poverty, that is *the absence of sufficient choice in assessing adequate, affordable, reliable, safe and environmentally benign energy services to support economic and human development,* (Reddy: 00) constrains economic and human

⁸ A matrix of key social processes is provided at Appendix A2, source ODA,1995, Aguide for social analysis of projects in developing countries, HMSO

⁹ Twice as high as Latin America and Asia.

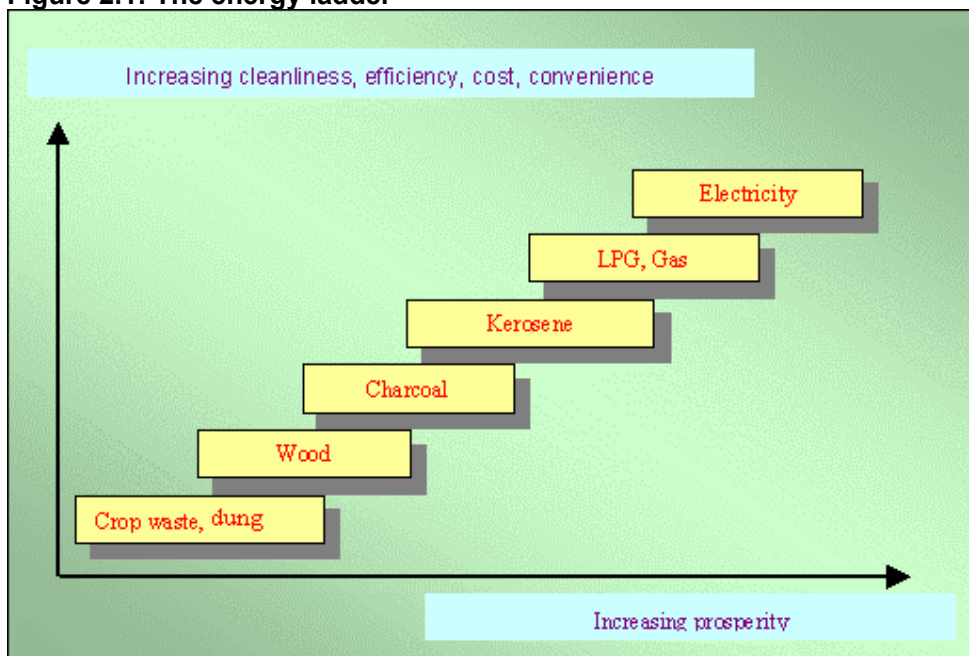
¹⁰ See Appendix B1

development.(Clancy et al: undated; Barnett: 00; Clancy: 02) As Barnett states, two billion people are without access to modern forms of energy such as electricity and oil.

Over time, countries and, within them, individuals, as they acquire more wealth, replace 'traditional sources' of energy with 'commercialised ' or modern fuels and thus move up the energy ladder, figure 2.1. However despite accessing more modern sources of energy they may, as is shown in this study, for cultural and practical reasons, choose to use more than one fuel. Frequently energy poverty has less to do with lack of fuel but more to do with a lack of capital and other resources to put energy to efficient use. (Barnett: 00)

Men and women have different levels of access to different types of energy and different roles in relation to energy. Shortages in a particular fuel may therefore affect men and women differently.(Rukato:undated) The role of women as major users and suppliers of fuel, and the fact that they use energy in circumstances that result in negative impacts for themselves and their children has been recognised for many years. (Cecelski: 84, 2000; Clancy, Skutsch and Batchelor: undated)

Figure 2.1: The energy ladder^a



a. Based loosely on economic theory of household behaviour and the assumption that modern fuels are normal economic goods and traditional fuels are inferior goods (Hosier and Kipanya: 93)

Source: Report on 'Public Health and Household Energy' downloaded from <http://www.sparknet.info/goto.php/qv/th.health/theme.htm>, August 2002

There have been many interventions with the aim of reducing women's energy burden, largely targeted at household energy programmes (e.g. improved cooking stoves; solar cookers). However, these were not always successful, even though women have demonstrated a willingness to switch and experiment with the most suitable fuels for the task at hand (Annecke:99). In part this may be because women were aware that time saved through increased energy efficiency might be filled with drudgery of a different and even more unacceptable kind. In part because, as with

other energy interventions, policy makers have generally failed to involve the poor (men and women) in the design and implementation of energy interventions directed at them. (Katyega:2003^a)

Within the household, women's inferior position means that, despite their major role in the use of energy, they are unable (or, in some cases, unwilling) to affect the energy decision making process. (Reddy:00; Clancy et al:2003) Within such an environment, if there are to be interventions to improve women's access to energy services, there will be a need to address traditional gender relationships and actively involve both men and women. (Annecke:99; Beall and Kanji:99; Clancy et al:2003) Real changes in relations between men and women require real changes in attitudes by both men and women. In many respects, these are the hardest things of all to change. It is therefore insufficient to consider technological solutions and /or more efficient energy alone, as evidence suggests that successful change needs to take account of social as well as technological processes. (Annecke:99; North et al:02; Clancy et al:2003)

Two recommendations made by Mbewe (00) for gender sensitive energy policy and planning - a participatory approach and provision of information and training to empower women in controlling and managing energy resources - are taken up by this study.

2.2.2 The rural context

The connection between fuel choice and its use, and major issues such as gender and poverty reduction have been extensively explored within a rural context. The relevant literature:

- examines the impact of energy on livelihoods in rural communities, where there is a heavy reliance on traditional fuels (crop-residues, dung, fuel wood and charcoal); and
- shows the negative affects on rural household livelihoods in terms of:
 - the opportunity costs of the time taken in the collection and use of these fuels;
 - the low calorific value of the energy produced;
 - the restricted range of end-uses on these types of fuel;
 - ill health caused by smoke and the carrying of heavy loads of wood and poor lighting; and
 - the time involved in the energy process that reduces the time for productive work. (Barnett:00;Celcelski:00; Clancy et al:undated).

By comparison there is a lack of micro level studies on energy use and and its impact on the livelihoods of the urban poor.

2.2.3 The urban perspective

At a macro-level, Hosier demonstrates, in his study of three Tanzanian cities,¹¹ the dramatic intensification of energy use caused by urbanisation and the comparative economic cost of supplying rural and urban residents with energy. Rural residents, who use less commercial energy and have easier access to cheaper but less efficient firewood, are supplied at a third of the financial cost of supplying urban residents. He further shows that each urban area has a unique energy-use *fingerprint* and consequentially energy-use in urban areas is neither *uniform or monolithic* within a

¹¹ Dar-es-Salaam, Mbeya and Shinyanga

country. (Hosier:93) The findings from this current study in Arusha confirm that urban wards also have unique energy fingerprints.

In urban areas there is a lack of direct access to 'free' traditional fuels. Therefore, the urban poor, like all urban residents, have, with very few exceptions, to buy fuel. For the wealthier with larger incomes a smaller proportion of their household expenditure is spent on energy. Whereas the poor spend a significant amount, generally around one third, or even more, of household expenditure on energy. (Hosier: 93; Barnes: 95; Clancy et al: undated; Meikle and Bannister:03)¹² A study in Arusha showed women spending between 25 and 50 per cent of their budget on fuel depending on the seasonal cost.(North et al:2002) In contrast, households in Europe spend as little as 2 to 7 per cent of household expenditure on energy and power.¹³

In the 1990s, the poor in Tanzania, were largely dependent on traditional fuels, and faced a crisis as such fuels became increasingly scarce and expensive. (Hosier and Kipondya:93). This continues to be the case as the energy transition in urban Tanzania proceeds slowly. Despite the large proportions of government investment in energy networks the high cost of energy delivered through these networks means that it often remains beyond the reach of the poor, especially those resident in poor urban areas.¹⁴ Instead there is evidence that the urban poor, in Tanzania as in other developing countries, are in the main using inefficient traditional and polluting fuel sources. (Powell and Starks:00; Katyega:03; Meikle and Bannister:02) While work by Campbell (03) in towns in Zimbabwe, as in other places including the UK, shows that even the wealthiest households continued to combine electricity with other fuels, usually kerosene, when both types are available.

Energy affects all aspects of poor urban households' livelihoods and changes in the accessibility and cost of fuel can have significant impacts not only on the more obvious physical and financial assets but also on social, natural and human assets and household livelihood strategies and aspirations.¹⁵ (Barnes:95; Meikle and Bannister:03)

Women's roles and needs in the household vary according to particular contexts, related to gender divisions of labour, power and control, and may include such issues as legal rights, domestic violence, equal wages, and women's control over their bodies. (Moser:93) At a minimum, women's access to energy services should be analysed at the community and household levels in terms of: access, availability, affordability, security and sustainability. (Anneck:99)

Campbell's somewhat dated and small study in Dar-es Salaam (92)¹⁶ identified a number of issues which are further tested in this current research. These relate to the control over energy expenditure by husbands or other male relatives and the reasons for women's fuel preferences. Campbell suggests that husbands' tendency to assert their traditional authority could be related to a fall in real incomes resulting

¹² In Guizhou, China, in 2000 poor families with less than RNB 500 per month were spending between 30-50% of their expenditure, whereas better off, but still relatively poor households with income over RNB500 were spending 10% of their expenditure on energy. RNB is a Chinese unit of currency. In 2000 8.1 RNB was equivalent to 1US\$. Information from Energy, Poverty and Sustainable Livelihoods DFID KaRs project R7661

¹³ Proportion of expenditure on fuel and power in Finland 2% and Denmark 6.8%. Source Housing statistics in the European Union 2003 - National Agency for Enterprise and Housing Denmark

¹⁴ The energy delivered is usually electricity and more rarely gas.

¹⁵ See Appendix B1 Sustainable Urban Livelihoods Framework

¹⁶ A three-week survey in 17 households in 1991

from a deterioration in the economy in the 1990s. A situation that continues in 2004. Women's fuel preferences related not only to cost but also to a variety of other factors such as:

- wear and tear on pots and pans;
- whether a servant was involved with the cooking;
- traditional ideas about the taste of food and the type and amount of food to be cooked; and
- experience, knowledge and familiarity with a specific fuel.

2.2.4 Energy as an urban poverty transforming vector

This study accepts that energy has a significant role in improving the lives of the urban poor and sets out to clarify the nature of the transforming process. In particular it aims to test the assumptions underlying MDGs 2 and 3, specifically that:

- improved energy efficiency will lead to women and girls having more time for more activities;
- some of the time saved will be used to achieve some (or more) education; and
- that improved education will contribute to women and girls improving the livelihoods of their families and thus reducing their poverty.

In order to do this it addresses two **hypotheses**.

- Time saved by using modern energy will result in women and girls having greater participation in educational activities, and
- access to modern energy will contribute to gender equality and women's empowerment.

To test the hypotheses the study set out to answer eight questions. These are as follows:

The current situation

- What is the level of access to and use of modern and traditional energy in urban households?
- What physical energy assets do people have?
- What are the roles, responsibilities and rights (decision-making) within the household?
- How much time is used in energy related reproductive activities?
- What strategies are used to save time when using energy?
- What is the nature of *energy poverty* in the case study wards?

Opportunities for change and their implications

- What changes in energy role, responsibilities and rights are needed to reduce time spent on energy related activities?
- How will women and girls use the saved time?

3. STUDY CONTEXT¹⁷

3.1 Introduction

This chapter provides the national and local context for the research which was under-taken in two wards, Daraja Mbeli and Kaloleni, in Arusha. In doing so it considers the nature of the economy; the socio-economic conditions and services provided, including education, health and other public services - water, sanitation and solid waste management. In addition it considers the nature of poverty in both Tanzania and Arusha, as well as reviewing energy supply and usage in both places. It ends with a review of gender relationships.

3.2 Location, demography and administration

The **Republic of Tanzania**, located in East Africa (figure 3.1) with a total land area of 945,000 sq.kms, is larger than the combined area of the UK and France. With a population, in 2001, of 35.6 million (HDI: 2003), a third of which are currently living in urban areas (a proportion estimated to grow to nearly a half over the next twenty years) it is the most rapidly urbanising country in Africa (Sida:1998). It has a young population, nearly half (45%) was under 15 and almost two thirds (65%) under 25 years old at the end of the 1990s, (UNDP:99)

Figure 3.1: Map of Tanzania



¹⁷ For a fuller explanation of the Tanzanian and Arusha contexts see Appendix C1

The Republic is divided into 25 administrative regions of which Arusha, located in the north east, and covering 93 sq.kms and with a population of 282,712 (Census 2002), is one of the largest (see figure 3.1). Arusha is divided into 10 districts. The district of Arusha Municipality, governed by the elected Arusha Municipal Council (AMC), is the regional government headquarters and comprises 17 wards. Each Ward has elected community representatives.

3.3 Economy

Despite GDP growth of 6.2% in 2002 (Kigoda:03), Tanzania is a highly indebted country with a weak economy. In 2001 the country qualified for debt relief amounting to approximately US\$3 billion over the next 20 years and nearly half (45%) of the government budget is drawn from foreign aid. (Mramba:03)

Unemployment is a serious problem, particularly for youth and women who are more vulnerable to unemployment than men and this in part explains why the informal sector is the most dynamic part of the Tanzanian economy in both employment generation and provision of relatively cheap basic commodities. By 1990 the informal sector was contributing between 20-30% of GDP.

Arusha is an important centre for tourism and the location of non-governmental organisations (NGOs). In 2000/1, 60% of its employment was agriculturally related. (HBS:0/1). Its economy also benefits from medium-size industry including textile spinning, brewing, and mining of precious and semi-precious minerals. In 2002 it was identified as among the nine highest urban centres of industrial growth in Tanzania but since then there has been an industrial decline.

3.4 Socio-economic conditions and services

3.4.1 Impact of urbanisation

In Tanzania, as in other African countries, there is a lack of adequate social services and infrastructure for the rapidly growing urban areas. This lack of delivery is leading to urban poverty and decay. The public sector's inaction is being filled by the residents' spontaneous actions which are frequently contrary to the plans of public authorities. Such actions have led to the development of the 'informal' city.¹⁸ Both rich and poor live in the 'informal' areas of Tanzania's cities.

Arusha, only a third of which is 'planned', experiences inadequate provision of services and the 'informal' development common elsewhere in Tanzania's urban areas.

3.4.2 Education

Education has consistently received the highest government investment. This together with the Primary Education Development Plan (2001-2006) (PEDP)¹⁹ has resulted in some improved education indicators for the primary sector. In 2002, 97

¹⁸ The informal city comprises informal settlements, informal economic activities, unregulated and not provided for urban development; a breakdown of law and order, slums and poor urban environment.

¹⁹ The PEDP (2001-2006) ensures that every 7 year old is enrolled in Class 1 and abolishes primary school fees. The Plan focuses on the construction of additional classrooms to cope with the huge increase in the number of children. Under the Plan parents and local committees are supposed to start initial construction of classrooms (foundations and walls) and the government then funds the completion and furnishing of the building.

per cent of all seven year olds in Arusha were enrolled in school, a 71% increase over the previous year. But this achievement has generated problems which still need resolution. Primary class rooms are over crowded and a number of older (post 7 years) children are enrolling and require special treatment.²⁰

There is ample evidence, including from this current study in Arusha,²¹ that entrenched traditional patriarchal attitudes permeate the culture and restrict girls' access to education at all levels. (THDR:99 and authors' fieldwork)

The vocational training system also has difficulty meeting the demands placed on it.

Three types of adult education²² exist in Arusha, adult literacy classes²³ and some small-loan related training, are government sponsored, and there are some private for profit and not for profit courses also available.²⁴

3.4.3 Health care

Health care in Tanzania is offered in both informal and formal sectors. The formal sector includes public and private services. The informal system comprises traditional practitioners²⁵ who offer medical services for the urban poor, usually relying on a mixture of herbal medicines and a prayer regime. The formal public health sector has a pyramidal referral structure reaching from the dispensaries to the consultant hospital.²⁶ (Mwaluko et al:91)

98% of **Arusha's** 62 health facilities are private.²⁷ Traditional medicine practitioners²⁸ play an important role in wards that lack formal health care services and for the poor who find modern health care too expensive.

The Municipal Community Health Officer (MCHO) focuses on preventative health and promoting better community health whereas the Municipal Medical Officer of Health (MMOH) has regulating responsibilities for all curative facilities, for compiling health statistics and for alerting the government to incidences of infectious diseases and epidemics. Major problems of concern are lack of funds and issues concerning 'knowledge, attitude and practice'.²⁹

²⁰ There may be five children at one desk, and schools have tried introducing two school session (morning and afternoon) but this is not deemed educationally successful. Added to this burden are a number of older children who enter primary school. Under PEDP, these children are no longer allowed to join Class 1 and have to be taught in a special MEMKWA 'stream' which has a 4 year crash curriculum to help them catch up.

²¹ Interview

²² Run in the wards, there are 26 adult education centres with 159 functional and post literacy classes. Source: Arusha Municipal Non-Formal Education Strategy, 2002-2006, AMC

²³ Literacy classes are held in the wards

²⁴ For more details see Appendix C1 para 3.3.2

²⁵ Some traditional practitioners are registered with the Municipal Medical Officer of Health's office and in this way are a part of the formal health care system.

²⁶ Dispensaries are not allowed to perform operations and usually have a few beds to keep patients overnight. Patients with more serious medical conditions are referred to a Health Centre and then, if necessary, to a District and then a Regional hospital. The pinnacle of the formal public health care system is the consultant or referral hospital. There are four referral hospitals allocated according to zones i.e. Muhimbili National Hospital (east), Kilimanjaro Christian Medical Centre (KCMC) (north), Bugando Hospital (west) and Mbeya Hospital (southern highlands).

²⁷ These include hospitals, health centres and dispensaries

²⁸ While some practitioners are registered under the Medical Officer of Health, many are not.

²⁹ Key Informant Interview

The three most prevalent diseases in Arusha are malaria, acute respiratory infection (ARI) and HIV/AIDs.

3.5 Other services

Water and sanitation

Municipal services have declined both in quality and quantity. Management of water supply and sanitation systems and services are now provided *de facto* almost exclusively by the community. (UNCHS:98) Municipal authorities lack the funds to buy and maintain necessary equipment and vehicles. Nationally it is estimated that 35% of the population is without sustainable access to an adequate water source.

Although GoT has plans, (since 2002) to improve the provision of clean water supply and removal of sewerage in urban areas by focusing on rehabilitating and expanding the water and sewerage infrastructure and providing facilities to urban water authorities in order to enhance their operations, progress is slow (i.e. a 3% increase in provision between 2001 and 2002) (GoT:03)

A water supply is accessible to 88% of the urban population of **Arusha**. However many of the urban poor cannot afford the metered water supply and buy water from local suppliers. The use of ground water (i.e. wells) is limited.

Waste water is a major problem in unplanned settlements and flows either down the middle of narrow streets or in drainage ditches at the side of the streets which often overflow in the wet season.

Figure 3.2: Arusha: percentage use of sewerage system by type

	Planned settlement	Unplanned areas
Septic tank linked to soakage pits	78	5
Pit latrines	8	92
Conventional piped sewage system	14	3

Source: PPA 2001

Solid Waste Management³⁰

AMC has 40 skips³¹ which are distributed among the 17 Wards. This means that many streets are without a skip. Households and businesses are charged for solid waste management services.³²

3.6 Poverty

Tanzania is ranked 59 out of 94 developing countries on the UNDP HPI-1³³ scale (UNDP:03). *To be poor in Tanzania is to have few or no choices – it means no security either in financial, legal or social terms* and, generally, women and youth are poorer than men. (SIDA:00)

³⁰ Key Informant Interview

³¹ 30 provided by the World Bank; 10 purchased by the AMC.

³² Households are charged TSh500/month (TSh10,000/month if in CBD); TS64,000/year for businesses At August 2004 1US dollar = 78.6 Tanzanian Shillings; 1 sterling pound = 144 Tanzanian shillings

³³ Calculated for the following 3 indicators of *deprivation*: a long and healthy life (probability at birth of *not* surviving to age 40) , knowledge (adult literacy rate) and a decent standard of living (% of population without sustainable access to an improved water source and % of children under weight for age)

Government's 2025 Development Vision (DV) (GoT:97)

Since 1997 poverty reduction is the main focus of the Government of Tanzania's (GoTs) development efforts. Vision 2025 has been developed into two strategy papers – the Tanzania Assistance Strategy (TAS) and the Poverty Reduction Strategy Paper (PRSP). TAS establishes poverty reduction as the core issue for international co-operation and the PRSP sets out the actions to be taken in the medium term.

Despite the DV there is no significant improvement in income and non-income (health, education, employment and housing) poverty over the ten years from 1991.

Key characteristics of urban poverty are set out in Figure 3.3.

Figure 3.3: Characteristics of urban poverty in Tanzania

- Growth of unplanned areas
- Rising unemployment in the formal sector
- Growth of informal sector
- Poor access to urban infrastructure and social services.
- Decreasing wage incomes
- Increase of survival strategies by urban residents on marginal activities
- Decreasing urban employment in public and private sector creates 'new poor' as well as those coming in from rural areas.

Source: Mwaiselage:1999

In Arusha a greater proportion of the population fall below both the basic needs and food poverty lines, than in Tanzania as a whole. Key findings of the Participatory Poverty Assessment Study 2001 are given in figure 3.4.

Figure 3.4: Findings of the Poverty Assessment Arusha 2001

- Poor households with fewer adult members contributing to the household income are the most vulnerable especially female-headed households and the households of the elderly.
- Most of the urban poor are faced with a trade-off between allocating their minimal earnings to food or paying other important expenses such as school fees or medical care
- Most of the urban poor are migrants most of whom are found in marginalised activities This finding was not supported by the present study. Many of the in Kaloleni and Daraja Mbili had lived in these communities for more than 15 years].
- Poverty eradication efforts have not been successfully translated into local government's plans and programmes and efforts at poverty eradication are often left to the community development department of the Municipality.

Source: Participatory Poverty Assessment: 2001

In Arusha, as in Tanzania as a whole, women are likely to be poorer than men for the reasons set out in Figure 3.5.³⁴

³⁴ They are often less mobile and they normally have less stable incomes and assets, leading to less flexibility in terms of their choice of income generating activities, housing security and opportunities for gaining access to social networks.

Figure 3.5: Reasons for women's greater poverty

- outdated customs and and culture are not friendly to women (ie. do not own property);
- higher levels of illiteracy (although this was not borne out by the data for Kaloleni and Daraja Mbili from the 2002 Non-Formal Education Survey);
- not involved in decision-making;
- they spend their incomes on family needs;
- they have no command over the income they generate;
- they use poor equipment in their activities;
- lack of freedom of movement due to confinement by their husbands;
- they are not able to secure employment because of illiteracy and lack of skills.

Source: Participatory Poverty Assessment Study 2001

3.7 Energy

3.7.1 National Energy Policy

Tanzania's National Energy Policy (NEP) was formulated in 1992 and was updated in 2003. The new policy aims to establish '*an efficient energy production, procurement, transportation, distribution and end-use systems in an environmentally sound and sustainable manner and with due regard to gender issues*' (GoT:03,1)

In detail the new policy:

- recognizes the relationship between energy and poverty and energy and gender;
- acknowledges that the high cost of commercial energy and the related equipment is a major constraint for the poor;
- recognises the need to change prevailing practices in energy use; but
- fails to incorporate strategies for achieving desired changes., specifically in the household energy sector.

The NEP gives extensive consideration to the rural energy problem but, apart from some generalised statements relating to the demand for energy and crosscutting issues relating to energy, it makes little reference to urban needs and supply. The GoT delegates its responsibility to the private sector in urban areas.

3.7.2 National energy supply and demand

Tanzanian energy usage comprises:

- Wood and biomass: 90%
- Petroleum products: 8%
- Electricity: 1.2 - 2%
- Coal and renewable energy: approx. 1%³⁵

The domestic sector is the largest energy consumer.

Easy availability, transportation and storage, as well as familiarity and affordability all cause public opinion to favour charcoal. Moreover charcoal production in eastern Tanzania is a major source of employment and income to many rural and urban dwellers. Adoption of energy-efficient stoves, such as a charcoal stove (*jiko*) that is cheap to buy - or can be made with moderate skill from scrap metal - is not as widespread as was hoped despite promotion by NGOs.

Although both rural and urban dwellers use firewood for cooking, the former are the predominant users.

³⁵ Key Informant Interview

Tanzania, despite having considerable oil and natural gas reserves in both coastal and offshore basins, currently has no national production of petroleum. Tanzania has the Songo Songo natural gasfield, (recoverable reserve of 14 billion m³ and total reserves of approximately 28 billion m³); the benefits of the current development work are not likely to be felt by domestic consumers until well into the future.

The government took an initiative to stimulate the use of LPG by reducing tax by 50% in July, 2003. No statistics are available to indicate whether this has resulted in greater use of LPG. The findings from this study provide no evidence that suggests there has been an increased take-up of LPG since 2003.

Kerosene is imported by private oil companies, and sold at petrol stations. The established kerosene distribution network facilitates its use in low-income urban and rural households. It may be more appropriate to subsidise kerosene than electricity since the benefits are less likely to be enjoyed by wealthier families. (Hosier and Kipondya:93)

Tanzania has a national supply of 860 megawatts of electricity with 65-70% generated by HEP dams and the rest by diesel and coal fired turbines (i.e. thermally produced). It is not possible for the country to have a stable fuel mix as fuel swapping between cheaper HEP (6c per unit) and more expensive diesel (15c per unit) generated electricity is sometimes necessary when the rains are poor.³⁶

TANESCO, the 100% government owned parastatal that is responsible for the national electricity supply has technical shortcomings, poor financial returns and management problems. The government is in the process of restructuring TANESCO and has recently entered a contract management deal with a private sector company in South Africa which has already resulted in changes to top management.

Approximately one tenth of households in Tanzania report a connection to the National Grid but this is largely in urban areas. Arusha is one of the regions with the highest number of households connected to the Grid. Affordability is a key constraint to electricity use in urban areas as was borne out by this study.

There has been considerable talk about renewable energy but there has been minimal allocation of funding³⁷.

3.7.3 Urban energy

Tanzanian cities have weak energy infrastructure and urban areas suffer from frequent power interruptions as a result of inadequate supply due to technical problems³⁸. Hosier (1993) notes three main reasons for the heavy reliance on traditional fuels for urban energy needs:

- low income levels;
- limited energy infrastructure; and
- erratic supplies of modern fuels.

³⁶ If the rainfall is good, HEP is run; if there is not enough water, then thermal has to be run and the government is making an effort to replace diesel turbines with open cycle gas turbines in an attempt to reduce the costs of electricity generation.

³⁷ Key Informant Interviews – Ministry of Energy and Minerals

³⁸ Ageing machinery, lack of fuel or spare parts, low water levels especially during the dry season

Charcoal, firewood, kerosene and electricity are currently the major energy sources for urban areas. The dominant fuels being charcoal and firewood which together account for 80% of cooking usage. 70% of households use kerosene for lighting, and a further 30% use electricity.

3.7.4 Supply and use of energy in Arusha

There is a large deficit between the supply and demand for wood and charcoal in Arusha District.³⁹ The electricity network is substandard and poorly maintained, at least partly because of lack of funds resulting from failure by customers to pay. Currently there is an annual shortfall in income to TANESCO of nearly a half a billion Tanzanian shillings. Tanesco is adopting a number of strategies to improve payment of charges and repayment of debt.

Most households in Arusha currently use firewood and charcoal in preference to electricity and gas. Very few use electricity for cooking. Restaurants and guest houses are all significant users of woodfuel. In addition, Arusha's textile industry and brewery have also reverted to using woodfuel because of high electricity costs. Because of their demand, this further reduces the availability and hence raises the cost of this energy source for domestic consumers⁴⁰.

3.8 Gender

3.8.1 The cultural paradigm

The cultural paradigm still considers women, despite evidence of changing male and female economic roles and responsibilities, as subservient to men. Men are still expected to be the bread winner and women to be married and perform all the reproductive work including care for children, the old, sick and disabled. These responsibilities are rarely supported by improved technology. Boys are commonly preferred over girls. This social preference for boys by family, community and the legal system gives them more options to succeed than girls. Girls are nurtured to become women who are non-argumentative, non assertive and quick to accept defeat and subordination. *In school, they (girls) are often assigned domestic activities, such as fetching water for teachers and cooking for the bachelors, limiting their time for study. Boys are given more time after school for sports, while girls are usually assigned household chores.* (Mzinga: undated)

3.8.2 Household structure

The nuclear family comprising a married couple with children is more common in urban areas than the large extended families that predominant in rural areas. Although as shown in this study such extended families are still relatively common in some poor urban areas.

Growth in number of female headed households

Over a quarter (28%) of all urban households (excluding Dar-es-Salaam) were headed by women in 200/1 (HBS: 02). There has been a growth of 4 per cent in the number of households headed by women over the decade since 1991/2. This increase is attributed to divorce, separation of spouses, or because of death of the husband. An increase in broken marriages is credited to the social disruption

³⁹ Currently there is regional demand of 3.2 billion cubic meters. The current regional supply is 2 million cubic meters (if all the wood supply was depleted). The sustainable capacity (without degradation) is 100,000 cubic meters.

⁴⁰ Key Informant Interview

resulting from globalisation and structural adjustment programmes. The increase in widowhood appears, in large part, to result from the impact of HIV/AIDS.

HIV/AIDS

During 2002 the number infected with HIV/AIDS reached 2.2 million (6.5% of population).⁴¹ A government agency (TACAIDS) was established in 2001 and the increased percentage of the government budget allocated to this agency in 2003/04 indicates the seriousness of the HIV/AIDS problem. (Mramba:03)⁴²

3.8.3 Education and literacy

There is evidence that entrenched traditional patriarchal attitudes permeate the culture and restrict girls' access to education at all levels. (THDR:99 and authors' fieldwork). In 2002, in Arusha approximately two thirds of those deemed illiterate were female.

3.8.4 Productive role

The 1970s and 80s saw a marked increase in the economic participation rate of women from 7% (1971) to 65% (1990). (Trip:94) In all probability this rate will have increased still further since then due to the growing pressures of structural adjustment and globalisation in the 1990s and early 2000s.

Young and old women are engaged in beer brewing, operating small mobile food stalls selling doughnuts, peanuts, and ice cream, gardening, poultry keeping, pig keeping and selling charcoal and firewood. (Koda: 95)

Finance and credit

As head of the household, husbands usually control household finances.

Female entrepreneurs working in the informal sector have little access to credit due to the limited size of their ventures, lack of collateral and their inability to generate savings. (Omari and Koda:91) Although some women in towns use formal savings and credit societies and postal savings accounts the major saving mode for most women is *upatu* and *kibati*⁴³.

Power relations

Women's increasing economic responsibilities and power fails to relieve them of their productive role. With the result that they have an increased workload. As explained by Koda (91) men's tendency to ignore household responsibilities has not been sufficiently challenged.

The division of labour, development of the labour force (male and female) and changes in the decision-making process at the household level are key to the alleviation of poverty. For this reason the authors support Biermann's (97) plea for more research into understanding household allocation of resources, in order to enable policy makers to devise social policies which will affect changes at household level for the better.

⁴¹ These figures are based on the number of people that are tested at health centres and hospitals

⁴² 0.5% in 2001; 0.4 in 2002; 1.6% in 2003. Mramba (2003)

⁴³ See Glossary

This study contributes to this understanding by clarifying the relationships around the energy decision-making process in urban households, and by raising awareness, of poor households and other stakeholders, of the importance of the energy process and the access to energy services for improving the sustainability of livelihoods.

4. METHODOLOGY

4.1 Introduction

4.1.1 The team

The team for this DFID funded project⁴⁴, which was undertaken in two wards in Arusha, Tanzania, comprised the Community Development Training Institute (CDTI),⁴⁵ Tengeru and the Development Planning Unit, University College London (DPU).⁴⁶ The core team was supported by WODSTA (Women's Development for Science and Technology Association), a local NGO⁴⁷ that was responsible for designing and implementing two community workshops,⁴⁸ a variety of Arusha Municipality employees at the municipal and ward level and, most importantly, the poor women, men and children living in the two study wards.⁴⁹

Dr Sheilah Meikle was responsible for the overall direction of the study.⁵⁰ In addition to regular weekly team progress meetings in Arusha, there were also email and telephone communication between London and Arusha. In the absence of the Principal of CDTI these meetings were managed by the DPU researcher, Patrice North. The study also had a virtual advisory group.⁵¹

4.1.2 Study location and process

In order to address its two main aims the project was structured in two parts. The first was research focused and the second practice based. The former set out to test two hypotheses:

- *“time saved by using modern energy will result in women and girls having greater participation in educational activities”* and
- *“access to modern energy will contribute to gender equality and women's empowerment.”*

The latter enabled residents of each of the two study wards to design an energy focused project that can contribute to the improvement of the livelihoods of poor urban women and girls in Arusha.

The fieldwork was undertaken in two urban wards, Daraja Mbili and Kaloleni, in Arusha, Tanzania. As discussed in chapter 5 and summarised in figure 4.1 there are distinct differences between the two wards.

⁴⁴ KaRs Contract No. R8321 29 August, 2003 – 30 June, 2004

⁴⁵ Isack Chimile (original Tanzanian study leader) Salum Selenge, Tanzanian study leader after death of Isack Chimile; Dr. Florence Ghamunga, Theresia Elias, Godfrey Mnzava and Crescent Muhandi

⁴⁶ Dr. Sheilah Meikle, Principal Research Investigator - overall study management and Patrice North, researcher

⁴⁷ Lyne Ukio, Lydia Joachim and Amanulas Kibona

⁴⁸ The objective of these workshops which are discussed in figure 4.5 was to enable the study communities to identify and design an energy intervention that would contribute to their livelihoods.

⁴⁹ Blandina Nkini, Community Development Officer for Kaloleni ward was particularly active on behalf of the study

⁵⁰ The various management tools and a fuller description of the process is set out in figure 4.3 and appendices D1, D3 and D5

⁵¹ Alison Bannister, Future Energy Solutions; Maneno Jackson Kateyga, Principal Researcher, TANESCO; Edina Mangesho, Director of Gender Development, Ministry of Community Development Gender and Children; N.C.X. Mwiha, Assistant Commissioner, Renewable Energy, Ministry of Energy and Minerals; Justina P.L. Uisso-Rusali, Senior Research Officer, Ministry of Energy and Minerals; Estomih N. Sawe, Executive Director, TaTEDO.

Figure 4.1: Comparison of Daraja Mbili and Kaloleni wards: key indicators

Name of ward	Daraja Mbili	Kaloleni
Layout	unplanned	planned
No. streets ^a	6	3
Socio-economic condition	poorest	better off
Family size	3-19	1-14
Type	urban	Urban/peri-urban

^a A local administrative unit below the ward level

Source: Project fieldwork

The integration of research and practice was an important feature of this study. Although it set a challenging task it proved achievable and has resulted in the community residents feeling that their contribution to the research has already started to benefit their lives. Further consideration is given to the characteristics of this process; its length, its various components and the linkages among them, as well as the location of the various activities, is set out in figure 4.2: the study process.

There follow sections on the research and practice components and a conclusion.

4.2 Research component

4.2.1 Introduction

The research was participatory and primarily qualitative in approach, although it also proved possible to collect quantitative data. It incorporated inputs from a variety of stakeholders including the residents of the wards and the research team.

Specifically, this component was concerned with:

- ❑ Understanding how energy is used in poor urban households
- ❑ Understanding how poor women and girls can optimise their use of energy through the use of cleaner and more efficient energy
- ❑ Testing assumptions concerning the relationship between energy and the achievement of Millennium Development Goal (MDG) 2 and 3.

In order to examine these three issues it collected and tested information using a number of tools and a process of triangulation as set out in figures 4.4 and 4.5.

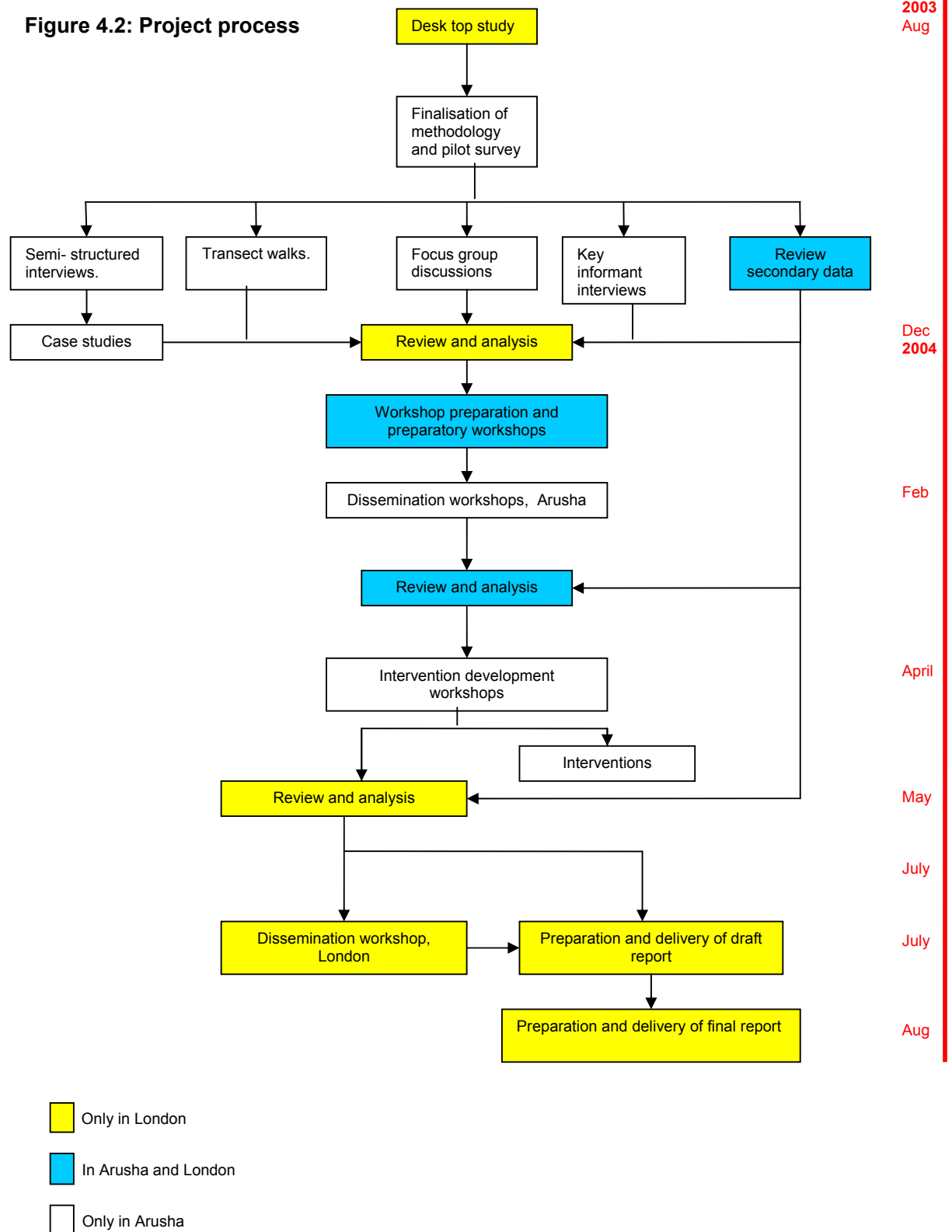
Through prudent management of funds and as a result of the strengthening of the £ sterling against the Tanzanian shilling over the project period it was possible to undertake 8 workshops, 5 more than those required by the research contract.

4.2.2 Study samples

The study sampled 60 households in each of the 2 wards. The sampling frames were the ward registers in each street. Households sampled in each street were proportional to the number of households registered in each street. This resulted in more interviews in the poorest streets. It was originally intended to interview a small sample of women in male-headed households as a control group. As this sample was very small this strategy was abandoned. See Appendix D7.

In order to compare the energy role, responsibilities and rights of women in poor and less poor households; and in female headed and male headed households the semi-

Figure 4.2: Project process



structured interview samples were divided in the proportions set out in figure 4.3. for both wards. Women were interviewed in all four sub-groups. Men were interviewed in male-headed households.

The study used a well-being matrix to differentiate between poor and non-poor households. The ward-elected leaders and executive officers determined the indicators used in this matrix, as set out in figure 4.6. The initial discussions resulted in three levels of well being: rich, moderately poor and poor.

Figure 4.3: Semi-structured interviews by sample selection

	Male headed households ^a		Female headed households ^b		Total
	Poor	Non-poor	Poor	Non-poor	
Daraja Mbili	15	15	15	10	55
Kaloleni	15	15	14	15	59
Total	30	30	29	25	114

^a includes man and woman in each household. ^b only women interviewed.

Source: Authors

4.2.3 Definititons - poverty and gender

The team identified two possible Swahili words for 'poverty', *ufukara* and *umaskini*. The former, which in translation implies absolute poverty or destitution and is associated with physical disability, was unacceptable to the Ward Livestock Officer for Kaloleni ward.⁵² Once this had been identified, the milder *umaskini* was used. This is taken to mean *the inability to sustain oneself in life. The poor standard of life which people experience in the environment in which they live. It is caused by the people themselves.*⁵³

The term gender was given its conventional definition.

4.2.3 Dissemination⁵⁴

Dissemination of the draft findings occurred in the process of study. Dissemination events completed are:

- Press conference, February 2004, Arusha, prior to, and to advertise, the February workshops.
- Articles in Arusha Times 21-27 February, 2004
- WODSTA community energy workshops, 30th April and 3rd May, 2004
- Publication in the DPU News, Issue 46, February 2004 www.ucl.ac.uk/dpu/
- Publication UCL Newsletter, August 2004
- Publication in DFID Energy News, Issue 18, May 2004 www.dfid-kar-energy.org.uk
- Publication in DFID Urbanisation News, Issue 18, May 2004 www.lboro.ac.uk/garnet/UrbanKaR/DFID-KAR-URBAN.html
- Workshop, DPU London 23 July 2004.
- WODSTA will include an article in the next Newsletter (tba).REFERENCE
- Interworld Radio, part of the Panos Institute, London will use this study in a programme in early 2005.
- Arusha Times website 21-27 February, 2004 www.arushatimes.co.tz
- Dissemination workshops, 18 and 19 February, 2004 (see figure 4.5)

⁵² Kaloleni Focus Group Discussion

⁵³ Focus Group discussion with Youth group in Kaloleni

⁵⁴ Press release, press cuttings, workshop programmes, and lists of participants are included in Appendix D8

It is also planned to submit material for publication to id21, ITDG Boiling Point, Headon (Household Energy Network), SPARKNET (Energy network for East Africa) and ENERGIA (International Network on Gender and Sustainable Energy); Development and Change; and Environment and Urbanisation. A DPU Working paper is in preparation and will be published as a hard copy and on the DPU website. There will also be posters in the energy focal point in each of the two wards. The Principal of CDTI has agreed to include information on the study and more generic material on energy/poverty/gender in the next CDTI curriculum.

Figure 4.4 Summary of tools used

Tool	Total number
<p>Semi-structured interviews These were undertaken with women in female-headed households and men and women in male-headed households in 3 streets in each of the study wards. The nature of the sample is described in 4.2.2. Interviews lasted between 30-45 minutes. The guideline for the interviews is given in Appendix D1</p>	114 ^a
<p>Key Informant interviews Key informant interviews were held with individuals from the public, private and community sectors in Arusha and Dar-Es-Salaam. A full list in Appendix D2</p>	31
<p>Case studies Four case studies were undertaken in each of the two study wards, one each of male-headed poor and non-poor and female-headed poor and non-poor. The case-study respondents were selected because their original interview or a meeting with a team member raised issues of particular interest. They further elaborated information from the semi-structured interviews. Each case-study discussion took between 60 and 90 minutes. The sustainable urban livelihoods structured the responses. Information from these case studies is incorporated in boxes in Chapter 5. A fuller description is given in Appendix D3</p>	8
<p>Focus group discussions (FGD) Three FGDs were held in each ward; with representatives of three sets of stakeholders: ward extension workers, elected ward leaders and youth⁵⁵. Each FGD comprised, by design, a mix of men and women, as the participants in all 3 groups were used to working together in a mixed male and female environment. This mix of participants led to lively and informative discussions and exchanges. A detailed breakdown of the participants by FGD is given in Appendix D4.</p>	6
<p>Workshops Four types of workshop were undertaken, each with a different purpose. See figure 4.4</p>	10
<p>Transect walks A transect walk was undertaken in the 3 streets of each ward. The observation guideline used is given in Appendix D5</p>	6
<p>Secondary data A wide range of published and unpublished documents were collected and used. A complete list is given in the bibliography.</p>	

Source: Report authors

^a 6 short of planned sample - one unusable, because of incorrect classification, and impossible to obtain 5 more interviews from non-poor female headed households in Sanare - the poorest street in Daraja Mbili

⁵⁵ The Tanzanian research team defined *youth* as boys/men and girls/women between the ages of 15-20 years.

Figure 4.5: Types of workshops⁵⁶

Purpose	Participation	Facilitating organisations	No.
<p>Preparatory Held in February 2004 they introduced interviewed members of the community to the issues to be covered in the dissemination and testing of findings workshops. They aimed to communicate the main preliminary findings from the study; engage local residents in 'testing' them out; raise awareness of the relationship between energy, poverty and gender and the impact on household livelihoods; identify key local energy problems and start to think about possible solutions. This served to increase the confidence of both the men and the women by providing a solid knowledge base and encouraged their participation in the next round of workshops held in the wards.</p>	<p><i>Kaloleni:</i> 12 people <i>Daraja Mbili:</i> 17 people</p>	DPU CDTI Community Development Officers (CDOs)	3
<p>Dissemination and testing of findings A workshop was held in Daraja Mbili on 18 February and in Kaloleni on 19 February. These shared the initial findings of the study with a range of stakeholders and sought the participants' comments on the reality and nature of the findings. They also identified a number of key local energy-related problems. N.B Videos in Swahili are available of both these events</p>	<p><i>Daraja Mbili:</i> 31 people Kaloleni: 32 people</p>	DPU/CDTI team	2
<p>Development of community energy intervention Two workshops were held in Kaloleni and Daraja Mbili Wards on in 30th April and 3rd May, 2004 respectively. These allowed residents to revisit the problems identified in the February workshops and identify and design an energy intervention. This event also included a demonstration of the time taken to cook a ¼ kg of meat using a variety of fuel types⁵⁷ using ordinary stoves as well as using a wonder basket to cook 2 kgs of rice. The demonstrations were in the open and attracted a crowd from the neighbourhood apart from the participants. This proved invaluable in raising the interest of both women and men in energy issues.</p>	<p><i>Kaloleni:</i> 24 people Daraja Mbili 26 people</p>	WODSTA CDTI CDO	2
<p>Dissemination and testing findings After completion of the draft findings a workshop was held at the DPU, London with professional energy and social development advisors to critically review the study.</p>	14 people	DPU	1

Source: Authors

The DPU Master's programme in Social Development Practice (SDP) is already using findings from the study and the 2004 programme will incorporate reference to energy/poverty/gender in one of the course's four core modules on poverty debates. DPU's SDP students undertook their two-week field study in Arusha (May 2004) where they worked with the CDTI team on energy/poverty/gender in the two study wards. Their focus of interest was productive rather than reproductive energy.⁵⁸

⁵⁶ NB Full information on participants, programmes, issues examined, and evaluation of the activities is given in Appendix D6

⁵⁷ Fuels used were saw dust, charcoal, sawdust briquettes, used oil, kerosene.

⁵⁸ The student's TOR for the field study is incorporated in Appendix D9

Figure 4.6: Wellbeing matrix used to differentiate between the poor and non-poor in the sample areas

Livelihood Indicators	Rich	Moderately Poor	Poor
1. Type of housing (structure - construction materials; no. of rooms etc.)	Constructed from concrete blocks, plastered, painted, with good roofing materials and ceilings. Glass windows. Good quality tiled flooring. Well ventilated. Private space around house. No flooding.	Constructed from concrete blocks but not properly finished. Corrugated iron or tin roofing. Partial plastering and painting and no ceilings. Open windows with metal grille/wood shutters. Bare concrete floors. Poor ventilation. May have small private space around house. No flooding.	Constructed from sticks and mud and with corrugated iron or tin roofing. May be roughly held in place with heavy stones. No plastering or painting. None or only 1 window opening. No ceilings. Earth or poor quality bare floors. Poor or no ventilation. No private space around house. Liable to flooding.
2. No. of rooms	3-4 bedrooms or more, sitting room, indoor kitchen, bathroom and toilet. Spacious rooms.	2-3 bedrooms, sitting room, kitchen and may have inside toilet. Small rooms.	1 or 2 small rooms only. No inside kitchen or toilet.
3. Household furniture and appliances	Full range of electrical appliances – cooker, fridge, microwave, TV, radio, VCR. Telephone (landline and/or mobile), dining suite, wardrobe, beds, mattress, carpets/ rugs, curtains.	Limited range of electrical appliances - TV, radio. May have fridge. Basic furnishings. No carpets.	No electrical appliances. May have cheap radio. Extremely basic furniture and household utensils. Owns almost nothing.
4. Type of toilet	Water closet.	Own toilet/pit latrine (i.e. not shared)	Shared pit latrine.
5. Access to water	Own internal piped water supply.	Own external piped water supply.	Shared external water supply/no running water and has to buy.
6. Type of energy	Connected to electricity supply. Uses for lighting and cooking. Uses charcoal and kerosene for cooking.	Connected to electricity supply. Uses for lighting only or may be disconnected. Uses firewood, charcoal and kerosene for cooking.	No electricity. Kerosene lighting. Firewood (mostly), charcoal and kerosene for cooking.
7. Type of employment	Secure employment with regular income (civil servant or profession). Retired/pension.	Not in employment or retired/pension.	Not in employment or dependent on relatives or social handouts.
8. Type of IGA or entrepreneurial activity	Owns 1 or more businesses – exports/ wholesale/retail	Small scale IGA – agricultural produce, keeps livestock, sells water, food vending. May rent room(s) in house/yard.	Extremely small scale IGA - day labour or street vending or none.
9. Type of food consumed at every meal	Well balanced diet; protein, fat, vegetables, fruit	3 meals per day but not balanced diet and lacking variety.	Stiff porridge; soured milk. Snacks on corn, cassava etc. Poor quality unbalanced diet.
10. Number of secondary school aged children in formal education	All in secondary education; ability to pay for private education.	Some in govt. secondary education. Cannot afford private schools.	None or only selected child in govt. secondary school.
11. Ability to afford health care services	Use of AMC hospital or private health care. Can afford medicines.	Use of health clinic in Kaloleni, dispensary or trad. Medicine. Can not afford private health care. Difficulty affording medicine.	Use of health clinic in Kaloleni, dispensary or trad. medicine. Cannot afford private health care. Can not afford medicines.

Source: Ward elected leaders and executive officers

4.3 Practice component

4.3.1 Introduction

This practice component aimed to provide poor women and men with information on how to improve their use of energy and begin to strengthen their capacity to take part in the energy decision making process, and thus contribute to the improvement of their livelihoods. The community working with WODSTA, CDTI and the CDOs to identify design and establish an energy intervention addressed these aims in both wards.

4.3.2 The process

As shown in figure 4.2 the identification, design and establishment of the focal point interventions was an integral part of the overall project process.

Figure 4.7 unpacks and further elaborates the practice component process. It demonstrates how research activities and findings (boxes A/2 and D) have fed into and influenced the mobilisation of the ward communities to successfully identify, design and establish locally resourced and sustainable energy interventions. Most importantly it stresses the need to motivate key stakeholders.

The DPU staff was able to take advantage of their visit to Arusha with their students in May 2004 to review the WODSTA report of the ward community energy intervention workshops. By that time the two communities had both identified focal points as their interventions; prepared action plans including budget projections; established focal point committees; identified locations for the focal points; and, in the case of Kaloleni, had programmed a forthcoming event.

A key issue is the provision of resources to sustain the fledgling interventions. The DPU team was able to negotiate with:

- the Principal of CDTI to provide a student intern on a regular six-monthly basis to each focal point to provide an informed community development worker to assist with activities and day to day management;
- the AMC Chief CDO to discuss the possibility of providing IGA grants (from existing AMC committed funds) for women with the focal point committees as a possible source of funding for energy related IGAs linked to the focal points, for example, the production of locally produced energy saving stoves.
- The AMC Adult Education Officer prepared to liaise and cooperate with both Chief CDO and CDTI

WODSTA had already agreed to act as intermediary in obtaining sawdust briquettes and energy saving stoves in bulk and supplying them in small quantities to the focal points to sell. The focal points will obtain a small profit from these sales which will provide finance for their various activities. The Mayor sees these focal points as demonstration projects. If they prove their value he is prepared to roll them out across the remaining 15 wards.

4.4 Conclusions

The methodology was sound and it proved possible to successfully integrate the research and intervention components.

The authors, as set out in figure 4.8, have identified a number of variables within the operational environment of the project that had a positive impact on its performance and outcome. It would be interesting to weigh these variables and produce a ranked list. This would involve the use of a tool such as pair-wise ranking⁵⁹ by all of the stakeholders involved in the practice component. This has not been done and the list given is one developed by the authors and therefore is not ranked. Nevertheless this figure incorporates the lessons of experience which have value in their own right.

⁵⁹ For a full explanation of this analysis see Slocum, Rachel, et al, 1995, *Power, Process and Participation - Tools for Change* IT Publications, page 175

Figure 4.7: Practice component process

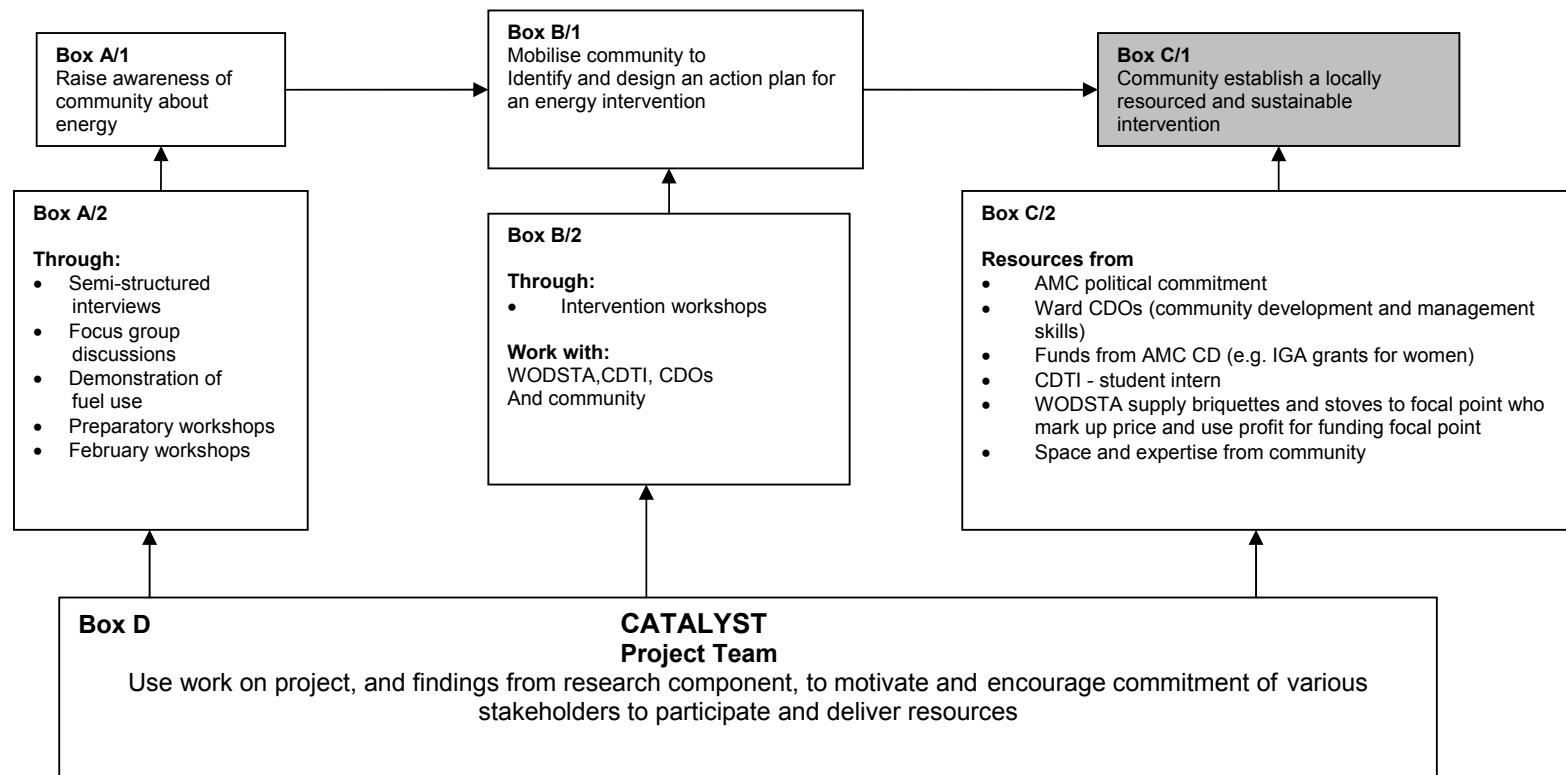


Figure 4.8: Variables influencing the performance of the practice component

Variable	Comment
Length of association	
Established working relationships	Sheilah Meikle, the principal researcher, the CDTI team and AMC have worked together with DPU students in Arusha since 1999. During that time they have worked on a variety of social development field work projects, two of which were energy focused. Patrice North was a member of the 2002 student body. During this period it has been possible establish open and effective working relationships.
Local presence and experience	CDTI and WODSTA are local organisations. DPU has worked in Arusha for the past 5 years. All partners therefore have understanding of the nature of the local institutional and cultural context.
Inherent and acquired characteristics	
Team members	Key team members had the relevant skills, knowledge and commitment to undertake this work. They had the ability to encourage the participation of others, adapt to challenging situations and keep the study focused. They were also able to work concurrently at a number of distinct but mutually reinforcing levels. They were able to take advantage of opportunities and to identify, work with and develop others.
Other stakeholders	Presence of local stakeholders willing to collaborate with the team and use their knowledge and connections to assist the project.
Trust	
Local authority	Trust resulting from established relationships between key individuals in AMC and the project team.
Community	Long term engagement between the team and the study communities resulted in understanding and appreciation by the communities that the purpose of the study was not merely research but had a practical purpose which could lead to community benefits.
Study design and implementation	
Design	A participatory approach was very beneficial. Workshops were particularly valuable tools.
Implement-Ation	Careful preparation was essential to achieve successful implementation of all elements. It was also essential to closely monitor the performance of the various stakeholders.

Source: The authors

5. RESEARCH FINDINGS⁶⁰

5.1 Introduction

This chapter reviews the findings of the research component. It is in two parts: a contextual comparison of the two wards, Daraja Mbili and Kaloleni and the two research samples which comprise six streets,⁶¹ three drawn from each ward, which are the focus of the research and an examination of the study findings. Conclusions on the two hypotheses are set out in chapter seven.



Women queuing for kerosene in Arusha

5.2 The study context - Daraja Mbili and Kaloleni

Daraja Mbili with a population of 22,108 (Census: 02) emerged as an illegal settlement of migrant workers in the 1960s and is one of the poorest urban areas in Arusha. Kaloleni with half the population of Daraja Mbili (11,651) is predominately a planned settlement and is generally wealthier than Daraja Mbili. The inferior situation of Daraja Mbili compared to Kaloleni relates both to the overall level of public services and the situation of individual households. Figure 5.1, which compares the health facility provision of the two wards, demonstrates the inferior situation of Daraja Mbili which lacks all but traditional healers.

Figure 5.1: Health facilities - Kaloleni and Daraja Mbili

Daraja Mbili	Kaloleni
Formal health facilities	
No health facilities in Daraja Mbili Nearest are in Unga Ltd. and are all dispensaries. Terrat Road Dispensary, Mr Massawe St. Michael Dispensary, Dr. Lekundayo Kanora Huruma Dispensary, Dr A Kanora Cogi Unga Dispensary	Kaloleni Health Centre (govt.) Ithnaasheri Hospital (voluntary - Muslim), Dr M Sheriff Soweto Health Centre (private), Dr Mariki Arusha Hospital for Women and Children (200 Metas), Dr Wanjara Elerani Dispensary (private), Dr A Gulleth Mianzini Dispensary (private), Dr Sweke Mianzini Dispensary (new). Diplomat House opposite PRIDE office). Not listed by AMC (private). Religious foundation), Dr Kessy
List of Registered Traditional Healers ⁶² ATME (Association of traditional Medicinemen)	
Hesseni Ally Gumbo Sophia Mwanaidi Rose V. Mollel Maimuna O. Mchelo <i>Unga Ltd.</i> Hicha Mbwana Dismas Sichilima	None registered

Source: Office of Medical Officer of Health, AMC

⁶⁰ More detailed findings are provided in Appendices E1- 1-15

⁶¹ A street is basically a neighbourhood division which is further subdivided into '10 cell' units. Each street has a leader and secretary who according to parliamentary regulations should receive some payment from street income (i.e. from fees collected). However, this either does not happen or the amount received is not commensurate with the expected workload. The two study wards each have an elected councillor and Kaloleni as a special councillor for women who sit on the AMC. A '10 cell unit' is a smaller level of administration comprising 10 households.

⁶² There are numerous traditional healers in Daraja Mbili who are not registered.

Figure 5.2 again demonstrates the inferior position of Daraja Mbili; it has fewer kindergartens, and no secondary school, compared with the stronger position of Kaloleni which has eight kindergartens (7 privately funded) and a secondary school. The seven private kindergartens in Kaloleni confirm the wealthier position of households in this ward with sufficient income to educate their children privately.

Figure 5.2: Education facilities in Daraja Mbili and Kaloleni

	Daraja Mbili	Kaloleni
Kindergarten	1 government	1 government 7 private
Primary school Capacity	One 2,300 pupils (1,149 girls, 1,151 boys)	One 1,622 pupils (839 girls, 783 boys)
Annual intake	135 pupils (NB 2003, 586 pupils registered in standard 1 - i.e. more than four times over subscribed)	80 pupils
Secondary school	None	1 government

Source: Kaloleni Ward Education Officer, quarterly Report March 2003; Community Development Officer, Quarterly report, Sept-Dec, 20003; and key informant interviews

In accord with national policy, described in chapter 3, the aim is for universal primary education. However the community is expected to contribute to a classroom building programme by supplying materials or labour. There are also additional costs to be found for each child. In Daraja Mbili this is estimated to amount to between TSh12,500 -15,000 per child per year.

As shown in Figure 5.3, there are numerous problems associated with primary school participation.

Figure 5.3: Educational problems - schools

Daraja Mbili	Kaloleni
<ul style="list-style-type: none"> <input type="checkbox"/> Poor attendance - children have to work for parents but also truant e.g. to video places <input type="checkbox"/> Heavy domestic workload by girls curtails their attendance at school <input type="checkbox"/> No follow up by parents <input type="checkbox"/> Hunger - tired and can't concentrate through lack of food <input type="checkbox"/> A few children with HIV/AIDs <input type="checkbox"/> Smoking and drug problems <input type="checkbox"/> Lots of gangs 	<ul style="list-style-type: none"> <input type="checkbox"/> Poor attendance: truancy <input type="checkbox"/> Heavy domestic workload by girls curtails their attendance at school <input type="checkbox"/> No follow up by parents <input type="checkbox"/> Most complete their homework using kerosene lamps <input type="checkbox"/> Some pupils do not have exercise books (provided free by school for poor pupils) <input type="checkbox"/> No mention of HIV/AIDs <input type="checkbox"/> No problems of drugs/child abuse <input type="checkbox"/> No problem with behaviour in school

Source: Key informant interviews

Figure 5.4 highlights some significant differences not only between the two wards but also between the educational performance of boys and girls at primary school. In large part girls out-perform boys not only in the numbers taking the national exam, at the end of primary school, for entry to secondary school, but also in the proportion of those passing. Interestingly in Daraja Mbili, in the years 2000-2002, there were always more girls than boys taking the National exam, this despite the fact that there are generally more boys than girls at primary school. The girls' superior performance is also, with the exception of 2002 when there seems to have been a major problem which affected both boys and girls, reflected in their exam performance, with a greater percentage of girls who took the exam passing compared with boys. In

Kaloleni the numbers of girls and boys taking the exam have been closer than in Daraja Mbili. Not only was 2002 the year that more girls than boys took the exam, for the first time in three years, but, again for the first time, a greater proportion of girls than boys taking the exam were successful.

Figure 5.4: 2002 -National exam passes and secondary school places awarded - Daraja Mbili and Kaloleni⁶³

		No. and proportion sitting exam				No. and proportion passing exam						Number of secondary school places awarded as proportion of those passing exam		
		(b) % of total boys and girls		(d) % of boys and girls		(e,g,i) number passing (f,h,j) e as % of a; g as a % of c; l as a % of a+c						First line k, l, m equal total number of places awarded Second line k,l,m no of places as proportion of passes - e,g,i		
		Boys		Girls		Boys		Girls		Total		Boys	Girls	Total
		No (a)	% (b)	No. (c)	% (d)	No. (e)	% (f)	No (g)	% (h)	No (i)	% (j)	(k)	(l)	(m)
Daraja Mbili	☐ 2000	71	49	73	51	18	40	27	60	45	31	(18) 100%	(27) 100%	(45) 100%
	☐ 2001	50	39	77	61	13	48	14	52	27	23	(13) 100%	(14) 100%	(27) 100%
	☐ 2002	83	45	100	55	12	14.5	8	8	20	11	(12) 100%	(8) 100%	(20) 100%
Kaloleni	☐ 2000	94	52	86	48	49	57	37	43	86	48	(10) 20%	(14) 38%	(24) 28%
	☐ 2001	84	52	78	48	67	58	49	42	116	72	(23) 34%	(24) 49%	(47) 41%
	☐ 2002	87	48	95	52	35	40	48	51	83	46	(6) 17%	(19) 40%	(25) 30%

Source: Kaloleni and Daraja Mbili primary school records

In Daraja Mbili all the eligible pupils were awarded secondary school places. In Kaloleni, despite a secondary school being located in the ward, only a third (30% - 2002) were awarded places. Again, girls tended to be more successful in all three years. However parents in Kaloleni may choose to send their children to schools in other wards.

Children also have problems during their secondary education. The most significant of which, for this study, is the fact that girls in Kaloleni do not have enough time at home for their studies because of domestic duties. To ensure they complete their school work they frequently choose to stay at school for up to two hours after the official closing time. However, as indicated in figure 5.4, this handicap has, in general, not stopped girls out-performing boys in the national secondary exam,

Adult literacy classes are provided in both study areas, as well as a vocational class in domestic science in Sanare and carpentry, domestic science and metal work in the Kaloleni area. Generally participation in adult education is low.⁶⁴ The reasons for non attendance are summarised in figure 5.5.

⁶³ Detailed statistical data source in Appendix E1

⁶⁴ Ward Education Officer Quarterly Report, March 2003

Nearly every household in Daraja Mbili, and a number in Kaloleni, is involved in some type of business or productive activity. These include guest houses, hair dressing, dress-making, restaurants, butchers, milling, traditional health centres, and frequently involve activities related to reproductive tasks,⁶⁵(see Figure 5.6) They are the prime occupations for some and a source of secondary income for others.

Figure 5.5: Reasons for low participation in adult education⁶⁶

- Involvement in agricultural activities at a distance from home
- Poor facilities discourages attendance
- Age -people think there is no need to be educated
- Some need reading glasses which are difficult to obtain
- Unmotivated teachers
- No teaching materials provided
- As there is no budget from the Municipality there are no permanent classrooms available and it is difficult to find suitable accommodation during the wet season

Source: Various key informant interviews

However, the inability to pay for electricity excludes many female-headed households from engaging in cleaner, income generating activities with potentially higher returns. One woman in Kaloleni - Magharibi who was unable to pay her electricity bill after her husband left her was no longer able to make ice-cream She lost both her income and her fridge which she had kept in a corner of her yard covered with a carpet to use again when she could afford the reconnection charge. The fridge is now rotting away.⁶⁷

In addition many households in both wards keep livestock; dairy cattle, goats, sheep, chickens and ducks, to subsidise their livelihoods.⁶⁸

Figure 5.6: Reproductive associated productive activities

- Making 'bites' is the most popular small-scale income-generating activity (IGA) among practically all the women
- Female-headed households in Kaloleni appear to be more economically active than those in Daraja Mbili
- Making traditional medicines and local brew are only evident in the poorer ward
- There is some differentiation in activity type between non-poor and poor households. Activities requiring more capital and electricity e.g. making ice-cream, hairdressing and other type of business in town are, as expected, restricted to the non-poor households. A number of activities take place at night and require lighting e.g. selling chips and sewing⁶⁹.

Source: Interviews and case-studies

5.3 Comparison of Daraja Mbili and Kaloleni study samples

5.3.1 The six streets

The research sample was drawn from six streets, three - Ali Nanya, Sanare and Jamhuri - from Daraja Mbili and Magharibi and Mashariki (planned) and 200 Meta (unplanned), in Kaloleni. Figure 5.7 summarises the physical differences between the two sub-samples. This, again, highlights the inferior position of Daraja Mbili

⁶⁵ See Box D below

⁶⁶ Ibid 6

⁶⁷ Semi-structured interview

⁶⁸ A comparative breakdown for each ward of the numbers involved is given in Appendix E2

⁶⁹ All sewing in the sampled households was done using treadle machines.

compared with Kaloleni, in this case in terms of water, sanitation and solid waste services.

The median household sizes of between 5-7 are similar for both study groups whatever the sub-category. There is some indication that many of these poorer urban households comprise extended, rather than merely nuclear families which are increasingly occurring in urban areas. In the Kaloleni group the households range in size from 3-19, and in Daraja Mbili from 1-14. In Kaloleni, and to a much lesser extent in Daraja Mbili, some households will include a servant. Non-poor male headed households in Kaloleni are the most likely to include a servant (47%), compared with 33% of female-headed non-poor households and only 33% of male-headed non-poor households in Daraja Mbili.⁷⁰

Figure 5.7: Sample streets – physical indicators

	Daraja Mbili	Kaloleni
Study streets - layout	Jamhuri, Ali Nanya and Sanare – all unplanned	2 planned streets (Magharibi and Mashariki) 1 unplanned street (200 Metas)
Type	Urban	Urban/peri-urban
Water	No houses have water throughout the year. No use of shallow wells Approximately 25% have piped water ^a Approximately 70% public stand pipes	65% piped water 4 public stand pipes
Sanitation	Pit latrines. More than half of households suffer from liquid waste problems	Central sewage system but with insufficient capacity. Houses have own septic tanks Frequent flow back from toilets
Solid waste management	Between a quarter and half of households depend on AMC for disposal. Shortage of skips.	2 skips for whole ward Collection of skips irregular because of shortage of trucks ⁷¹ Privatised service

a: Information on water, sanitation and solid waste based on information from two wards of Ali Nanya and Sanare.

Sources: Sanare/Ali Nanya Community Profile, 2003 ; MCHO and Ward Executive Officers for Daraja Mbili and Kanoleni

Figures 5.8 and 5.9, drawing on findings from the eight case studies, illustrate the different asset profiles of non-poor and poor male headed households in both Kaloleni and Daraja Mbili.^{72, 73} In both wards generally, for all groups, there are differences of degree rather than type in terms of assets owned. The key assets which determine the security or otherwise of the household is, the occupation of the key bread winner and the security of tenure of the home. Poor households, whether in Kaloleni or Daraja Mbili, are less likely to have secure employment, more likely to have only one main bread-winner, and either rent or have a poor quality house. Figures 5.8 and 5.9 capture a picture of livelihoods at a point in time, they do not capture the dynamism of the livelihoods. The semi-structured interviews provide some insight into the nature of this movement. In a number of cases these show that frequently, the non-poor female headed households are not as stable in their position as the non-poor male headed households. Where the husband has died or left the home, the household is often living on a reduced income and benefiting from past investment in physical or natural assets that are now gradually being eroded. Such

⁷⁰ A detailed break down of household size and households with servants is given in Appendix E3

⁷¹ Information from MCHO

⁷² A fuller picture is given in Appendix E4

⁷³ It is impossible to draw detailed conclusions from eight case-studies however these findings are supported both by the semi-structured interviews and the focus group discussions.

families, therefore, have less secure livelihoods than male-headed non-poor households.

Figure 5.8: Livelihood differences, Kaloleni

Kaloleni				
	Male headed households		Female headed households	
Assets	Non-poor households	Poor households	Non-poor households	Poor households
Natural	<input type="checkbox"/> Inherited land <input type="checkbox"/> Owns land outside Arusha <input type="checkbox"/> Owns cattle	<input type="checkbox"/> Inherited land <input type="checkbox"/> Owns land outside Arusha <input type="checkbox"/> Owns 'sheep and goats'	<input type="checkbox"/> Husband bought land in Kaloleni	<input type="checkbox"/> No natural assets
Physical	<input type="checkbox"/> Own house with concrete blocks <input type="checkbox"/> Piped water supply <input type="checkbox"/> Electricity supply <input type="checkbox"/> Pit latrine and WC <input type="checkbox"/> Expensive furniture and furnishings <input type="checkbox"/> Wide range household appliances <input type="checkbox"/> Bicycle and wheel barrow	<input type="checkbox"/> Own house with concrete blocks <input type="checkbox"/> Buys water <input type="checkbox"/> Pit latrine <input type="checkbox"/> Simple furniture and no furnishings	<input type="checkbox"/> Own house with concrete blocks <input type="checkbox"/> Buys water - piped water supply (disconnected) <input type="checkbox"/> Flush toilet - but uses bucket to flush <input type="checkbox"/> Some furniture <input type="checkbox"/> TV and good range of appliances	<input type="checkbox"/> Rents room in earth mortar and plastered house <input type="checkbox"/> Buys water - no piped water supply <input type="checkbox"/> Pit latrine <input type="checkbox"/> Some simple furniture and cooking utensils
Financial	<input type="checkbox"/> Self employed farmer - over 100 acres <input type="checkbox"/> Wife - IGA, livestock <input type="checkbox"/> Private education for 2 children <input type="checkbox"/> Borrows from friends and relatives <input type="checkbox"/> Does not borrow from banks and financial institutions <input type="checkbox"/> Problem paying school and medical fees.	<input type="checkbox"/> Subsistence farmer <input type="checkbox"/> Wife - main earner - formal sector <input type="checkbox"/> Borrows soft loan(s) from employer <input type="checkbox"/> Does not borrow from banks and financial institutions <input type="checkbox"/> Problem paying school and medical fees.	<input type="checkbox"/> Trader in second-hand clothing <input type="checkbox"/> No husband <input type="checkbox"/> Borrows from relatives <input type="checkbox"/> Does not borrow from banks and financial institutions <input type="checkbox"/> Problem paying school and medical fees	<input type="checkbox"/> No permanent income - small chip business <input type="checkbox"/> No husband <input type="checkbox"/> Borrows from relatives <input type="checkbox"/> Does not borrow from banks and financial institutions <input type="checkbox"/> Problem paying rent and medical fees
Human	No information collected ⁷⁴			
Social	<input type="checkbox"/> Church group member	<input type="checkbox"/> Church group member <input type="checkbox"/> Member of <i>kibati</i> group <input type="checkbox"/> 10 cell leader	<input type="checkbox"/> None	<input type="checkbox"/> Church group member <input type="checkbox"/> Secretary to street leader

Source: Kaloleni case studies

⁷⁴ There was some confusion over the definition of 'human assets'. This fault was only identified in the final analysis

Figure 5.9: Livelihood differences, Daraja Mbili

Daraja Mbili				
	Male headed households		Female headed households	
Assets	Non-poor households	Poor households	Non-poor households	Poor households
	<input type="checkbox"/> Bought, unsurveyed plot 1974 <input type="checkbox"/> Owns 3 exotic goats	<input type="checkbox"/> Bought unsurveyed plot 1979 <input type="checkbox"/> No space for garden or livestock	<input type="checkbox"/> Owns unsurveyed plot <input type="checkbox"/> No space for garden or livestock	<input type="checkbox"/> Bought unsurveyed land 1973 <input type="checkbox"/> No space for garden or livestock
Physical	<input type="checkbox"/> Own house <input type="checkbox"/> Piped water supply <input type="checkbox"/> Electricity supply <input type="checkbox"/> Pit latrine <input type="checkbox"/> Well furnished <input type="checkbox"/> TV and telephone and wide range of appliances	<input type="checkbox"/> Own house with concrete blocks <input type="checkbox"/> Well, spring or buys water <input type="checkbox"/> Pit latrine <input type="checkbox"/> Minimal furnishings	<input type="checkbox"/> Own house with concrete blocks <input type="checkbox"/> Buys water <input type="checkbox"/> Electricity supply <input type="checkbox"/> Flush toilet but not yet connected <input type="checkbox"/> Pit latrine <input type="checkbox"/> Some furniture <input type="checkbox"/> TV and good range of appliances	<input type="checkbox"/> Owns mud and lathe house <input type="checkbox"/> Buys water <input type="checkbox"/> Electricity disconnected <input type="checkbox"/> Pit latrine <input type="checkbox"/> Basic furnishings
Financial	<input type="checkbox"/> Father wages earner - formal sector <input type="checkbox"/> Wife IGA - 'vintage' and sells chapatis and buns <input type="checkbox"/> Borrows from employer <input type="checkbox"/> Problem paying electricity bills.	<input type="checkbox"/> Night watchman - casual labour <input type="checkbox"/> Borrows small loan(s) from employer <input type="checkbox"/> Problem paying school and medical fees.	<input type="checkbox"/> Sole wage earner - gardens and sells produce in kiosk <input type="checkbox"/> No husband <input type="checkbox"/> Borrows from <i>kibati</i> <input type="checkbox"/> Problem paying school and medical fees	<input type="checkbox"/> No income, dependent on generosity of son and elder sister <input type="checkbox"/> No husband <input type="checkbox"/> Problem paying school and medical fees
Human	No information collected ⁷⁵			
Social	<input type="checkbox"/> Church group member	<input type="checkbox"/> Church group member <input type="checkbox"/> Member of <i>kibati</i> group <input type="checkbox"/> 10 cell leader	<input type="checkbox"/> belongs to 2 <i>kibati</i> groups	<input type="checkbox"/> None other than Allah

Source: Daraja Mbili case studies

5.4 The study findings

5.4.1 Introduction

The study findings are reviewed here in relation to the eight questions which, as explained in chapter two, have been used to test the two hypotheses. The questions fall into two groups, six address the current situation, although in some cases this is aspirational, and two build on the first group to assess the opportunities for change and the implications of any such opportunities. The questions are set out below.

The current situation

- What is the level of access to and use of modern and traditional energy in urban households?
- What physical energy assets do people have?
- What are the roles, responsibilities and rights (decision-making) within the household?
- How much time is used in energy related reproductive activities?
- What strategies are used to save time when using energy?
- What is the nature of *energy poverty* in the case study wards?

Opportunities for change and their implications

- What changes in energy role, responsibilities and rights are needed to reduce time spent on energy related activities?

⁷⁵ There was some confusion over the definition of 'human assets'. This fault was only identified in the final analysis

- How will women and girls use the saved time?

The knowledge used to inform the answers has been drawn from the: semi-structured interviews (114); key informant interviews (31); case-studies (8); focus group discussions (6); workshops (8); and various secondary data; which are described in chapter 4.

5.4.2 Level of access to and use of modern and traditional energy in urban households

Electricity and kerosene are the two modern fuels used. Electricity is the aspirational fuel of choice.⁷⁶ However cost and unreliable supply make its use carefully managed by all the study households.⁷⁷ Figures 5.10 and 5.11 illustrate the use of electricity by the study households. Figure 5.10 shows:

- in both wards all, or nearly all, the non-poor households, whether male or female headed, are connected to the electricity supply;
- in both wards, female headed non-poor households generally make more use of electricity for household activities than male-headed households. The exceptions being that all male and female headed households, in Kaloleni, use electricity for lighting and that in Daraja Mbili the same proportion of female and male headed households use electricity for cooking. This may be because the husband in male-headed households is more concerned with expense rather than convenience;
- more use is made of electricity in Kaloleni, generally Daraja Mbili households are (in some cases marginally) less likely to be connected to and use electricity for various activities;
- poor female headed households do not use electricity for cooking in either Daraja Mbili or Kaloleni;
- poor female headed households are substantially worse off in terms of electricity use than poor male headed households in Daraja Mbili; the difference is not as great in Kaloleni;
- the number of poor female headed households that are disconnected is higher in Kaloleni than Daraja Mbili which seems to suggest that they are suffering a greater erosion in their livelihoods;
- female headed poor households make no use of electricity for cooking;
- female headed poor households in Kaloleni is the category which uses electricity least for lighting, ironing, TV and radio;
- largest number of disconnections are for female headed poor households;
- In both Daraja Mbili and Kaloleni, the use of TV and radio is higher among non-poor female headed households than poor and non-poor male headed households. This situation is almost reversed in male headed poor, and female headed non-poor households where there is a higher use of radios and TV (Kaloleni only) in male headed households. This could be because men, who are the major users of radios and TVs in male-headed households, seek their entertainment outside the home. In the poorer households men do not have the same financial resources to go out in the evening

⁷⁶ See Appendix E2 for a breakdown of comparative fuel costs in Arusha 2002-2004

⁷⁷ There had been one fire using LPG and as a consequence households were afraid to use it.

Figure 5.10: Poor and non-poor comparative use of electricity

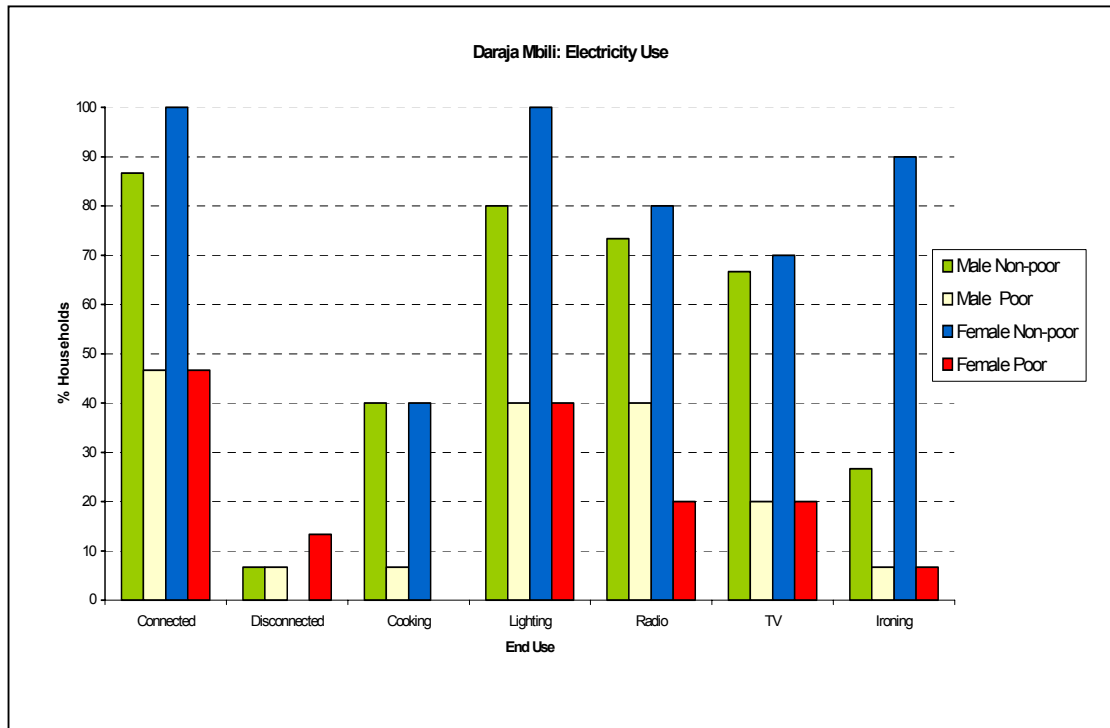
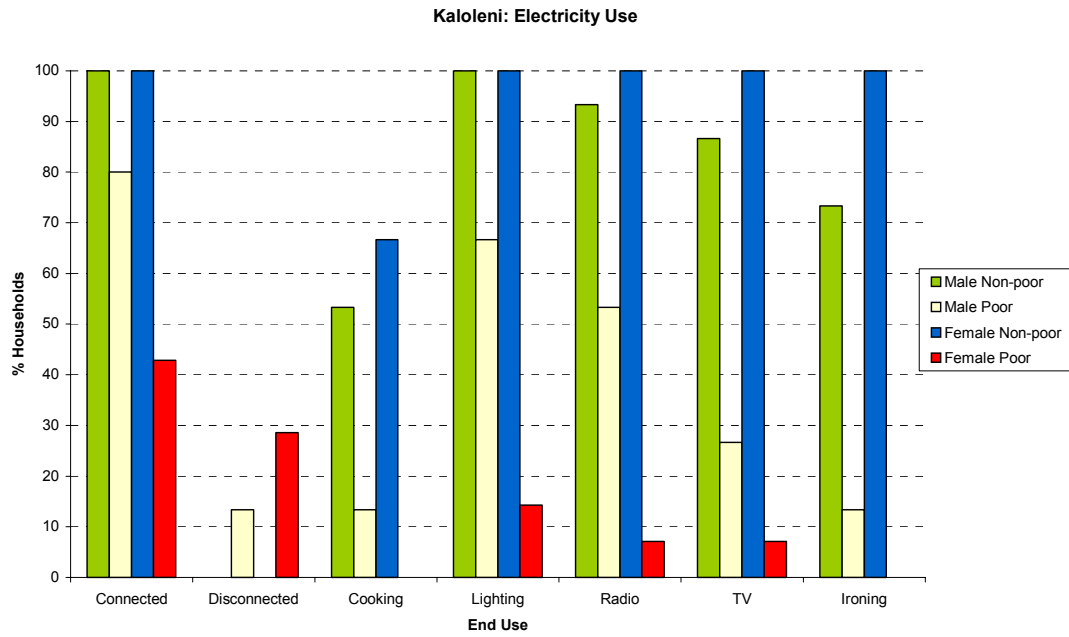
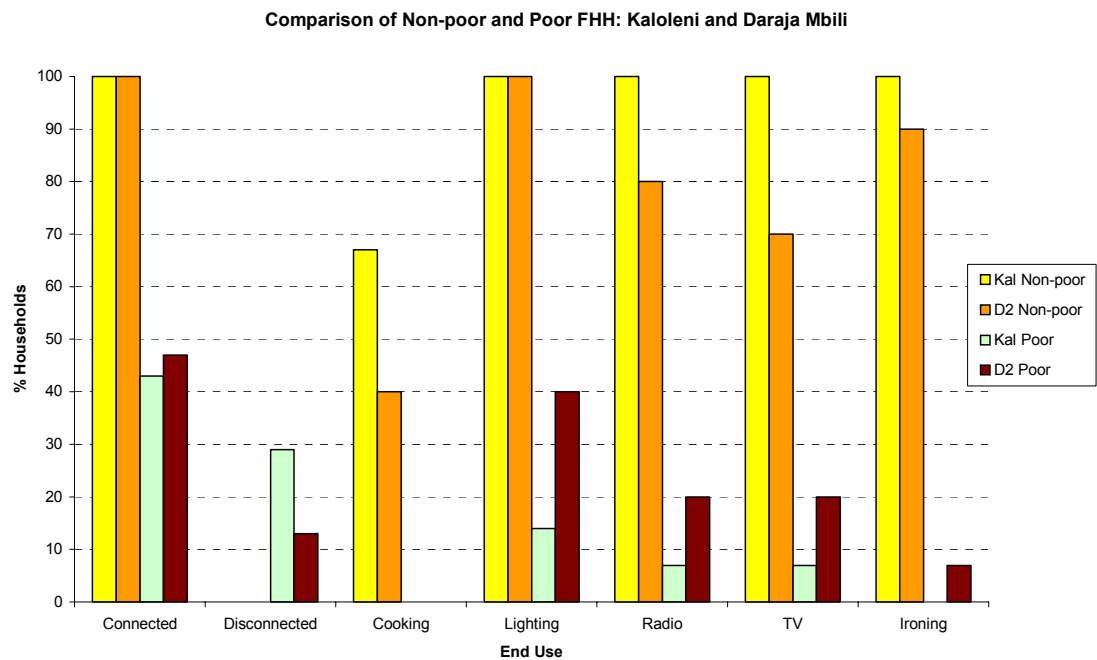
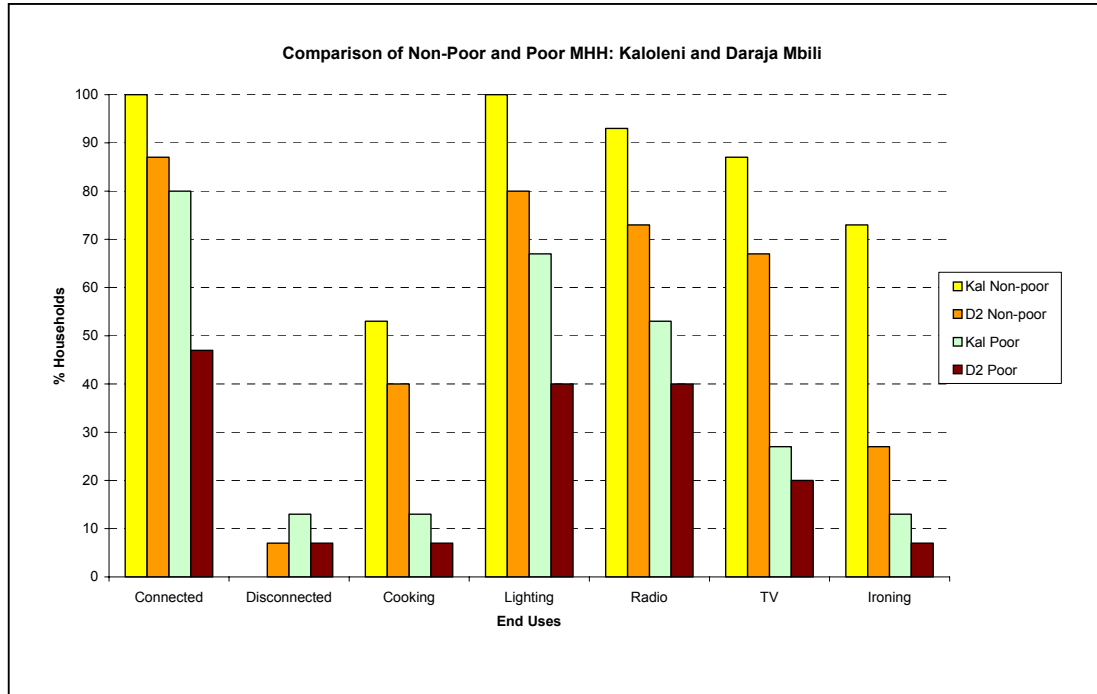


Figure 5.11 illustrates more dramatically the differences in electricity use between male headed households and female headed poor and non-poor households in the two wards.

Figure 5.11: Comparative use of electricity Kaloleni and Daraja Mbili



- ❑ Male headed households in Kaloleni make greater use of electricity than all the households in Daraja Mbili;
- ❑ Least use of electricity by poorer households in Daraja Mbili. There are slightly more disconnections in poor households in Kaloleni
- ❑ Female headed non poor households in both Kaloleni and Daraja Mbili make more use of electricity than in male headed households in Kaloleni and Daraja Mbili
- ❑ There are wider differences in electricity use among poor and non-poor female headed households than male headed households.
- ❑ There is greater use of electricity for ironing among female headed non-poor households than male headed households non-poor households

However it should not be assumed that the use of electricity is always popular with the wider community.

One person used a car battery to light his room and provide another bulb over his door to light the shared toilet. He was harassed by other tenants because they wanted to hide their activities and their comings and goings in the compound
Youth Group, Daraja Mbili

One other person made a wooden case and arranged some used dry cell batteries which he lowered into a pit latrine and produced electricity to light his room. He was harassed by TANESCO for producing his own electricity without TANESCO's consent
Youth Group, Daraja Mbili

Other fuels

Figure 5.12 illustrates the use made of other fuel types in the two wards. It shows the use, and intensity of use, of kerosene, charcoal, firewood, sawdust and batteries. It clearly demonstrates the popularity of kerosene for both cooking and lighting amongst all the sub-groups. It should be noted that kerosene is not pure, as it is mixed with diesel.

- ❑ All households use kerosene to ignite charcoal and firewood wood fires.
- ❑ Non-poor households only use kerosene for lighting if the electricity fails. They also use it for light cooking.
- ❑ Poor households frequently use kerosene for lighting because they are not connected to the grid; or because they are currently disconnected; cannot afford to pay; or the electricity is down.
- ❑ Women in poor female headed households choose to use kerosene for morning cooking to save time.

Charcoal is the most popular 'traditional' fuel. It is used by nearly all households for some cooking (particularly slow cooking such as beans) and to obtain traditionally tasting food. It is also used by some households for ironing. However it is associated with two problems.

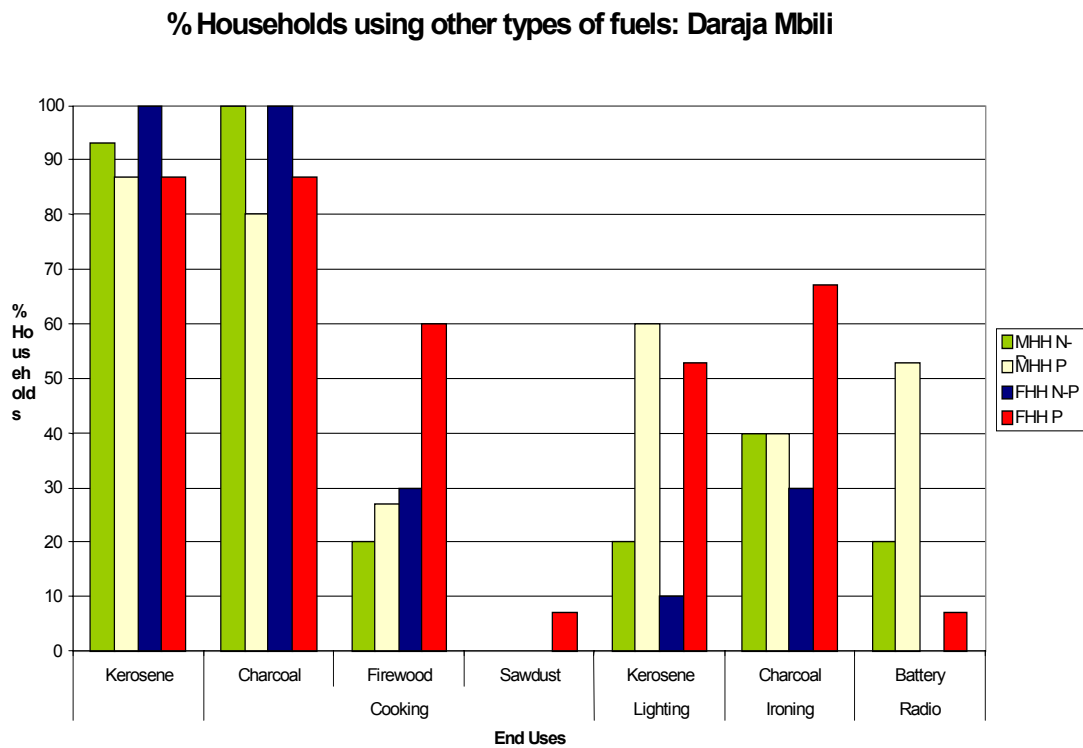
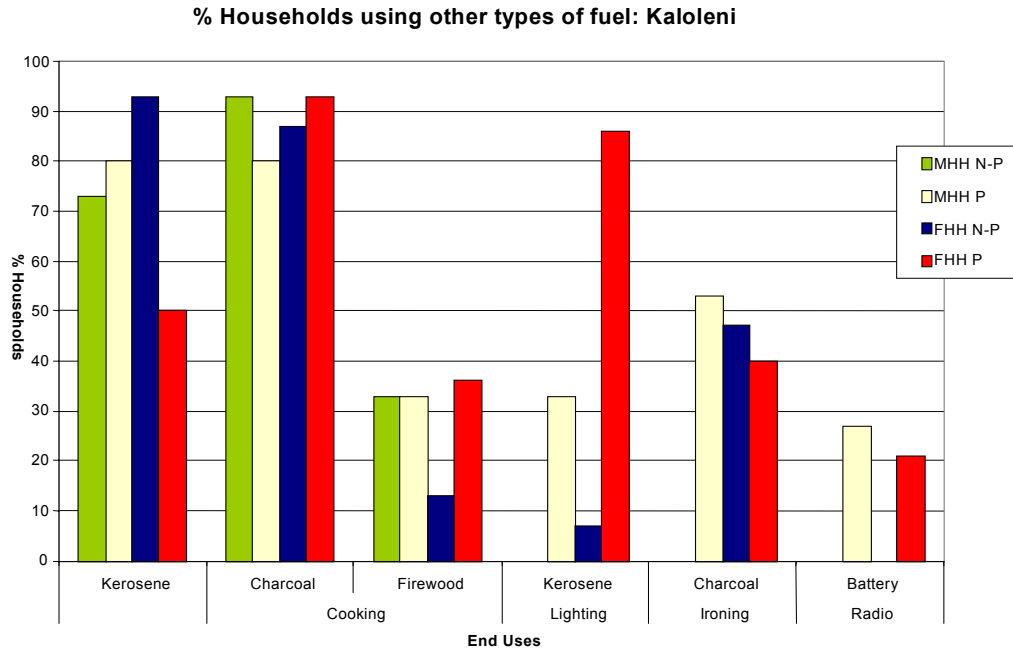
- ❑ It is not as easily available and therefore more expensive in the wet season.
- ❑ There is deterioration in its calorific value because it is now made from soft wood rather than hardwood.

Figure 5.12 further shows that:

- ❑ firewood, the 'poor person's fuel', is used in all households, with poor female headed households in Daraja Mbili by far the highest users;
- ❑ sawdust is rarely used;
- ❑ as would be expected in Kaloleni, kerosene for lighting is mostly confined to poor households with a far higher proportion of use in poor female headed households compared to poor male-headed households. In Daraja Mbili, this situation is reversed, with slightly more use in poor male-headed households;

- there is greater use of kerosene in both male headed and female headed non-poor households;
- charcoal for ironing is used fairly uniformly in all categories of households in Daraja Mbili with poor female-headed households the highest users. In Kaloleni,

Figure 5.12: Other Fuels



- use is largely restricted to both male-headed and female-headed poor households, with a very high percentage (85%) of the latter using charcoal;
- in Daraja Mbili, the use of battery radios is mostly confined to poor and non-poor male-headed households whereas in Kaloleni, use is only in poor households with very little difference between those that are male-headed and those that are female-headed.

Appendix E5 provides more detailed analyses of the fuels used and not used for cooking and lighting, drawn from the various focus groups.

Health effects associated with various types of energy

There is a local awareness of the health implications associated with various fuels. (Figure 5.13)

Figure 5.13: Health effects of various fuel types

□ Electricity	None except electric shock
□ Kerosene	Eye and nose problems especially if the wick is not extinguished properly Can explode and kill
□ LPG	Chest and eye problems
□ Charcoal	Chest and eye problems
□ Firewood	Chest and eye problems
□ Sawdust	None
□ Biogas	No knowledge

Source: Focus group meetings

Availability of fuel

Kerosene is the most easily available fuel in Kaloleni and Daraja Mbili bearing in mind seasonal changes in the supply of charcoal and firewood. LPG is only available from one outlet in the centre of Arusha.

Availability of equipment

Use of a particular fuel does not just depend on opportunities and constraints concerning fuel itself but also on the equipment and appliances needed to convert fuel into energy. Figure 5.14 summarises the opportunities and constraints for obtaining equipment needed to use electricity, kerosene, charcoal and firewood.

Figure 5.14: Access to equipment

□ Ordinary, scrap metal charcoal and kerosene stoves are easily available
□ Charcoal irons are easily available
□ Energy saving stoves are not easily available
□ A variety of electrical equipment is on sale in Arusha (cookers, fridges, electric kettles, washing machines, microwave cookers, TVs, videos etc.)
□ Gas cylinders and regulators are not easily available

Source: Various semi-structured interviews, case-studies and focus group discussions

Cost of fuel and equipment⁷⁸

The majority of households using electricity complained about the high unit costs and problems with billing and supply. Electricity tariffs rose significantly in June 2004 and a small household that consumes 180 units/month now pays an additional 60% (i.e. an increase from TSh 9,900 to TSh 16,950. Many households who would like electricity are unable to afford the connection costs. **Currency conversion**

⁷⁸ Appendix E6 gives details of fuel and equipment costs in Arusha.

The cost of LPG fell by TSh 4,000 in June 2003 but since there was no record of LPG use in the sampled households, this has little impact on their livelihoods.

The cost of kerosene (tied to petroleum costs) has increased from TSh 430 per litre in 2002 to TSh 550-600 in 2004 and poor households find it an expensive fuel. Interestingly the data shows that the price of charcoal (in large sacks) has remained relatively stable but the price of buying in smaller quantities has increased. This, of course, greatly affects poorer households who tend to buy in smaller quantities. Firewood has also increased in price since 2002 from TSh 700 to TSh 800 for a large bundle. **Currency conversion**

Most stoves, except the cheap, locally available scrap metal ones, are not affordable by poor households. Non-poor households who can afford a wider range of electrical equipment complain of electrical surges which damage appliances.

The ability to cook outside using firewood and/or charcoal stoves is severely constrained in the wet season and the need to cook indoors in a restricted space means increased costs (kerosene is preferred), especially for poor families who do not have a separate kitchen.

Relationship between fuel type and use

As shown in the energy ladder in figure 5.16, households, whether poor or non-poor, do not make exclusive use of one fuel, nor is only one fuel used for only one activity. Rather, all the households in the study, despite having access to electricity and kerosene chose, for cultural and practical reasons, a mix of modern and traditional fuels, a situation which chimes with experience elsewhere in Africa and the world discussed in 2.2.3. Accessibility to the various fuels is constrained in part by the availability of the fuel and in part by its cost, as well as the cost of the equipment needed to use the various fuels. As shown in figure 5.16 poor households are highly dependent on firewood and charcoal and restrict their use of the more expensive kerosene and electricity, when it is available, to use for lighting, powering TVs and radios and, in the case of kerosene, for fast cooking. For non-poor families, electricity, kerosene and charcoal are the most frequently used fuels.

Fuel Preferences

- The overall preference among all households as shown in figure 5.15 is for electricity. The low percentage expressing this aspiration among female-headed non-poor households is because the majority of these households already use electricity.
- For female-headed households in Daraja Mbili, electricity is beyond their aspirations; they know they are unable to afford it. They are also unable to envisage an alternative fuel.
- Generally, in poor households, preferences for an alternative fuel are one step up on the energy ladder from the fuel presently used, e.g. a household using firewood will aspire to using charcoal and a household using charcoal will aspire to using kerosene. This is particularly evident for poor male-headed households.

Figure 5.16: Energy ladder in Kaloleni and Daraja Mbili

Increasing cleanliness, efficiency, cost and convenience

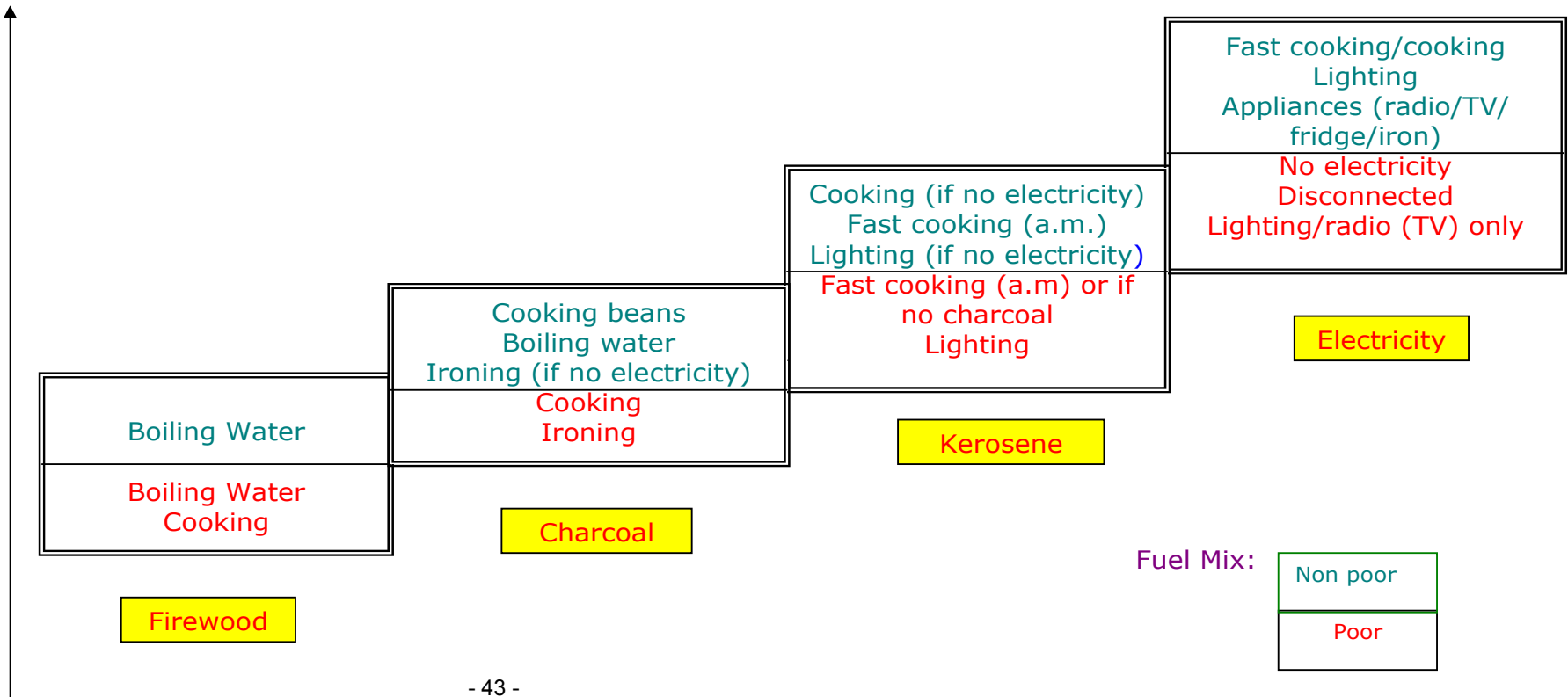


Figure 5.15 Preferred fuels, households in percentages

	Daraja Mbili				Kaloleni			
	Non-poor		Poor		Non-poor		Poor	
	FHH	MHH	FHH	MHH	FHH	MHH	FHH	MHH
Electricity	20	60	14	67	40	93	67	87
LPG	-	-	-	-	0	7	0	7
Kerosene	7	0	0	13	0	7	0	7
Charcoal	0	0	0	7	0	0	7	0
Solar	0	7	0	0	0	0	7	0
Biogas	0	0	0	7	-	-	-	-
Firewood	0	0	0	7	-	-	-	-

Source: semi-structured interviews

5.4.3 Available physical energy assets

The study team observed the use, or presence, of the following pieces of equipment that are used domestically.

- Fridges (these were mostly reported in female headed non-poor households in both wards)
- Iron (electric) and iron (charcoal) which one poor female headed household reported borrowing from a neighbour
- One gas stove, which was owned by a male headed non-poor household but without the cylinder
- Electric stove (2 ring). Both non-poor and poor households in Daraja Mbili have and use these
- 1 heater was reported
- Radios and TVs
- Videos and microwaves (non-poor only)

The team also observed two types of kerosene lamps used for lighting: a hurricane lamp and a *karaboi /kibatari* which are often made from small recycled cans.



Woman holding a 'kibatari' lamp

Use of energy saving stoves

There is minimal use of energy saving stoves. Perhaps as a result of their awareness of the amount of money spent on fuel, relative to their incomes, female-headed households in Daraja Mbili are more aware of them than male headed households.

Charcoal and sawdust energy saving stoves are not used because they are more expensive compared to ordinary stoves.
Youth Focus Group, Kaloleni

A firewood energy saving stove can be built in the kitchen using clay soil. Only 2 pieces of firewood are sufficient to cook beans until tender. The stove can hold 3 cooking pans at the same time.
Blandina Nkini, CDO, Kaloleni

5.4.4 Roles, responsibilities and rights (decision-making) within the household

The study found that the Tanzanian cultural paradigm (described in 3.7.1) applies in the study area. Thus, in most households, whatever the category, men are expected to be the bread winner and women are responsible for all the reproductive tasks such as cooking and cleaning, child care and care for the elderly and sick. In the study streets women in the main are still 'guided' by their spouse or a male relative.

My husband decided when he was alive, now I just follow.
Widow – semi-structured interview

Reference has already been made to the fact that here as elsewhere in Tanzania, boys are given preference over girls in education and girls are expected, unlike their brothers, to help with domestic tasks out of school hours.

Despite local stereotypes, decision-making patterns in households vary. In male-headed households, joint decision-making is often held up as an 'ideal' as it will result in more equitable outcomes. There is also evidence that there is some pressure, certainly among the more educated, for a greater sharing of decisions, as shown by the following quotations.

If husband not willing to share decision-making then both husband and wife should be called to the Ward Executive Office for counselling and education
Focus group meeting

Educate women so they can make rational decisions
Focus group meeting

In reality, a number of factors mitigate against this: time; traditional mores about decision-making; knowledge and educational levels; illness; age (at both levels of the age spectrum); economic power; laziness or lack of interest in making a particular decision.

In this study the semi-structured interviews and focus group discussions provide some insight into the energy decision-making process among male and female headed households (figure 5.17).⁷⁹

Figure 5.17: Decision-making in male headed households

Choice of	Daraja Mbili		Kaloleni	
	Non-poor	Poor	Non-poor	Poor
Types of energy	Primarily M	Insufficient data	Joint	Individual, either M or F
Cooking stoves	F	F	F	F
Household appliances	M	M	Joint, or M	Mainly M

Source: semi-structured interviews

⁷⁹ It has proved possible to obtain quantitative data from the interviews and a detailed breakdown of this information is given in Appendix E7

Decisions around choice of energy

There is a greater tendency for men and women in non-poor households in Kaloleni to perceive that decisions about the choice of fuel are made jointly, than in Daraja Mbili where there appears to be minimal joint decision-making. Again, in poor households in Kaloleni, there is less joint decision-making. However, all this should be tempered by the knowledge that frequently in households where there was a stated joint approach both men and women saw themselves as the main influence on the decision.

Decisions around purchase of cooking stoves

In non-poor and poor households in Kaloleni and Daraja Mbili the decision to purchase a cooking stove is generally the woman's responsibility. In poor households this is very much the case. This lack of interest in 'women's affairs in the kitchen' means that there is little opportunity for women to acquire additional funds for the purchase of a more expensive energy efficient stove. Interestingly one Kaloleni woman, in a non-poor household, qualified her ability to make decisions by stating that it depends on the cost of what is to be purchased. This would seem to support the findings of Campbell in Dar-es-Salaam, discussed in 2.2.3, that women relinquish decision-making power when the cost of a cooking stove falls beyond their budget.

The man pays; he makes the decisions and owns the stoves and appliances
Community opinion - focus group

Decisions around purchase of household appliances

In non-poor households in Kaloleni, there appears to be disagreement about whether the decision-making process concerned with the purchase of household appliances is undertaken jointly or by men. There was agreement that the woman rarely decides. In Kaloleni's poor households, the data indicates that joint decisions are fewer and the man is the major decision-maker. In Daraja Mbili this level of decision-making is the concern of men in all the households. Although some women felt they were involved in the process.

Mother and children discuss and identify what they need and inform father who buys when he has money
Community opinion - focus group

Decisions in female headed households

In both poor and non-poor households it appears that the majority of women, as would be expected, are the sole decision-makers regarding types of energy used and purchase of cooking stoves and appliances. However, there is evidence that some women in both poor and non-poor households share decision-making with immediate family members, or continue to make decisions according to the wishes of a dead husband.

5.4.5 Time used on energy related activities

Introduction

Information on the time spent on domestic tasks was drawn from two main sources: semi-structured interviews and case studies. In addition, for cooking, this main

understanding was further informed by the results of a small scale fieldwork experiment⁸⁰ and from the results of cooking demonstration projects undertaken in each of the two wards as part of the intervention workshops and discussed in chapter six.⁸¹

For a number of reasons, specifically because:

- in all households with a maid/servant it is the maid/servant that buys fuel and cooks;
- women generally are used to multi-tasking and will start a cooking task and then leave to do something else;
- women are so used to doing 'it' i.e. the energy related task, that they do not even think about it in 'measurable' terms;
- in the majority of all households, girls assist with fuel purchase and afternoon/evening cooking;

women, in whatever category of household, had great difficulty in quantifying the time spent on domestic tasks.

However, one or two men in the non-poor households were able to quantify the time spent in cooking and differentiate between faster and slower fuels to complete cooking tasks. It would appear that they had worked out the economic costs of using different fuels for different types of cooking. The following quotation tends to support this argument:

If my husband caught me using kerosene to cook beans, I'd be in trouble'
Woman from non-poor household

Cooking, the Tanzanian pattern⁸²

Cooking takes place in Tanzanian households according to a typical daily schedule, of seven activities, which require energy. Figure 5.18 provides a comparative summary of the time taken on these activities in each category of household in each of the two study wards. From this it can be seen that:

- time spent on cooking is generally less in Kaloleni (the richer ward) than in Daraja Mbili;
- there is a greater range in cooking times in Daraja Mbili suggesting that kerosene (the faster and more expensive fuel) is used less and there is more reliance on charcoal;
- both poor and non-poor female-headed households in Kaloleni spent less time in cooking breakfast. This most probably reflects their need to get their children off to school as quickly as possible so that they can spend time on other activities;
- no female-headed household (poor or non-poor) boiled water for bathing. This could be because the demand for hot water for bathing is made by the husband or that female-headed households have greater problems in accessing water or prefer to save money by not buying water for bathing;
- taking evening tea is not a feature of the poorer ward ; and
- there were no cooking times given for cooking supper in poor female headed households in Daraja Mbili which suggests that either they can not afford to eat

⁸⁰ Undertaken by Blandina Nkini, Community Development Extension Worker, Kaloleni

⁸¹ Organised by WODSTA

⁸² More detail is given in the case-study reports in Appendix E6-E12

both lunch and supper, eat food cooked at lunch time but not heated up in the evening or eat street food because it is quicker.

Figure 5.18: Time taken for domestic activities in minutes⁸³

Activity	MHH Non-poor		MHH Poor		FHH Non-poor		FHH Poor	
	K	DM	K	DM	K	DM	K	DM
Tea	10	15-60	10	15	10	15-30	15-30	30
Breakfast	30-90	30	60-90	60	10-15	30	15	30
Boiling water (bathing)	10	10-15	10-15	15	-	-	-	-
Lunch	60-90	60-120	60-90	120-150	60-90	180	60-120	150
Boiling water (washing)	10	90	10-15	15	10	-	-	-
Evening tea	-	-	-	-	10	-	-	-
Supper	90	120	60-90	60-120	60	120	90	-

Source: semi-structured interviews

Cooking, the controlled experiment

The controlled experiment, which cooked a standard weight of beans using firewood, charcoal and sawdust briquettes, demonstrated the comparative cost in cash and human resources of using these three fuels.⁸⁴ Conversations with those watching the experiment and discussion at the two dissemination workshops showed that women and men generally did not know the real cost of using these fuels. All three had different strengths and weaknesses and so are used for different task. So for example:

- firewood needs a lot of attention as it is necessary to continually add pieces of wood to the fire;
- sawdust briquettes start slowly but later cook as fast as firewood;
- charcoal takes too long to get hot and there has to be further charcoal added in the process; and
- it would be unusual to cook beans using kerosene because this would cost too much.

Cooking, the intervention workshop experiments

The findings of the demonstration exercises undertaken in the two intervention workshops are given in Appendices E16-E19

Again in these experiments there was clear evidence that residents lacked an understanding of the comparative costs of using different types of fuels.

Ironing

Non-poor households use a charcoal iron when there is no electricity. Poor households always use a charcoal iron, either their own or borrowed from a neighbour. Daraja Mbili households tend to spend more time in ironing.

5.4.6 Strategies used to save time⁸⁵

Although women generally find it difficult to quantify the time taken in energy-related activities, they are able to articulate the types of strategies they have for saving time. They use four main ways of saving time:

⁸³ For full data see Appendix **WHICH?**

⁸⁴ Full report in Appendix E13

⁸⁵ For more detail see Appendices E8-E14

- ❑ cooking in larger quantities;
- ❑ buying fuel in larger quantities;
- ❑ changed use of cooking stoves; either using more than one stove at a time, or use an energy saving stove; and
- ❑ changing to a different type of fuel.

However as shown in figure 5.19, poor and non-poor households strategies are affected by what they can afford to buy, thus, for example, poor households would try to buy larger quantities of charcoal and firewood whereas non-poor families would aim for a larger purchase of kerosene.

Figure 5.19: Strategies for saving time

Non-poor	Poor
<ul style="list-style-type: none"> ❑ Use more than one stove (up to 3) ❑ Use 2 rings of electric cooker instead of 1 ❑ Wake up early and reduce resting time ❑ Buy kerosene in large quantities (5 liters per week) ❑ Use sawdust 	<ul style="list-style-type: none"> ❑ Use more than 1 stove at a time (kerosene and charcoal or both charcoal) ❑ Use electricity ❑ Use firewood ❑ Try and buy charcoal and firewood in larger quantities

Source: semi-structured interviews

Cook in larger quantities

This strategy is used differentially in the two wards. In Kaloleni, the female-headed households, both poor and non-poor, cook enough food at lunchtime for 2 meals and then reheat food in the evening. This strategy is used in a more limited way in poor male-headed households. In Daraja Mbili where households tend to be poorer, this strategy is only possible in a limited way in male-headed households (poor and non-poor).

Buying fuel in larger quantities

Buying fuel in larger quantities means different things to poor and non-poor, for example non-poor households can afford to buy and store larger quantities of kerosene, whereas poor households would be buying larger amounts of charcoal and firewood. In the former case households with a maid/servant might hesitate to do so in case the maid/servant uses more fuel than is needed because of the readily available supply. In the latter case the poor households even if they can afford to buy in larger quantities rarely have space to store large amounts.

Changed use of cooking stoves

The data suggests that the strategy of using more than one stove - in the case of non-poor households this may be up to three stoves - at the same time is most frequently adopted by women in male-headed households. These categories of women use this strategy more often than women in female-headed households. It is also used more often in non-poor households in the richer ward (Kaloleni) than in the poorer households. This could be explained because of better education and knowledge and more financial resources in non-poor households. Interestingly, there was no evidence of any strategies being used in poor female headed households in Kaloleni which is not the case in Daraja Mbili. This could be because in Kaloleni more women in female headed households have moved into poverty after the death of a husband, whereas women in Daraja Mbili have been more used to coping with poverty even when they had a spouse.

Use of energy saving stoves

Although very few women knew about or used energy saving stoves (5.4.2), nevertheless the use of energy saving stoves was mentioned as a time-saving strategy.⁸⁶ Women who used them were most likely to come from female headed households.

Changing to a different fuel

This is not a widely used strategy in any of the households, although use of a fuel *higher* on the energy ladder is generally seen to be more time saving. Female-headed households generally see electricity as the household fuel that will reduce time. However, firewood is still considered to be a 'fast' fuel in some poor households and also in a male-headed non-poor household. Non-poor households see a need for an alternative source of cheap, efficient energy.

According to one key informant⁸⁷, it is necessary to look at who is using household energy and what is being cooked. If it is a house girl cooking there is 'lots of waste' (*when using electricity*)⁸⁸. 'They need to understand good load management. House girls are able to manage charcoal more efficiently'. It is also necessary to 'look at types of food being cooked'⁸⁹.

Use of charcoal depends on what is to be cooked. For long cooking food such as beans, the use of charcoal can be reduced by soaking the beans in water overnight and cooking them in the morning when cooking time will be shorter.
Elected Ward Leader, Focus Group Discussion, Kaloleni

5.4.7 The nature of energy poverty in the study areas

Energy poverty, as defined in 2.2.1, is *the absence of sufficient choice in assessing adequate, affordable, reliable, safe and environmentally benign energy services to support economic and human development*.⁹⁰ Energy poverty constrains economic and human development. (Clancey et al:undated; Barnett:00; Clancey:02) It is known that over time, countries and, within them, individuals, as they acquire more wealth, replace 'traditional sources' of energy with 'modern' fuels and thus move up the energy ladder. The modern fuels higher up the ladder are cleaner, more efficient and and convenient. So the decision to use higher level 'modern' fuels, if the opportunity presents itself, makes sense.

However, as in this study, despite modern sources of energy being available they may, for a variety of reasons, not be accessible to every household. In this study all the fuels set out in the generic energy ladder, in chapter two, are theoretically available. Nevertheless many households, although they may aspire to use modern fuels, are *de facto* experiencing partial energy poverty. This is for a number of reasons, including:

- lack of financial resources within a household. This means that even where a modern fuel is available it is not affordable and is therefore not accessible. Thus

⁸⁶ The authors suspect interviewer bias, i.e interviewers with an awareness of energy saving stoves suggested this as a possible strategy.

⁸⁷ Director for Gender, Ministry of Community Development, Gender and Children

⁸⁸ Households that have house girls deliberately restrict the use of energy for cooking to firewood, charcoal and kerosene because of mismanagement of electricity in terms of waste.

⁸⁹ For example, no household would use kerosene to cook beans.

⁹⁰ Reddy: 00

poorer households are more likely to be experiencing some type of energy poverty. The nature of this constraint is clearly shown in para 5.4.2;

- poor, unreliable quality of service. In this case even those who can afford to access electricity are aware of its limitations and would not depend on it as a sole energy supply. (para 5.4.2);
- where servants are responsible for the use of energy there is a concern that they will be extravagant in its use. This is a mixture of social and financial issues. (para 5.4.2)
- lack of understanding, sometimes resulting in fear, of how to use a modern fuel - as is the case with LPG (para 5.4.2)
- a desire to maintain traditions as expressed in the desire to use charcoal for food cooking in order to main its traditonal taste.

After all, we all originally come from rural areas
Counsellor for women, Kaloleni

As explained in chapter two, and as this chapter demonstrates, men and women have different levels of access to different types of fuel and different roles in relation to energy and thus, as demonstrated by these findings they may experience energy poverty differently.

5.4.8 Changes needed in energy roles, responsibilities and rights to reduce time spent on energy related activities?

This study has found that to achieve effective and sustainable changes in the household energy process and hence energy roles, responsibilities and rights, it will be necessary, in view of the existing cultural paradigm, to work with both women and men. Further because of the unique energy-use *fingerprint* in each locality it is necessary for any changes to be context sensitive.

Two sets of issues have been identified which, if changed, could lead to the use of more efficient time saving energy not only by women but also by men and others in the home. The first is concerned with increasing the knowledge and understanding of the performance of various fuels and how best to use them. The second relates to changed approaches around energy in the community and government sectors. Suggestions on how these changes could be achieved are set out in Figure 5.20.

Figure 5.20: Proposed actions to change energy process

Work with men and women in the community to raise awareness of:

- efficient use of energy and energy efficient technologies; and
- comparative costs⁹¹ and performance of a variety of fuels.

Action needed

- Improve knowledge of strategies to maximise efficiency of energy use.
- Improve knowledge of and access to more efficient energy technologies.
- Provide community level demonstrations.
- Build on women's knowledge and experience to locally produce simple, affordable and user-friendly stoves.
- Challenge ill-founded or over-generalised perceptions that mitigate against the use of modern energy.

Work within the community and government sectors to change approaches to the household energy process (see overleaf)

⁹¹ Costs includes not just financial costs but also short and long-term opportunity costs (time, health and education).

<p>ion needed</p> <ul style="list-style-type: none"> <input type="checkbox"/> Policies based on evidence. <input type="checkbox"/> Make energy a community issue. <input type="checkbox"/> Work towards changing embedded cultural attitudes and practices. <input type="checkbox"/> Provide seed capital for training and information. <input type="checkbox"/> Involve community development extension staff and NGOs in energy change process.

Changing the decision-making process

The six focus groups spent some time thinking about how women could be empowered to have a decisive role in decision-making. Their suggestions together are set out in Figure 5.21. There was a consensus that education, formal and informal, and opportunities to develop self-confidence through undertaking IGAs were the best ways of enabling women's empowerment.

Figure 5.21: How to empower women in the energy decision-making process

Daraja Mbili	Kaloleni
Youth Groups (Source: 2 Youth focus group discussions)	
<p>General agreement that decisions are mostly made by men in the households though if it were them they'd make joint decisions. Girls and women can be empowered to make decisions through:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Education; <input type="checkbox"/> Skills development so that they can run IGAs which will empower them economically and hence enable them to make decision; <input type="checkbox"/> Provisions of capital/loans - but these have problems and do not benefit the poor because: <ul style="list-style-type: none"> - of conditions attached to loans e.g. collateral - soft loans given to women are too small to enable someone to undertake a sound and profitable IGA - high interest rate on loan - credit institutions do not involve clients in policy decisions regarding the loans - corruption by some employees of credit institutions who demand some bribes before endorsing a loan. 	<p>Agreed that normally men dominate decision-making process in households. They were not happy with that situation and proposed a change to joint decision-making. Suggestions to empower women to have a decisive role in household energy decisions:</p> <ul style="list-style-type: none"> <input type="checkbox"/> educate both men and women on the merits and demerits of one parent making decisions; <input type="checkbox"/> educate women so that they can make rational decisions; and <input type="checkbox"/> men should appreciate women's decisions.
Extension Workers (Source: 2 Extension workers focus group discussions)	
<ul style="list-style-type: none"> <input type="checkbox"/> Education for both men and women. In D2 this is done once every 2 months in each street. They are taught people's rights and obligations. An example was given of two men from different families jointly building a house. After completion they found problems with the management of the house and so decided to sell it. They involved their families in the whole decision-making process in the sale of the house. <i>Belief that people are changing as a result of education.</i> <input type="checkbox"/> Allow and encourage women to form economic groups where they can exercise decision-making freely. <input type="checkbox"/> Get rid of gender discriminatory norms and culture. Example given of Masaai women who were eating in a hotel one market day. Two Masaai men entered the hotel and saw the women eating and said '<i>If these had been our wives we wouldn't have allowed it.</i>' <p>Not sure about use of bold/italics in this table</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Build up their confidence through education so that they can make rational decisions as well as their husband – if husband is willing. If the husband is not willing to involve or let his wife decide they should both be called to the WEO (not in abbreviations) office for counselling and education. <input type="checkbox"/> Educate both men and women about equality and especially that involving women in decision-making will not deprive men of their status or position in the household or in society; <input type="checkbox"/> Educate men to do away with their selfish attitude towards women and to stop underrating them. They should see women as partners and hence increase their wife's self-confidence so that they can participate fully in decision-making. <input type="checkbox"/> Men should be prepared to participate in the activities women do. This will also increase women's confidence as they will feel they are valued by their partners and so feel freer to make decisions. <input type="checkbox"/> Educate more men (and women) on the health risks from using various energy sources such as charcoal, firewood, etc. Knowing the dangers women are in can make them sympathetic and hence allow women to decide on what type of energy to use or not.

Figure 5.21: How to empower women in the energy decision-making process (continued)

Daraja Mbili	Kaloleni
Elected leaders (Source: 2 Elected leaders Youth focus group discussions)	
<ul style="list-style-type: none"> ❑ Education for both males and females (through social welfare dept., community development dept.) and provision of pamphlets and leaflets to the people. ❑ Men need to fully involve women in household decision-making. ❑ Religious institutions should encourage equal involvement of males and females. ❑ Transparency within the family. A story was narrated by one of the participants – there was a high earning man (income in US\$) who was not transparent with his wife about his income and expenditure. He happened to be a good drinker who always came home drunk. His wife used to inspect his pockets and take any amounts of money that were left there. Over time, she was able to buy a plot of land and build a house with the money saved. Later on, the husband came to learn that his wife had built a house in a low density area. He was furious with his wife and wanted to beat her. She explained how she had raised the money for the house. The man was ashamed and eventually praised his wife for being brave. 	<p>Most of the people in urban areas are now more liberal (due to education, religious teaching, and social interaction with different tribes) and decisions are made jointly (mother, father and children). The problem is still there in peri-urban areas where cultural ties are still strong – the man decides on almost everything. The only solution to this is to educate both men and women that either of them can make rational decisions.</p> <p><i>Note: Much of the input in this FGD was from men</i></p>

5.4.9 Use of time saved

The perceptions of ward extension workers in Daraja Mbili concerning what women would do with time saved from energy-related activities are given in Figure 5.22.

Figure 5.22: How women will spend any spare time

<ul style="list-style-type: none"> ❑ Improve household income by involvement in IGAs/forming IGA groups for doing productive activities ❑ Go to educational centres for more knowledge and skills (but have to be mobilised first) ❑ Get more time for doing household activities so reducing need for housegirls/servants ❑ Mothers would help children with homework ❑ Some girls would spend time on their homework

Focus Group Discussion, Ward Extension Workers, Daraja Mbili

These opinions fit very well with the answers provided by women in both wards. By far the greatest number of women state they would pursue income generating activities (Kaloleni, half of respondents and Daraja Mbili, two thirds), either new ones or build on the ones that they already engage in. However, there are major constraints in trying to translate aspirations into reality. These include lack of access to capital; resistance from husbands in some male-headed households; what is seen

to be harassment of small entrepreneurs by municipal authorities, and lack of diversity in types of activities pursued.⁹²

A much smaller proportion expressed a desire to take-up educational activities in any spare time - under a third of respondents and about a fifth in Daraja Mbili. These figures do not relate to additional up-take of, or more commitment to, education by children in the households, either as a result of less onerous domestic duties or because the women have more money from their IGAs to invest in their children's education. Interestingly, involvement in education is chosen more by female-headed households than women in male-headed households. Despite educational aspirations there are constraints that militate against further education for girls. The most important is cultural as well as lack of household resources and secondary school places. The specific problems perceived by youth, extension workers and elected representatives in their focus groups are set out in Figure 5.23.

Figure 5.23: Problems with accessing education

Daraja Mbili	Kaloleni
Youth Groups Source: 2 Youth focus group discussions	
<p>All agreed that education for women is quite fine but the problem is poverty:</p> <ul style="list-style-type: none"> <input type="checkbox"/> there is no money to pay for education <input type="checkbox"/> not enough opportunities for doing so in Daraja Mbili 	<ul style="list-style-type: none"> <input type="checkbox"/> Poverty – women have no money to pay for education <input type="checkbox"/> Lack of time due to heavy domestic workload <input type="checkbox"/> Cultural aspects which leave women behind in development issues <input type="checkbox"/> Reluctance of women to take up educational opportunities <input type="checkbox"/> Men's jealousy of their wives <input type="checkbox"/> Ignorance on the part of men
Extension workers (Source: 2 Extension leaders focus groups)	
<ul style="list-style-type: none"> <input type="checkbox"/> lack of awareness and mobilisation; <input type="checkbox"/> despair and discouragement due to no employment, no market for products, some members in <i>kibati</i> are not faithful; and <input type="checkbox"/> jealousy of men, which doesn't allow women to take advantage of educational opportunities 	<ul style="list-style-type: none"> <input type="checkbox"/> lack of time: most women fail to attend educational classes due to the heavy workload they face in the home (domestic chores); <input type="checkbox"/> lack of funds to pay fees: since women do not have decision-making power regarding household income and expenditure they have to follow what the man decides. Generally men would prefer to use the money for other things like sending children to school, drinking etc. rather than education for the wife; <input type="checkbox"/> reluctance on the part of some women particularly those with young children to leave their children behind; <input type="checkbox"/> lack of interest in education among women because of limited employment opportunities; <input type="checkbox"/> fear of power struggle in the household by men. Most men think that if the wife is educated or has an IGA which yields good money/income, the woman would feel more equal to the man and therefore won't obey her husband any more. She will be arrogant; and <input type="checkbox"/> low level of education of some women - this excludes them. If a woman is not educated at all – can't read and write – it is difficult for them to join skills development sessions.

⁹² Mentioned in both interviews and focus group discussions

Figure 5.23: Problems with accessing education (continued)

Daraja Mbili	Kaloleni
Elected leaders (Source: 2 Elected leaders focus group discussions)	
<p>How will skills be put into practice once learned?</p> <ul style="list-style-type: none"> ❑ Currently the AMC militia men are harassing people undertaking small scale businesses along the street by taking away their tools, e.g. sewing machines, and evicting them from their working places. Tailoring is problematic where even the best tailor is denied the opportunity to practice his/her skills until they pay some fees for a licence. An example was 'a very good tailor who can make a dress just by looking at you but was denied a chance to practice his skills and is now frustrated and has resorted to drinking local spirits because no customers are giving him work to do. 	<ul style="list-style-type: none"> ❑ Some of the women do not have confidence to take up educational opportunities. ❑ Private vocational education centres are available but the majority of people do not have the ability to pay the fees.

Some comments by youth, extension workers and elected leaders on how to aid the empowerment of women are given in figure 5.24

Figure 5.24: Comments on empowerment.

<p>Empowerment</p> <ul style="list-style-type: none"> ❑ Education ❑ Skills development so that they can run IGAs which will empower them economically and hence allow be able to make decisions ❑ Provision of capital/loans – but this has problems: <ul style="list-style-type: none"> ○ Do not benefit the poor because of conditions attached to the loans e.g. collateral ○ The soft loans given to women are too small to enable someone to undertake a sound and profitable IGA ○ High interest rate on loan Credit institutions do not involve the clients in policy decisions regarding the loans ○ Corruption by some employees of credit institutions who demand some bribes before endorsing a loan. ❑ Need for ward leaders to mobilise and create awareness among women to take up educational opportunities for skill development
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Source: Youth, extension workers and elected leaders focus discussion groups in Daraja Mbili

5.4.10 End Remark

The findings for the practice component are reviewed in Chapter 6. Chapter 7 incorporates a conclusion, including an assessment of the hypotheses, and the way ahead.

6. PRACTICE COMPONENT

6.1 Introduction

As explained in section 1.2 the integration of research and practice is an important feature of this study. This chapter describes the process and outcome of the practice component at the time of report writing. It describes the process (shown in figure 4.2) which led to the design of two interventions, one in each of the two wards and reviews the action plans for the interventions.

6.2 The process

As shown in Figures 4.2 and 4.7, the study was structured for the research findings to inform the communities work to design and establish a locally resourced intervention. The practice component falls into three parts:

- awareness-raising of the community about energy;
- mobilisation of the community to identify and design an action plan for an energy intervention; and
- implementation of the interventions.

The actions involved are summarised in figure 6.1

Figure 6.1: The practice component process

Practice component	Activities
Community awareness raising about energy	<ul style="list-style-type: none"> □ Semi-structured interviews, FGDs, KII, and case studies □ Preparatory workshops □ Dissemination workshops □ The controlled cooking experiment
Community mobilisation	<ul style="list-style-type: none"> □ Intervention workshops
Implementation of sustainable interventions	<ul style="list-style-type: none"> □ Space and expertise from community □ Ward CDOs (community development and management skills) □ AMC political commitment □ Funds from AMC CD (e.g. IGA grants for women) □ CDTI - student intern □ WODSTA supply briquettes and stoves to focal point who mark up price and use profit for funding focal point

Community awareness-raising about energy

The research activities: semi-structured interviews; focus groups; case-study discussions; controlled cooking experiment; key informant interviews; and the preparatory and dissemination workshops (discussed in detail in chapters 4 and 5) within Daraja Mbili and Kaloleni all served to raise the awareness of the two communities, the Arusha Municipal officers and elected representatives and NGOs.

Community mobilisation

Two workshops were facilitated, one each in Daraja Mbili and Kaloleni wards by WODSTA staff. The workshops undertook four activities:

- in sub-groups they brainstormed the answers to questions which are summarised in figure 6.2;
- undertook a cooking demonstration (findings in Appendix F3 – F6);
- agreed (in realisation of the implications of the findings of the above activities that there is a need for more information to be disseminated through the community) to establish an energy focal point;
- appointed a management committee (see Appendices F1 and F2)

- finalised the roles and responsibilities of the committee; and prepared an action plan (see Appendices F1 and F2).

Figure 6.2: Energy problems - questions and answers

Daraja Mbili	Kaloleni
Q1. Why no use of energy efficient stoves?	
<ul style="list-style-type: none"> □ Lack of knowledge about the technology and its benefits □ Low income □ Unavailability of the technology anywhere in the ward 	<ul style="list-style-type: none"> □ Lack of knowledge about the technology and its benefits □ People think they are slow because they only use a little wood or charcoal
Solutions	
<ul style="list-style-type: none"> □ Training in the technology □ Workshops for developing and selling the technology should be set up at the ward level 	<ul style="list-style-type: none"> □ Training in the technology
Q2. Why no use of biogas?	
<ul style="list-style-type: none"> □ Lack of knowledge about the technology □ Restriction on the number of animals that a household can keep in urban areas □ Lack of a system for biogas collection □ Lack of awareness on how to use biogas □ The technology is expensive for most households 	<ul style="list-style-type: none"> □ Lack of knowledge about the technology □ Lack of enough space to keep livestock
Solutions	
<ul style="list-style-type: none"> □ Educate people in the technology □ Economic empowerment of the households . Govt. should lessen restrictions on keeping animals and selling of charcoal □ Establishment of income generation activities 	<ul style="list-style-type: none"> □ Extension workers to educate people in the technology
Q3. Why no use of solar energy?	
<ul style="list-style-type: none"> □ Lack of knowledge on its use and benefits □ Expensive technology □ Low income households 	<ul style="list-style-type: none"> □ Lack of knowledge on its uses and benefits □ Low incomes □ Expensive technology □ Lack of experts on this technology
Solutions	
<ul style="list-style-type: none"> □ Education of the community about the technology □ Income generation activities 	<ul style="list-style-type: none"> □ Education of the community about the technology □ Exemption of taxation on energy equipment by government □ Solar technicians should market themselves so that they are known □ Community to be trained on how to develop these technologies by themselves
Q4. Why minimal use of sawdust?	
<ul style="list-style-type: none"> □ Lack of knowledge of technology □ Inadequate supply of sawdust □ It is smoky and unclean 	<ul style="list-style-type: none"> □ Lack of knowledge of technology □ Inadequate supply of sawdust □ It is smoky and unclean □ It is tedious to put in the stove
Solutions	
<ul style="list-style-type: none"> □ Education in the technology □ Lack of adequate supply of trees for sawdust 	<ul style="list-style-type: none"> □ Education in the technology □ Easy availability of sawdust
Q5. Why no bulk buying of charcoal, kerosene or firewood?	
<ul style="list-style-type: none"> □ Poverty, low income households □ Inadequate availability of the technologies □ Habitual use of low quantities of energy □ Transporting charcoal from rural areas is difficult and expensive □ Legal restrictions on use and transportation of charcoal 	<ul style="list-style-type: none"> □ Poverty, low incomes □ Lack of storage facilities □ Inadequate availability of the technologies □ Habitual use of low quantities of energy □ Depends on the decisions of the household leader □ For security reasons – to avoid fire accidents

Figure 6.2: Energy problems - questions and answers (continued)

Solutions	
<ul style="list-style-type: none"> <input type="checkbox"/> Creation of awareness of alternative sources of energy <input type="checkbox"/> Less restriction by government on the use of charcoal <input type="checkbox"/> Income generation activities to raise money for energy 	<ul style="list-style-type: none"> <input type="checkbox"/> Availability of soft loans <input type="checkbox"/> Create awareness of alternative sources of energy <input type="checkbox"/> Provide enabling environment for economic activities <input type="checkbox"/> Involve women in IGAs <input type="checkbox"/> Entrepreneurship development
Q6. Implications of men making majority of household energy decisions?	
<ul style="list-style-type: none"> <input type="checkbox"/> Men own and control all means of production and resources at household Level <input type="checkbox"/> Patriarchal systems of decision-making <input type="checkbox"/> Cultural practices <input type="checkbox"/> Women's low education <input type="checkbox"/> Inadequate knowledge of women and their rights <input type="checkbox"/> Lack of control of resources by women 	<ul style="list-style-type: none"> <input type="checkbox"/> Subordination of women makes them lose confidence <input type="checkbox"/> Men own and control resources at household level <input type="checkbox"/> More men have education compared to women <input type="checkbox"/> Men's superiority complex <input type="checkbox"/> Cultural practices <input type="checkbox"/> Women's low education <input type="checkbox"/> Lack of confidence in women
Solutions	
<ul style="list-style-type: none"> <input type="checkbox"/> Awareness creation on the need for men to involve women in the decision-making process <input type="checkbox"/> Women's rights to be observed by the community <input type="checkbox"/> Equal rights between men and women at all levels <input type="checkbox"/> Discourage negative cultural practices <input type="checkbox"/> Legal education for women 	<ul style="list-style-type: none"> <input type="checkbox"/> Awareness creation on the need for men to involve women in the decision making process <input type="checkbox"/> Frequent community meetings for exchange of ideas between men and women <input type="checkbox"/> Use of opinion leaders to create awareness to men
Q7. Cannot use electricity as we would like to	
<ul style="list-style-type: none"> <input type="checkbox"/> Too expensive <input type="checkbox"/> Irregular supply of electricity <input type="checkbox"/> Low income <input type="checkbox"/> Lack of knowledge of how to use it 	<ul style="list-style-type: none"> <input type="checkbox"/> Too expensive <input type="checkbox"/> Electricity can be dangerous and harmful <input type="checkbox"/> Low income <input type="checkbox"/> Lack of knowledge on how to use it
Solutions	
<ul style="list-style-type: none"> <input type="checkbox"/> Education on its uses and how to use it <input type="checkbox"/> Income generation activities 	<ul style="list-style-type: none"> <input type="checkbox"/> Education on its uses and how to use it
Q8. Lack of knowledge about different types of energy, efficient use of energy, and safe and efficient energy technologies	
<ul style="list-style-type: none"> <input type="checkbox"/> Lack of exposure to alternative technologies <input type="checkbox"/> Low income <input type="checkbox"/> Lack of energy distribution centres <input type="checkbox"/> Lack of constant availability 	<ul style="list-style-type: none"> <input type="checkbox"/> Lack of exposure to alternative technologies <input type="checkbox"/> Low education <input type="checkbox"/> Habit <input type="checkbox"/> Lack of constant availability
Solutions	
<ul style="list-style-type: none"> <input type="checkbox"/> Dept. Of Community Development to design training programmes on energy technologies <input type="checkbox"/> Dept. of Community Development to provide soft loans for access to technologies 	<ul style="list-style-type: none"> <input type="checkbox"/> Economic empowerment

Source: Intervention workshops

6.3 The outcomes

There are two main issues which receive consideration here: the nature of the action plans developed in the intervention workshops and the resources and institutional position required to ensure the implementation of sustainable interventions.

Action plans

The action plans are set out in figures 6.3 to 6.6. From these it can be seen that the estimated total cost for the activities identified in the two wards is almost the same at

TSh2,190,000 (Daraja Mbili) and TSh2,200,000 (Kaloleni) respectively i.e. approximately £.....(August 2004 exchange rate)

Implementation of sustainable interventions

The DPU staff was able to take advantage of their visit to Arusha with their students in May 2004 to review the WODSTA report of the ward community energy intervention workshops. By that time the two communities had both identified focal points as their interventions; prepared action plans including budget projections; established focal point committees; identified locations for the focal points; and, in the case of Kaloleni, had programmed a forthcoming event.

A number of resources are listed in figure 6.3 and 6.4. Focal point committees were appointed at the intervention workshops and space was committed for the home of the focal points.

The DPU team was able to negotiate with:

- *the Principal of CDTI to provide a student intern on a regular six-monthly basis to each focal point to provide an informed community development worker to assist with activities and day to day management;*
- *the AMC Chief CDO to discuss the possibility of providing IGA grants (from existing AMC committed funds) for women with the focal point committees as a possible source of funding for energy related IGAs linked to the focal points, for example, the production of locally produced energy saving stoves.*
- *The AMC Adult Education Officer prepared to liaise and cooperate with both Chief CDO and CDTI*

WODSTA had already agreed to act as intermediary in obtaining sawdust briquettes and energy saving stoves in bulk and supplying them in small quantities to the focal points to sell. The focal points will obtain a small profit from these sales which will provide finance for their various activities.

The Mayor sees these focal points as demonstration projects. If they prove their value he is prepared to roll them out across the remaining 15 wards. (4.3.2)

Community expertise as it is developed will be forthcoming. Ward CDOs are already supporting the focal points.

Figure 6.7 sets out a possible institutional position for the focal points. This position takes account of the committed actions by AMC staff, CDTI Principal and WODSTA.

Figure 6.3: Daraja Mbili; community energy focal point action plan and budget

STARTING DATE	ACTIVITY/TASK	RESOURCES	BUDGET	RESPONSIBLE	DATE TO ACCOMPLISH
10 May	Seek an office room to rent	Funds	Tsh. 240,000	Committee	10 July
3 May	Analysis of the stoves to be used at D2	Expertise	Tsh. 50,000	Committee	August 2004
1 June	Purchase of stoves	Funds	Tsh. 100,000	Committee	September 2004
10 June	Purchase energy/fuel	Funds	Tsh. 100,000	Committee	October 2004
15 June	Purchase cooking utensils, knives etc	Funds	Tsh. 50,000	Committee	November 2004
10 May	Community mobilization	Posters Brochures camera microphones	Tsh. 250,000	Committee Community Street leaders	December 2004
10 July	Purchase food stuff for demonstration	Funds	Tsh. 50,000	Committee	December 2004
15 July	Conduct practical demonstration	Funds, slogans, camera posters leaflets	Tsh. 250,000	Committee Community Street leaders Key people	December 2004
TOTAL			Tsh.1,090,000		

Figure 6.4: Daraja Mbili; energy initiative action plan

STARTING DATE	ACTIVITY/TASK	OBJECTIVES	RESOURCES	BUDGET	RESPONSIBLE	DATE TO ACCOMPLISH
17 May	Conduct meeting (each street)	To create awareness to community members on energy crisis	Microphones Key people	Tsh. 100,000	Street leaders Cell leaders Street Executive Officers	December 2004
1 July	Conduct practical demonstration on Energy issues	To create awareness on energy saving stoves and environmental conservation	Key people Experts Microphones Slogan, food stuff	Tsh. 150,000	Committee Experts Community	December 2004
1 June	Conduct training on alternative energy	To educate the community on advantages of energy saving stoves and alternative energy	Trainers Key people Stoves Fuel	Tsh. 250,000	Committee WEO	December 2004
1 October	Sensitise community on gender equality	To educate community on gender issues; rights, roles, decision making	Facilitators Key people	Tsh.300,000	Committee Community Street leaders WEO	December 2004
1 July	Sensitise community on the outdated cultural norms/traits	To educate community on the effects of negative cultural practices	Facilitators Key people	Tsh. 300,000	Committee WEO Street leaders community	December 2004
TOTAL	-	-	-	Tsh.1,100,000	-	-

Source: Both plans developed at intervention workshop as reported by WODSTA facilitator

Figure 6.4: Kaloleni; community energy focal point action plan and budget

DATE TO START	ACTIVITY/ TASK	OBJECTIVE	RESOURCES	BUDGET	RESPONSIBLE	DATE TO ACCOMPLISH
22 May	Conduct meeting (each street)	To create awareness to community members on energy issues	Microphones Expertise, key people	Tsh. 100,000	WEO, Street leaders Extension officers	December 2004
20 June	Training community on energy saving stoves and alternative energy	To create awareness on energy saving stoves and alternative energy	Facilitators Key people Training materials	Tsh. 200,000	WEO Extension officers	December 2004
1 July	Conduct practical demonstration on energy use	To disseminate information on energy use, problems. and promote stoves and fuels	Camera Microphone Food stuff	Tsh. 250,000	Key people WEO Committee	December 2004
1 August	Sensitise community on gender equality	To educate community on gender issues; rights, roles, and decision making	Facilitators Key people	Tsh. 300,000	WEO Cell leaders Street leaders Community	December 2004
5 Sept.	Sensitise community on outdated cultural practices	To educate community on the effects of outdated cultural practices	Facilitators Key people Training materials	Tsh. 300,000	WEO Cell leaders Street leaders community	December 2004
TOTAL				Tsh.1,150,000		

Figure 6.6: Kaloleni; energy initiative action plan

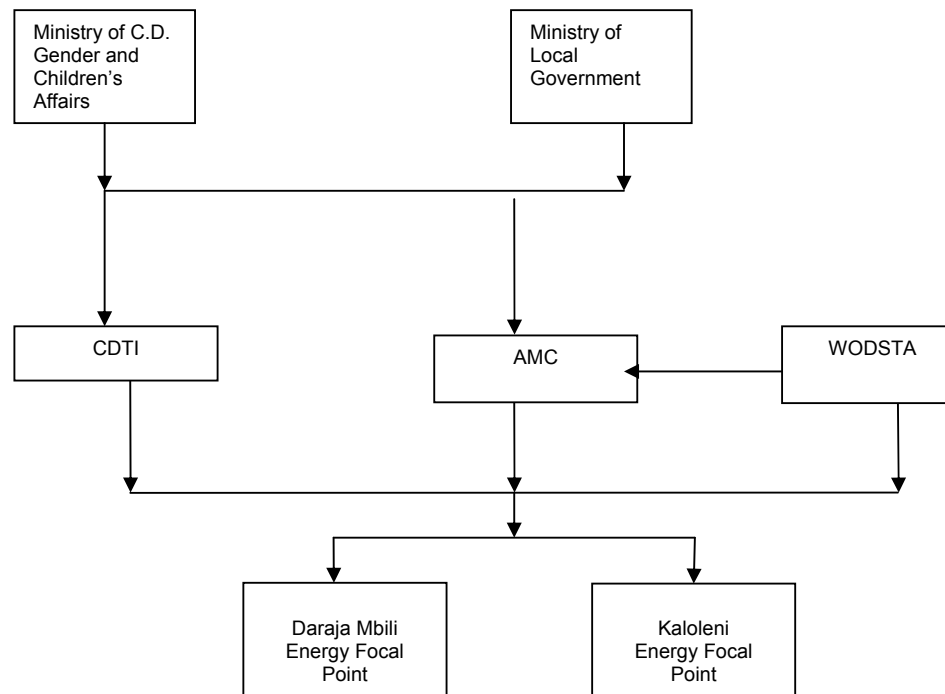
DATE TO START	ACTIVITY/ TASK	RESOURCES	BUDGET	RESPONSIBLE	DATE TO ACCOMPLISH
6 May	Seeking a site to set up an office/centre	Funds	Tsh. 20,000	Councillor Committee	July 15
5 May	Analysis of proper stoves/energy required	Expertise Funds	Tsh. 30,000	Committee	June 10
24 May	Making wonder basket stoves	Thread, needles, baskets, black cloth, polythene papers, saw dust, Trainer	Tsh. 20,000	Committee WODSTA (Trainer)	August 30
10 May – 10 June	Purchase of stoves required	Funds Expertise	Tsh. 150,000	committee	August 15
10 May – 10 June	Purchase of energy/fuel required	Funds Expertise	Tsh. 100,000	Committee	August 15
15 – 25 June	Prepare posters/ leaflets, slogan, brochure	Funds Expertise Artist	Tsh. 250,000	Committee	August 30
15 – 30 June	Community mobilization	Video camera Vehicle Music generator	Tsh. 250,000	Committee	September 30

A Study of the Impact of Energy use on Poor Women/Girls Livelihoods in Arusha, Tanzania

		Drama			
10 May – 10 June	Purchase utensils	Funds	Tsh. 50,000	Committee	June 30
28 June – 1 July	Purchase food stuff for demonstration	Funds	Tsh. 30,000	Committee	July 10
1 July	Conduct practical demonstration	Funds, Expertise Key people, Stoves, fuel	Tsh. 150,000	Committee Key people	September 30
TOTAL			Tsh. 1,050,000		

Source: Both plans developed at intervention workshop as reported by WODSTA facilitator

Figure 6.5:
Energy focus groups
institutional position



7. CONCLUSIONS AND THE WAY AHEAD

7.1 Introduction

The conclusions in this chapter relate to the implications that can be drawn from the study in regard to the two hypotheses and assess whether, and how, the study has achieved its two aims. Consideration is given to the way ahead from both research and practice perspectives.

7.2 Conclusions

7.2.1 Hypotheses

Hypothesis one - *Time saved by using modern energy will result in women and girls having greater participation in educational activities*

This hypothesis presupposes that:

- currently women and girls do not use, or use modern energy only infrequently, or for part of their daily tasks;
- they are willing and able to use modern energy;
- by using modern energy they will save time;
- the time saved will be in sufficiently large 'chunks' to provide the temporal space in which to undertake additional activities (thus if women save time as a result of using modern energy it is of limited value if it is very small amounts each day.
- having temporal space, women and girls will be willing to use it for some kind of education, or education related activity.

Of the three modern fuels – electricity, LPG, and kerosene – considered in the study, electricity is the fuel aspired to by all four groups of households (male and female headed whether poor or non-poor). However, its expense, and the poor quality of supply means that poor households either cannot afford to use it or, where they can, have to severely limit its use and even non-poor households, nearly all of whom are connected to electricity, use it relatively sparingly. Households are not willing to use gas which they perceive as being unsafe because of past accidents. Kerosene, which is the most easily available modern fuel, is popular for cooking and lighting amongst all the household groups.

The study found that households, whether poor or non-poor, do not make exclusive use of one fuel, nor is only one fuel type used for only one activity. Instead for a mixture of practical and cultural reasons they use a mix of modern and traditional fuels.

There is evidence that women, in so far as they can, mix their use of fuels in order to save time, although using a variety of fuels is only one of four time saving strategies. The other three being; cooking in larger quantities, buying fuel in larger quantities, and changing to a different type, or number of cooking stoves. However, the shorter time spent on daily activities in non-poor households (where there is greater use of modern fuels) compared with poor households suggests that the time saved each day would be relatively short, unless all households could have access to reliable and affordable electricity for all activities. In view of Tanzania's current electrical

situation and the relative poverty of the households this is most unlikely in the short to medium term.

Under a third of women in the Kaloleni and a fifth in Daraja Mbili expressed a desire to take-up an educational⁹³, or education related activity (including girls having more time for homework or mothers helping children with homework), in any time saved as a result of using modern fuel. This compared to a half of women in Kaloleni, and two thirds in Daraja Mbili, who would aim to undertake an income generating activity, perhaps not surprisingly in households that are lacking in income and assets. Moreover in the study area access to education is not just restricted through lack of time. Lack of money to spare for education, cultural constraints, and lack of educational opportunities are also factors that need addressing if women and girls are to benefit from improved and increased access to education.

In relation to the first hypothesis it can be concluded that, in the study area, if women and girls had improved access to modern energy they would be willing to use it and thus save time. However in the current context it is unlikely than more than a third and perhaps as low as fifth of women would be interested in using any time they saved for educational or educational related purposes. As constraints other than energy used have a significant on their willingness and ability to access education these also need consideration if women and girls are to benefit in educational terms from an improved access to modern energy.

Hypothesis two - *access to modern energy will contribute to gender equality and women's empowerment.*

To assess this hypothesis thought is first given to the meaning of *gender equality* and *women's empowerment*. In this study *gender equality* is taken to mean a more equitable share of energy related household responsibilities between men and women. *Women's empowerment* is taken to relate to women's right to participate in the energy decision-making process. Consideration is therefore given to:

- the existing nature energy roles, responsibilities and rights within the household;
- the changes needed in energy roles, responsibilities and rights to achieve greater gender equality and women's empowerment; and
- an assessment of the extent that access to modern energy will be a contributing factor to the changes in roles, responsibilities and rights.

This study finds that Daraja Mbili and Kloleni have conservative attitudes to gender roles, responsibilities and rights. The generally accepted paradigm, as in Tanzania as a whole, is one in which men are seen as the bread winners and household decision makers while women are responsible for reproductive tasks and are subservient to men. Nevertheless, despite this stereotype, decision-making patterns in households vary, with a greater likelihood of more educated households tending to make joint decisions. There is evidence that the energy decision-making process falls into three parts. Thus while men are most likely to make decisions about expenditure on household appliances women are most likely to decide on the type of cooking stove to be used, unless the stove falls into a price category which is more than they are allowed to spend in which case they will defer to their husbands. Decision making

⁹³ Educational in this context included any type of informal skills development, adult education – supplied by the public and private (profit and non-profit making) as well formal education.

about the type of energy to be used is less clear cut, with men sometimes making the decision and sometimes the decision being made jointly.

This study finds that to achieve effective and sustainable changes in the household energy process and hence energy roles, responsibilities and rights, and thus move towards *gender equality and women's empowerment*, it will be necessary, in view of the existing cultural paradigm, to work with both women and men. Further because of the unique energy-use *fingerprint* in each locality it is necessary for any changes to be context sensitive. Two sets of issues have been identified which, if changed, could lead to the use of more efficient time saving energy not only by women but also by men and others in the home. The first is concerned with increasing the knowledge and understanding of the performance of various fuels and how best to use them. The second relates to changed approaches around energy in the community and government sectors.

There is anecdotal evidence from this research that men are more willing to share in energy related tasks when the process is easier, cleaner and quicker.⁹⁴ So the use of modern fuels would appear to be the ideal if there is to be a more equal sharing between men and women of household energy related tasks. Unfortunately for the reasons discussed earlier, households in the study area, in the short and probably medium term, are likely to have limited access to electricity the most desired of modern fuels. Nevertheless it is the contention of this report that greater *gender equality and women's empowerment* in the energy process can be achieved through making energy a focus of community interest and working with men and women to increase the knowledge and understanding of the performance of various fuels and how best to use them.

7.2.2 Aims

There is every indication that this study has achieved both the aims set in the project document.

First aim - *To provide stakeholders (including policy makers, planners and implementers in the public and community sectors) with an improved understanding of how access to energy impacts on the livelihoods of poor urban women and girls. In particular, to consider how changes in the energy decision-making process, and women and girls' energy responsibilities, might affect their capacity to take advantage of educational opportunities (MDG2)⁹⁵ and contribute to their greater empowerment and greater equality in the household (MDG 3);⁹⁶and*

The various dissemination activities (section 4.2.3), a large number of which have been completed, have publicised the findings of this study locally in Arusha and Tanzania, as well as to a wider audience outside Tanzania. In so doing they have provided a wide range of stakeholders with a wider understanding of *how access to energy impacts on the livelihoods of poor urban women and girls*.

Second aim - To contribute to the improvement of the livelihoods of poor urban

⁹⁴ Semi-structured interviews and informal discussions

⁹⁵ Millenium Development Goal

⁹⁶ See Appendix A1

women and girls in Arusha by providing them with information on how to optimise their use of energy and to begin to strengthen their capacity to take part in the energy decision-making process.

This second aim has been achieved by enabling the study communities to design and implement two energy focal points, one in each of the two wards. Thus these communities have begun, with the help of relevant local institutions, the process of raising their awareness of how to improve their household energy processes. The action plans for both focal groups when undertaken will sensitize the community to the need for more equal gender role and rights.

7.3 The way ahead

7.3.1 Background

The findings and interventions described in this report are context specific. They were undertaken in specific relatively poor urban communities in Arusha, northern Tanzania at a specific time. They comprise an intricate mesh of issues and understandings around the household energy process and provide evidence to inform future policies. Most importantly they demonstrate the ignorance of individuals and communities about the comparative performance of the variety of fuels which are available in Arusha. Significantly the integration of research and practice is an important feature of this study.

7.3.2 The research perspective

The research has highlighted the need for more data on the amount, and cost of energy used for each domestic activity. This information could then be used to advise households on how best to manage household energy budgets. Careful energy management is particularly important for poor households who are currently spending about a third of limited budgets on energy.

In view of the relatively limited research on the energy, poverty, gender relationship in urban areas, and the context specific nature of the study there is a need for further follow-up research in other towns both within and outside Tanzania, possibly in west and southern Africa and a country outside Africa to assess the generic nature of the findings.

7.3.3 The practice perspective

In a very short period of time it has proved possible for two communities to establish interventions which will, if sustained, will contribute to improving the lives of poor households, especially women and girls, in Daraja Mbili and Kaloleni.

The performance of the two interventions should be evaluated in approximately six months to assess whether they are having an influence on energy management in Daraja Mbili and Koleni. If they are having a positive influence they should be widely publicised and other communities enabled to adopt this approach so that they can also benefit.



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IN MEMORY OF

Isack Chimile

Past Principal CDTI

Who sadly did not live to see the completion of this work

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We start by thanking the men, women and children who live in Daraja Mbili and Kaloleni wards for being so generous with their time.

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APPENDICES

A1	Matrix of energy and the Millennium Development Goals
A2	An energy focused social processes matrix
B	Sustainable livelihoods framework
C	National and Arusha city context
D1	Semi-structured interviews
D2	Key informants
D3	Case study guidelines
D4	Participants in focus group discussions
D5	Transect walks observation guidelines
D6	Full list of workshop participants
D7	Structure of sample
D8	Press release and cuttings
D9	Students' field trip TOR
E1	Primary school exam places and secondary places awarded
E2	Estimated number of livestock kept in Kaloleni
E3	Family size
E4	Case studies' Assets
E5	Energy uses: focus group discussions
E6	Fuel and appliances costs in Arusha
E7	Decision making in male headed and female headed households
E8	Kaloleni – amount of time spent on cooking beans using charcoal
E9	Kaloleni – amount of time spent on cooking beans with firewood
E10	Kaloleni – Amount of time spent on boiling water for tea using kerosene
E11	Kaloleni – Amount of time spent on boiling water for tea using electricity
E12	Daraja Mbili - amount of time spent on cooking beans using charcoal
E13	Daraja Mbili - Amount of time spent on boiling water for tea using kerosene
E14	Daraja Mbili - Amount of time spent on boiling water for tea using electricity
E15	Controlled experiment
F1	Kaloleni – ward intervention
F2	Daraja Mbili – ward intervention
F3	Kaloleni – comparison of fuels on set cooking task
F4	Kaloleni – analysis of stoves
F5	Daraja Mbili – comparison of fuels on set cooking task
F6	Daraja Mbili – analysis of stoves

APPENDIX A1

Matrix of Energy and the Millennium Development Goals

	Directly Contributes	Indirectly contributes
<p>MDG 2: Universal Primary Education <i>[To ensure that, by 2015, children everywhere will be able to complete a full course of primary schooling]</i></p>	<ul style="list-style-type: none"> • Energy can contribute a more child friendly environment (access to clean water, sanitation, lighting and space cooling) thus improving attendance at school • Availability of modern energy services frees children's and especially girls time from helping with survival activities (gathering firewood, fetching water); lighting permits home study • Lighting in schools allows evening classes and helps retain teachers, especially if their accommodation has electricity • Electricity enables access to educational media and communications (ICT) in schools and at home that increase education opportunities and allow distance learning 	<ul style="list-style-type: none"> • Access to energy provides the opportunity to use equipment for teaching (overhead projector, computer, printer, photocopier, science equipment) • Modern energy systems and efficient building design reduces heating/cooling costs and this school fees, enabling poorer greater access to education
<p>MDG 3: Gender equality and women's empowerment <i>[Progress towards gender equality and the empowerment of women should be demonstrated by: ! Ensuring that girls and boys have equal access to primary and secondary education, preferably by 2005, and to all levels of education no later than 2015]</i></p>	<ul style="list-style-type: none"> • Availability of modern energy services frees girls' and young women's time from survival activities (gathering firewood, fetching water, cooking inefficiently, crop processing by hand, manual farming work) • Good quality lighting permits home study • Electricity enables access to educational media and communications (ICTs) in schools and at home that increase education opportunities and allow distance learning 	<ul style="list-style-type: none"> • Lighting in schools allows evening classes and helps retain teachers especially if their accommodation has electricity • Street lighting improves women's safety • Reliable energy services offer scope for women's enterprises

APPENDIX A2

An energy focused social processes matrix

Social Processes	Key Aspects
Livelihoods Improvement/Impoverishment	<i>Livelihoods</i> : assets (e.g. physical. financial) <i>Vulnerability</i> : security, risks <i>Investment/losses</i>
Resources Access/Exclusion	<i>Entitlements</i> : energy services <i>Pressures on energy resources</i> Assessment of structural adjustment policies on energy policy and programmes Type of energy available
Knowledge Expansion/Reduction	<i>Knowledge and skills</i> Types and management of energy sources; energy technologies <i>Cultural dimensions of knowledge</i>
Rights Participation/Alienation	<i>Household decision-making process</i> <i>Energy policy</i>

Source; developed from ODA, 1995, A Guide to social Analysis for Projects in Developing Countries, HMSO pp 35 following

APPENDIX B

SUSTAINABLE LIVELIHOODS

The sustainable livelihoods (SL) approach

1. Introduction

The sustainable livelihoods approach is not new. It brings together and builds on earlier approaches. It is people centred, poverty focused, and acknowledges poverty to be a dynamic process. The approach itself is dynamic and the central ideas are continually challenged. This study contributes to the development of the approach by considering the contribution of energy to the livelihoods of poor men and women.

2. The SL framework

Figure 1 presents a sustainable livelihoods model. The **assets** in this model have been presented as a pentagon of five types: financial, human, natural, physical and social, as is proposed in Carney's model.¹ Although these generic assets are essentially the same for rural and urban models, the urban setting may result in a different emphasis for each type of asset. For example, natural capital is generally less significant in the urban setting whereas financial capital is usually more important.

The selection and design of livelihood strategies relates to **women and men's objectives** – what types of livelihood are desired and what areas of livelihood are prioritised. Livelihood strategies are, therefore, based on the values and priorities of the men and women who pursue them, rather than simply on the options and resources available to them.

Livelihood strategies are shaped by the combination of assets available, the urban contextual factors - including policies, institutions and processes; the vulnerability context - shocks, stresses and trends - which determine the availability of these assets, and men and women's objectives. Livelihood strategies can prioritise the interests of more powerful household members rather than the interests of all household members and thus may be inequitable; or they may be deleterious to the natural environment. In this light some strategies may be unsustainable in the longer run.

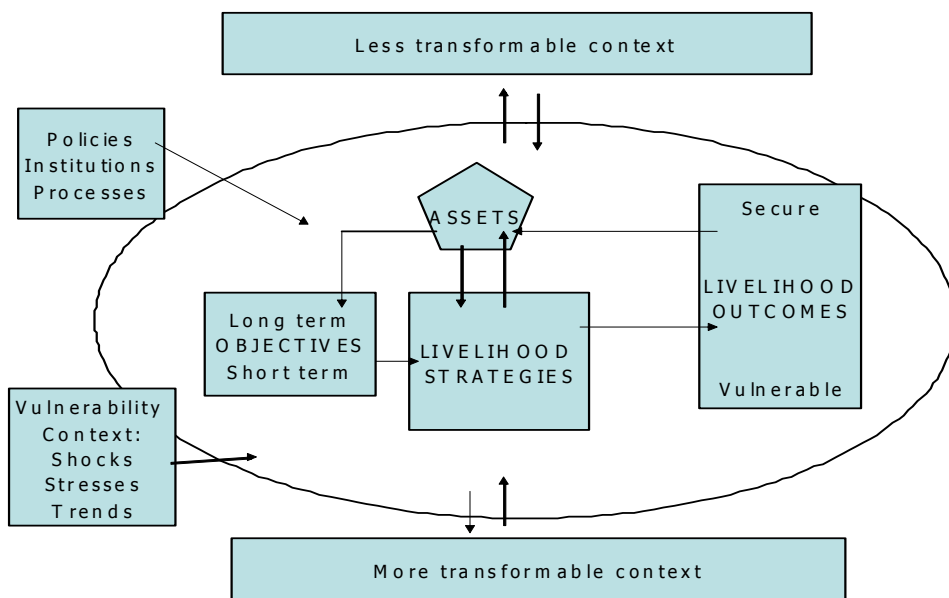
The **livelihood outcomes** of individuals or households are the results of people's success or failure in transforming, through a variety of strategies, the assets available to them into income or basic goods and services. Livelihood outcomes can be aggregated and seen in relation to their position on a continuum from vulnerability to security.² A sustainable livelihood is one which is secure and guards men and women against shocks and stresses without impacting negatively on the environment.

Because the **context** in which poor households pursue their livelihood strategies is a key determinant of the types of assets available to them and the types of livelihood strategies that they are likely to pursue – and thus, in the end, of the security or vulnerability of the livelihoods – it is the context which makes the sustainable urban livelihood distinctive. Poor urban men and women are likely to be vulnerable to different shocks and crises than their rural counterparts. The main sources of this vulnerability vary from city to city – but certain elements appear common to many poor urban residents. For example: their informal legal status in terms of residence, employment status and housing type; poor living environments; and a dependence on the cash economy for basic goods and services.

¹ Carney, 1998

² Moser, 1998

Figure 1: Sustainable Urban Livelihood Framework



Assets include:

- *Human capital* –skills, knowledge, information, ability to work and health
- *Natural capital* – air, land, water, wildlife, biodiversity, environment, wood and coal
- *Financial capital* – savings, credit, remittances and pensions
- *Physical capital* – transport, shelter, water, energy and communications infrastructure
- *Social capital* – social networks, groups, trusts and access to institutions

Source: As developed by Meikle et al for DFID, 1999 from Carney 1998

APPENDIX C - CONTEXT

C. STUDY CONTEXT

C.1 Location, demography and administration

The **Republic of Tanzania**, located in East Africa (figure 1.1) with a total land area of 945,000 sq.kms, is larger than the combined area of the UK and France. With a population, in 2001, of 35.6 million (HDI: 2003), a third of which are currently living in urban areas (a proportion estimated to grow to nearly a half over the next twenty years) it is characterised as the most rapidly urbanising country in Africa (Sida: 1998). This, together with the fact that the population is young, nearly a half (45%) was under 15 and almost two thirds (65%) under 25 years old at the end of the 1990s, (UNDP: 1999) has (as discussed later) significant implications for the delivery of social services and jobs.

Figure C.1: Location of Tanzania in Africa



Source: United nations, department of public Information, Cartographic Section, 2001

The Republic is divided into 25 administrative regions of which Arusha, located in north eastern Tanzania, and covering 93 sq.kms and with a population of 282,712 (Census 2002), is one of the largest (see figure 3.1).

Arusha is divided into 10 districts. The district of **Arusha Municipality**, governed by the elected Arusha Municipal Council (AMC), is the regional government HQ and comprises 17 wards. Each Ward has elected community representatives.

Currently, because a number of taxes have been lifted the AMC is experiencing a reduction in its budget.³ This has resulted in late payment of civil servants salaries. At the same time the Municipality is enhancing its efforts at revenue collection and this is having a negative impact in one off the study wards (section 5).

C.2 Economy

'Emerging from former President Nyerere's (Chinese) socialist model of development in 1985, **Tanzania** was particularly hard-hit by the (then) series of global recessions and ensuing structural adjustment policies (SAP) prescribed by the IMF and the World Bank. The impact of SAP has been particularly resonant amongst the majority of the population who are dependent on small-scale agriculture, and whose resulting migration to the urban areas has further worsened conditions amongst a growing urban population'. (Kaijage and Tibaijuka:1996 cited in DPU^a 2002). Unemployment is a serious problem, particularly for youth (10 to 34 years?) and women who are more vulnerable to unemployment than men.

Despite GDP growth of 6.2% in 2002 (Kigoda:2003), Tanzania remains highly indebted and has a weak economy. In 2001 the country qualified for debt relief amounting to approximately US\$3 billion over the next 20 years and nearly half (45%) of the government budget is drawn from foreign aid. (Mramba:2003)

The informal sector is the most dynamic part of the Tanzanian economy in both employment generation and provision of relatively cheap basic commodities. By 1990 the informal sector was contributing between 20-30% of GDP.

Arusha is an important centre for tourism and the location of international NGOs. In 2000/1, 60% of its employment was agriculturally related. (HBS:2000/1). In addition to small-scale agriculture and commerce its economy also benefits from medium-size industry including textile spinning, brewing, and mining of precious and semi-precious minerals. In 2002 it was identified as among the nine highest urban centres of industrial growth in Tanzania. However since then some industries have closed due to lack of raw materials, poor management, financial constraints and stiff competition for their products from imported commodities⁴. There is local awareness of the slowing of economic growth in the town.⁵

C.3 Socio-economic conditions and services

C.3.1 Impact of urbanisation

In Tanzania, as in other African countries, lack of human capacity and material resources has resulted in the failure of the public sector to provide adequate social services and infrastructure for the rapidly growing urban areas. This lack of delivery is leading to urban poverty and decay. (Box A) The public sector's inaction is being filled by the residents' spontaneous actions which are frequently contrary to the plans of public authorities. Such actions have led to the development of the 'informal' city.⁶ Both rich and poor are living in the 'informal' areas of Tanzania's cities.

Box A: Problems associated with urbanisation

creation of employment and IG (income generating) opportunities for growing

³ Development levy, market dues and highways tax

⁴ Arusha Municipal Council, 2002, 'Arusha Municipal Non-Formal Education Strategy' 2002-2006 Arusha Municipal Council

⁵ Mayor – interview December 2003

⁶ The informal city comprises informal settlements, informal economic activities, unregulated and not provided for urban development; a breakdown of law and order, slums and poor urban environment.

- populations;
- providing land, shelter and physical and social infrastructure;
 - managing the environment and city growth;
 - feeding and transporting the population;
 - putting in place appropriate institutions and mastering resources required to govern the city;
 - growing urban poverty
 - social tensions and increasing insecurity
 - a poor information base
 - effects of globalisation

Source: Kironde and Ngaware (2000)

Arusha, only a third of which is planned, as shown elsewhere in this report, experiences inadequate government provision of services and the 'informal' development common elsewhere in Tanzania's urban areas.

C.3.2 Education

Education has consistently received the highest government expenditure, with health and roads being second and third respectively, There is evidence that this together with the Primary Education Development Plan (2001-2006) (PEDP)⁷ has resulted in some improved education indicators for the primary sector. The vocational training system is less able to meet the demands placed on it.

Figure C.3: Amount in billion Tanzania Shillings and percentage of government spending on education 1998-2003

	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04
Total govt. expenditure (Including CFS)	973.8	1,191.9	1,258.5	1,626.5	2,219.1	2,607.2
Total govt..expenditure on education	329.8	436.0	509.8	689.8	829.6	985.6
% of total government expenditure	33.8	36.5	40.4	42.0	37.0	38.0

Source: Mramba (2003)

There is ample evidence, including from this current study in Arusha,⁸ that entrenched traditional patriarchal attitudes permeate the culture and restrict girls' access to education at all levels. (THDR:1999 and authors' fieldwork)
 PEDP is having a marked affect on primary school participation in **Arusha**. In 2002, 97% of all seven year old children were enrolled for school, a 71% increase over the previous year. But this achievement has generated problems which still need resolution. Specifically primary class rooms are over crowded and a number of older (post 7 years) children are enrolling and require special treatment.⁹

⁷ The PEDP (2001-2006) ensures that every 7 year old is enrolled in Class 1 and abolishes primary school fees. The Plan focuses on the construction of additional classrooms to cope with the huge increase in the number of children. Under the Plan parents and local committees are supposed to start initial construction of classrooms (foundations and walls) and the government then funds the completion and furnishing of the building.

⁸ Interview, Head, Kaloleni Secondary School

⁹ There may be five children at one desk, and schools have tried introducing two school session (morning and afternoon) but this is not deemed educationally successful. Added to this burden are a number of older⁹ children who enter primary school. Under PEDP, these children are no longer allowed to join Class 1 and have to be taught in a special MEMKWA 'stream' which has a 4 year crash curriculum to help them catch up.

There is already a shortage of secondary school places. Figure 3.4 indicates the scale of the problem. The increased numbers in the primary system will place further pressure on this inadequate system. The government is encouraging the further development of private courses for primary and secondary school students. However private tuition fees limit their accessibility to wealthier families.

Figure C.4: Students passing secondary school exam and number accepted

Year	Passed	Not selected for secondary school		High grades not selected	
		Number	%	Number	%
1999	4862	3164	65	961	30
2000	5112	4015	78	1168	29
2001	5409	4376	81	1637	37
2002	4946	4695	94	1454	31

Source: Arusha Municipal Non-Formal Education Strategy, 2002-2006, AMC

Two types of adult education¹⁰, adult literacy classes¹¹ and some small-loan related training, are also government sponsored. However there are attendance, funding and teacher motivational problems.¹²

In 2002, there were 4,484 men and women in Arusha aged 13-60 years who could not write, read or do simple arithmetic. Just over a third (1,608) of the total were men and just under two thirds (2,876) were women¹³. Unsurprisingly classes are more popular with women than men.

Guidelines for the extension of credit from Municipal Community Development Officers for training are comprehensive and involve training and follow-up. However, there is often no follow-up because of lack of transportation costs for government employees. Loans are often given to groups that live alongside the main road because of better access¹⁴.

There are a range of private courses available and include a variety of practical skills training. They are required to register in Dar-Es-Salaam and the Municipality does not keep records.

There are also some business/entrepreneurial schemes which either as in the case of FAIDAA,¹⁵ business training and institute/management consultants, who charge fees and others such as SEDA and PRIDE who are able to provide training as part of their loans system.

C.3.3 Health

¹⁰ Run in the wards, there are 26 adult education centres with 159 functional and post literacy classes. Source: Arusha Municipal Non-Formal Education Strategy, 2002-2006, AMC

¹¹ Literacy classes are held in the wards

¹² Classes are conducted at different levels and on average it takes up to two years, at one hour a day, three times a week to achieve functional literacy. Teacher motivation is also a problem since the teaching of these classes is unpaid and depends on the goodwill of the existing teachers. If only one person attends the class it has to be taught. – Interview with Municipal Education Officer

¹³ These figures are based on an education census conducted in 2002. Source: Arusha Municipal Non-Formal Education Strategy, 2002-2006, AMC

¹⁴ Key Informant Interview, Director of Gender, Ministry of Community Development, Gender and Children

¹⁵ Mostly men (80%) that attend courses but the number of females increased in 2002.

Women interested in book-keeping course and BAT, especially marketing.

System of Health Care

Health care in Tanzania is offered in both informal and formal sectors. The formal sector include public and private services. The informal system comprises traditional practitioners¹⁶ who offer medical services, for the urban poor, usually relying on a mixture of herbal medicines and a prayer regime. The formal public health sector has a pyramidal referral structure¹⁷ reaching from the dispensaries to the consultant hospital.¹⁸

Health Status

Government Spending

In 2000, public expenditure on health was 2.8% of GDP whereas public expenditure on education was 2.1%¹⁹. According WHO figures²⁰ this had risen to 4.4% in 2001. Data taken from Mramba, 2003 shows that government expenditure in both health and education has steadily increased over the period 1998/90 but spending on education has consistently been more than 100% of that on health. 2003/04 figures show that 10.8 % of total expenditure was spent on health and 22.4 % on education.²¹

Figures 3.5 and 3.6 below provide a number of health indicators for Tanzania. The first compares data from Tanzania with that from Sub-Saharan Africa where it can be seen that Tanzania compares unfavourably on several indicators, specifically undernourished people and tuberculosis cases. While the data shows the total number of adults living with AIDS to be below the figure for Sub-Saharan Africa, the precise extent and pattern of the AIDS crisis is unclear because of lack of data. Tanzanian statistics are based on cases reported at health centres and hospitals. Many people do not go for testing either because of the social stigma attached to AIDS or the fatalist attitude of those who think they are infected.²² Malaria is a major health risk.

The second table shows that while women appear to have greater longevity than men, poor health is a bigger contributor to their loss of life expectancy.

¹⁶ Some traditional practitioners are registered with the Municipal Medical Officer of Health's office and in this way are a part of the formal health care system.

¹⁷ Mwaluko GMP, Kilama WL, Mandara MP, Murru M, Macpherson CNL, 1991, *Health and disease in Tanzania*. London: Herper Collins Academic

¹⁸ Dispensaries are not allowed to perform operations and usually have a few beds to keep patients overnight. Patients with more serious medical conditions are referred to a Health Centre and then, if necessary, to a District and then a Regional hospital. The pinnacle of the formal public health care system is the consultant or referral hospital. There are four referral hospitals allocated according to zones i.e. Muhimbili National Hospital (east), Kilimanjaro Christian medical Centre (KCMC) (north), Bugando Hospital (west) and Mbeya Hospital (southern highlands).

¹⁹ UNDP HDR 2003¹⁹ Dispensaries are not allowed to perform operations and usually have a few beds to keep patients overnight. Patients with more serious medical conditions are referred to a Health Centre and then, if necessary, to a District and then a Regional hospital. The pinnacle of the formal public health care system is the consultant or referral hospital. There are four referral hospitals allocated according to zones i.e. Muhimbili National Hospital (east), Kilimanjaro Christian medical Centre (KCMC) (north), Bugando Hospital (west) and Mbeya Hospital (southern highlands).

²⁰ WHO, 2002

²¹ Excluding Consolidated Fund Service

²² i.e what's the point of being proved HIV+ when unable to pay for treatment and medication; it's better not to know (Key Informant Interview, Kaloleni Health Centre).

Figure C. 5 Health indicators – comparison of Tanzania and sub-saharan

Health Indicators	Value	
	Tanzania	Sub-Saharan Africa
Probability at birth of surviving to age 65 (% of cohort)		
• Men	26.1	32.0
• Women	29.2	36.1
Population with sustainable access to affordable essential drugs % (1999)	50-79	No data
Birth attended by skilled health personnel % (1994-2001)	36	38
Physicians (per 100,000 people) 1999-2220	4	No data
Undernourished people (as % of total population) 1998/2000	47	33
Children under weight for age (% under age 5) 1995-2001	29	No data
People living with HIV/AIDS 2001		
• Adults (% age 15-49)	7.83	9.00
• Women (age 15-49)	750,000	15,000,000
• Children (age 0-14) ²³	170,000	2,600,000
(6.5%)		
Malaria cases (per 100,000 people) 2000	1,207	No data
Tuberculosis cases (per 100,000 people)	212	198
Health expenditure		
• Public (as % of GDP) 2000	2.2	No data
• Private (as % of GDP) 2000	2.5	
• Per capita (PPP US\$) 2000	27	

Source: UNDP HDR 2003

Figure C. 6 : Health indicators - Tanzania

Health indicators, 2002		
Indicator	Value	Uncertainty Interval
Life expectancy at birth (years)		
Total population	46.5	
Males	45.5	44.3 - 46.9
Females	47.5	46.2 - 49.0
Child mortality (probability of dying under age 5 years) (per 1000)		
Males	163	149 – 177
Females	144	132 – 156
Adult mortality (probability of dying between 15 and 59) (per 1000)		
Males	561	534 – 585
Females	512	484 – 536
Healthy life expectancy at birth (years)		
Total population	40.4	
Males	40.0	38.7 – 41.5
Females	40.7	39.6 – 42.3
Percentage of total life expectancy lost due to poor health (%)		
Males	12.1	
Females	14.3	

Source: WHO²⁴

¹ In 2001, 45.6% of the population was under 15 (same source)

¹ <http://www3.who.int/whosis/country/indicators.cfm?country=tza>

²³ In 2001, 45.6% of the population was under 15 (same source)

²⁴ <http://www3.who.int/whosis/country/indicators.cfm?country=tza>

98% of **Arusha's** health 62 facilities are private.²⁵ Traditional medicine practitioners²⁶ play an important role in wards that lack formal health care services and for the poor who find modern health care too expensive.

The Municipal Community Health Officer (MCHO) focuses on preventative health and promoting better community health whereas the Municipal Medical Officer of Health (MMOH) has regulating responsibilities for all curative facilities; for compiling health statistics and for alerting the government to incidences of infectious diseases and epidemics. Major problems of concern are lack of funds and issues concerning 'knowledge, attitude and practice'.²⁷

The three most prevalent diseases in Arusha are malaria, acute respiratory infection (ARI) and HIV/AIDs.

C.4 Other services

Tanzania - Water, Sanitation and Solid Waste

According to UNCHS, 1998²⁸, municipal service provision has declined both in quality and quantity and some services, including management of water supply and sanitation systems and services, have become separated from the public sector and are provided *de facto* almost exclusively by the community. A major problem is the inability of municipal systems to meet the demands of rapid urban population growth. Funds are lacking to buy and maintain necessary equipment and vehicles.

It is estimated that 35% of the population is without sustainable access to an improved water source.²⁹ A study commenced in 2001³⁰ identified a number of problematic issues:

- decline in per capita water use, especially in the piped households.
- in both piped and un-piped households the main determinants of per capita water use are the households 'wealth' and cost of water. Piped households still pay much less than households obtaining water from vendors
- deterioration of piped water systems have occurred because of increased urban demand and lack of system maintenance
- the burden of water collection is still borne by women and children
- unsafe water sources and poor sanitation are still causing health problems (diarrhoea and other water-related diseases)

In 2002, the GoT approved a new water policy that aims at providing adequate water services to the people, involving the people in the management, monitoring and conservation of water resources. Although there are efforts to improve the provision of clean water supply and removal of sewerage in urban areas by focusing on rehabilitating and expanding the water and sewerage infrastructure and providing facilities to urban water authorities in order to

²⁵ These include hospitals, health centres and dispensaries

²⁶ While some practitioners are registered under the Medical Officer of Health, many are not.

²⁷ Key Informant Interview, Municipal Community Health Officer

²⁸ UNCHS, 1998, Chapter 2: Review of Municipal Services and Private Sector in East Africa in Privatisation of Municipal Services in East Africa Nairobi

²⁹ UNDP HDR 2003

³⁰ Mujwahuzi, M.R., 2001, Drawers of Water: 30 Years of Change in Domestic Water Use and Environmental Health - Tanzania country case study

www.ied.org/sarl/dow/tanzania

enhance their operations, progress is slow (i.e. a 3% increase in provision between 2001 and 2002)³¹.

Water

According to AMC data, a water supply is available to 88% of the urban population of **Arusha**. However many of the urban poor cannot afford the metered water supply and buy water from local suppliers. The use of ground water (i.e. wells) is limited.

Sanitation

Figure C.7: Percentage use of sewerage system by type

	Planned settlement	Unplanned areas
Septic tank linked to soakage pits	78	5
Pit latrines	8	92
Conventional piped sewage system	14	3

Source: PPA 2001

Waste water is a major problem in unplanned settlements and flows either down the middle of narrow streets or in drainage ditches at the side of the streets which often overflow in the wet season.

Solid Waste Management³²

AMC has 40 skips³³ which are distributed among the 17 Wards. This means that some streets are without a skip. These tend to be the poorer streets because they are not wide enough for the skip loader to pass. Full skips are emptied at a dumping centre at Lemara. There are 2 skip loaders for whole of the Municipality which can move a total of 7 to 8 skips per day. If 1 breaks down some streets are not serviced. Households and businesses are charged for solid waste management services.³⁴

C.5 Poverty

Tanzania is ranked 59 out of 94 developing countries on the UNDP HPI-1³⁵ scale (UNDP, 2003)

As explained by SIDA (2000) '*(T)to be poor in Tanzania is to have few or no choices – it means no security either in financial, legal or social terms*' and generally women and youth are poorer than men.

³¹ Government of Tanzania Economic Survey, 2003

<http://www.tanzania.go.tz/economicsurvey/part4/water.htm>

³² Key Informant Interview: Municipal Community Health Officer

³³ 30 provided by the World Bank; 10 purchased by the AMC.

³⁴ Households are charged TSh500/month (TSh10,000/month if in CBD); TS64,000/year for businesses

³⁵ Calculated for the following 3 indicators of *deprivation*: a long and healthy life (probability at birth of *not* surviving to age 40), knowledge (adult literacy rate) and a decent standard of living (% of population without sustainable access to an improved water source and % of children under weight for age)

Government's 2025 Development Vision (DV)³⁶

Since 1997 poverty reduction is the main focus of the Government of Tanzania's (GoTs) development efforts and the overriding goals have been expressed in the Government's Vision 2025 which outlines 5 main goals for the country:

- a society with high quality livelihood;
- peace, stability and unity;
- good governance
- a well educated and learning society; and
- a strong and competitive economy

Vision 2025 has been developed into two strategy papers – the Tanzania Assistance Strategy (TAS) and the Poverty Reduction Strategy Paper (PRSP). TAS establishes poverty reduction as the core issue for international co-operation and the PRSP sets out the actions to be taken in the medium term.

Despite the implementation of the DV there was no significant improvement in reducing income and non-income (health, education, employment and housing) poverty over the ten years from 1991. (Table 2.3)

Some of challenges and problems still facing the government in reducing poverty are set out in Box B

Box B: Poverty - challenges and problems facing GoT

Challenges

- To attain and sustain economic growth at least 8% per annum
- To improve service delivery to the community (the government in collaboration with the private sector)
- To strengthen infrastructure, especially key roads and agricultural irrigation projects

Problems

- an underdeveloped and crisis-ridden economy
- the negative impact of the structural adjustment programme on the poor
- a set of social arrangements that disempower some groups in such a way that limits/hinders their access to economic and cultural resources (especially land in rural areas)

Source: Kigoda: 2003 and Kaijage:1996

The impact of global recession and the subsequent SAPs prescribed by IMF and WB meant that the urban sector was increasingly unable to provide a livelihood for most households. The suffering of the urban population is aggravated by the fall in real earnings, the lack of employment opportunities, especially for youth, and cost sharing in the social field so that families are less and less able to meet their basic needs for food, medical care, schooling and housing. (Koda:1995)

The impact of the crisis means that more and more urban Tanzanian families are characterised by growing malnutrition among children, deteriorating moral standards, increasing drug abuse and alcoholism, reduced security, greater corruption, domestic violence and child abuse and increased illiteracy and poor health, as well as a greater burden for women in family maintenance

Key characteristics of urban poverty are set out in Box C.

³⁶ Government of Tanzania. *Tanzania's Development Vision and Long-Term Development Strategy* Dar-es-Salaam: September 1997.

Box C: Characteristics of urban poverty in Tanzania

- Growth of unplanned areas
- Rising unemployment in the formal sector
- Growth of informal sector
- Poor access to urban infrastructure and social services.
- Decreasing wage incomes
- Increase of survival strategies by urban residents on marginal activities
- Decreasing urban employment in public and private sector creates 'new poor' as well as those coming in from rural areas.

Source: Mwaiselage:1999

In **Arusha**, as shown in figure 3.8, a greater proportion of the population fall below both the basic needs and food poverty, than in Tanzania as a whole.

Figure C.8: Proportion of population below the poverty lines

	1991/92	2000/1	
	Tanzania in %	Tanzania in %	Arusha in %
Basic needs line	39	36	39
Food needs line	22	19	25

Source: Household Budget Survey 2000/01 as cited in Kigoda 2003 and ???

The nature of poverty and well-being as perceived by the urban poor in **Arusha** is summarised in Box D.

Key findings of the Participatory Poverty Assessment Study 2001 are listed in Box E. With one exception these are supported by the findings of this study.

In Arusha, as in Tanzania as a whole, women are likely to be poorer than men for the reasons set out in Box F.³⁷

³⁷ They are often less mobile and they normally have less stable incomes and assets, leading to less flexibility in terms of their choice of income generating activities, housing security and opportunities for gaining access to social networks.

Box D: Urban poor – perception of urban poverty and well-being in Arusha

Poverty	<input type="checkbox"/> Inability to afford food and accommodation <input type="checkbox"/> Engaged in unprofitable activities <input type="checkbox"/> Lack of credit/capital facilities for income generating activities <input type="checkbox"/> Lack of good shelter and clothing <input type="checkbox"/> Lack of freedom of choice <input type="checkbox"/> Being illiterate <input type="checkbox"/> Being orphaned <input type="checkbox"/> Large families <input type="checkbox"/> Single parent families (especially female-headed households) <input type="checkbox"/> Lack of legal rights
Well-being	<input type="checkbox"/> Own a good house <input type="checkbox"/> Access to capital and can undertake profitable business <input type="checkbox"/> Healthy, able-bodied <input type="checkbox"/> Can afford to educate children <input type="checkbox"/> Can get all rights including legal rights <input type="checkbox"/> Can be a leader if he or she likes <input type="checkbox"/> Have fixed assets such as land, house etc.

Source: Residents in the case-study wards

Box E: Findings of the Poverty Assessment Arusha 2001

- Poor households with fewer adult members contributing to the household income are the most vulnerable³⁸ especially female-headed households and the households of the elderly.
- Most of the urban poor are faced with a trade-off between allocating their minimal earnings to food or paying other important expenses such as school fees or medical care
- Most of the urban poor are migrants most of whom are found in marginalised activities [This finding was not supported by the present study. Many of the residents in Kaloleni and Daraja Mbili had lived in these communities for more than 15 years].
- Poverty eradication efforts have not been successfully translated into local government's plans and programmes and efforts at poverty eradication are often left to the community development department of the Municipality.

Source: Participatory Poverty Assessment: 2001

³⁸ 'They are often less mobile and they normally have less stable incomes and assets, leading to less flexibility in terms of their choice of income generating activities, housing security and opportunities for gaining access to social networks'.

Box F: Reasons for women's greater poverty

- outdated customs and and culture are not friendly to women (ie. do not own property);
- higher levels of illiteracy (although this was not borne out by the data for Kaloleni and Daraja Mbili from the 2002 Non-Formal Education Survey);
- not involved in decision-making;
- they spend their incomes on family needs;
- they have no command over the income they generate;
- they use poor equipment in their activities;
- lack of freedom of movement due to confinement by their husbands;
- they are not able to secure employment because of illiteracy and lack of skills.

Source: Participatory Poverty Assessment Study 2001

C.6 Energy

C.6.1 National Energy Policy

Tanzania's initial National Energy Policy (NEP) which was formulated in 1992 was updated in 2003. The new policy aims to establish *'an efficient energy production, procurement, transportation, distribution and end-use systems in an environmentally sound and sustainable manner and with due regard to gender issues'*³⁹.

While the new policy recognizes the relationship between energy and poverty and energy and gender it fails to incorporate strategies for achieving desired changes. Specifically in the household energy sector, it acknowledges that the high cost of commercial energy and the related appliances is a major constraint for the poor. It also recognises the need to change prevailing inefficient practices in energy use. The major focus in terms of energy supply is on rural and semi-urban women, although a broader approach to gender issues is iterated as a cross cutting strategy in all sectors. Box G highlights specific policy statements relating to the household sector.

The NEP gives extensive consideration to the rural energy problematic but apart from some generalised statements relating to the demand for energy and crosscutting issues relating to energy, set out in Box G, it makes little reference to urban needs and supply. As will be seen from detailed consideration of fuel supply below, the GoT divests its responsibility to the private sector in urban areas.

C.6.2 National energy supply and demand

Tanzanian energy usage comprises:

- Wood & biomass: 90%
- Petroleum products: 8%
- Electricity: 1.2 - 2%
- Coal & renewable energy: approx. 1%⁴⁰

The domestic sector is the largest energy consumer.

³⁹ National Energy Policy, 2003 p.1

⁴⁰ Key Informant Interview, Assistant Commissioner, Ministry of Energy and Minerals

Box G: NEP policies for the household sector

Demand side

- . Encourage efficient end-use technologies and good household practices
- . Encourage energy efficient buildings and wider application of alternative sources of energy for cooking, heating, cooling, lighting and other applications
- . Ensure safe utilisation of household appliances through regulation of safety standards

Supply side – related exclusively to *rural* energy

- . Promote application of alternative energy sources to replace firewood and charcoal (to reduce deforestation, health hazards, time spent by rural women in search of firewood)
- . Promote entrepreneurship and private initiative in the production and marketing of products and services for rural and renewable energy.

Crosscutting Issues

- . Promote gender equality within the energy sub-sectors both on the demand and supply side
- . Facilitate education and training for women in all energy aspects
- . Promote awareness of gender issues concerning men and women's social roles in the energy sector, including training on appropriate technologies
- . Promote awareness and advocacy on gender issues in the energy sector.

Source: Ministry of Energy and Minerals, 2003

Figure C.9: Energy Consumption per sector

Sector	% of energy consumed by sector
Household	76.5
Industry	12.3
Agriculture	3.9
Transport	2.9
Service sector/ others	4.4
Total	100.0

Source: van Asperen, 2001

• **Wood and biomass**

Charcoal

Charcoal accounts for a large proportion of the wood consumed in Tanzania. '(L)little is actually known about the actual extent of deforestation due to urban charcoal use'^{41 42} but there is no doubt that charcoal production accounts for extensive environmental degradation.

⁴¹ Monela *et al*, 1999 quoted in Tanzanian Association of Oil Marketing Companies, 2002, 'The True Cost of Charcoal'

⁴² The TOAMC, 2002 study estimated the environmental damage caused by charcoal production was comparable to a reduction in GNP of not less than 2%.

Its consumption is on an upward trend and according to the 2002 TAOMC study⁴³, there is a consensus among researchers concerning the reasons:

- charcoal prices have remained constant in the last decade making it increasingly affordable for most urban dwellers;
- electricity is unaffordable to most urban dwellers; more people move from electricity to charcoal and/or kerosene than go the opposite way;
- kerosene prices tend to rise, making kerosene unaffordable to many as a source of cooking energy, although it is the most popular source of light energy and;
- urban growth

Easy availability, transportation and storage, as well as familiarity and affordability all cause public opinion to favour charcoal. Moreover charcoal production in eastern Tanzania has been found to be a major source of employment and income to many rural and urban dwellers.⁴⁴

Adoption of energy-efficient stoves is not as widespread as was hoped despite promotion by NGOs. A charcoal stove (*jiko*) is cheap to buy or can be made with moderate skill from scrap metal. The CHAPOS Report (2002) suggested that reasons for the slow rate of adoption of improved charcoal stoves were *'the higher initial investment costs and the fragile nature and short life span of improved stoves. Low income households buy charcoal in small amounts almost on a daily basis, but the small amounts tend to be the most expensive. Thus, perhaps the low-income households in the city have the highest expenditure per unit on cooking energy'*. Mwhava and Towo (1994) examine a number of technological and financial constraints which create barriers to effective stove dissemination programmes, including lack of research on the actual cooking needs and preferences of end users, as well as the household contexts in which the stoves will be used.

Firewood

Most literature does not talk about firewood *per se* but subsumes both firewood and charcoal under the term *'fuelwood'*. Although both rural and urban dwellers use firewood for cooking, the former are the predominant users. The most common type of stove is the 3 stones firewood stoves which has a very low efficiency (as low as 7-12 %⁴⁵).

• Petroleum products

Petroleum

Tanzania is considered to have considerable oil and natural gas reserves in both coastal and offshore basins, however, with the 2000 closure of the petroleum refinery in Dar es Salaam, which had a capacity of 14,900 barrels per day there is currently no national production,⁴⁶ 30% of foreign exchange earnings are spent on importing petroleum products⁴⁷.

Liquid petroleum gas (LPG)

According TAOMC (2002), *'the Tanzanian LPG market in the 1990s was characterised by shortages and disruptions in supply, high cost of gas and lack of investment in infrastructure, packaging and safety'*. These factors as well as poor marketing led to a decline in consumption from over 6500 tonnes in 1996 to just 3500

⁴³ The study covered Dar es Salaam and 10 other urban towns. It did not include Arusha.

⁴⁴ Monela *et al*, 1999 quoted in CHAPOS Study, 2002

⁴⁵ National Forest Programme, 2001

⁴⁶ See Yager, Thomas. R, 2000, 'The Mineral Industry of Tanzania'

⁴⁷ Key Informant Interview, Assistant Commissioner, Ministry of Energy and Minerals

tonnes in 2001. However the established service station network provides the required infrastructure to support access to and distribution of petroleum fuels, including LPG and that the modern processing and bottling plant in Dar es Salaam has the capacity to ensure sustainable supply. (TOAMC, 2002)..

The argument that LPG could substitute for charcoal (although not for kerosene or electricity) and thereby contribute to reducing the adverse effects of charcoal in terms of tree loss and woodland degradation fails to take account of other significant issues. Specifically poor Tanzanian households are likely to be discouraged by the investment required to buy a stove to burn LPG. The cost of the first gas cylinder (which weighs 6kg) is also substantial but once the initial purchase has been made subsequent costs are for the gas only. However, the thermal efficiency of LPG combustion is high and LPG stoves have an efficiency of 45-65% energy conversion compared to that of charcoal stoves which is 20-35%. The common perception that gas is dangerous also discourages its use. If there is to be a significant change to gas for cooking, then a combined strategy which addresses price, promotion and enhanced availability will be required.

The government took an initiative to stimulate the use of LPG by reducing tax by 50% in July, 2003. No statistics are available to indicate whether this has resulted in greater use of LPG. The findings from this study provide no evidence that suggests there has been an increased take-up of LPG since 1 July 2003.

Kerosene

Kerosene is imported by private oil companies, and sold at fuel stations. The established kerosene distribution network facilitates its use in low-income urban and rural households. Kerosene stoves have efficiency rates of about 45 %. The main disadvantages of kerosene technology lie in the relatively short life-span of the stoves; the potential risks of their use (fire hazards, burn injuries); a tendency to smoke and for the fumes to flavour food. All of which may discourage potential users. Although It was argued by Hosier and Kipondya (1993) that such technology was relatively cheap, and therefore attractive for users, a more recent authority⁴⁸ identified the most significant constraint against the wider use of kerosene as its cost, and the need to buy special equipment.

On equity grounds, it is more appropriate to subsidise kerosene than electricity since the benefits are unlikely to be enjoyed by wealthier families. (Hosier and Kipondya: 1993)

• **Natural gas**

The Songo Songo natural gas field, has recoverable reserve of 14 billion m³ and total reserves of approximately 28 billion m³. The project was started in 2002 and construction of the pipes for transporting gas to Dar es Salaam is due to be completed at end of 2004. However, benefits are not likely to be felt by the household consumer until well into the future bearing in mind the following government priorities⁴⁹ for the use of this gas:

- Phase I: convert diesel fuelled plants to natural gas by pumping gas to cement plants.
- Phase II: Industry with thermal needs
- Phase III: Households. Must properly cost energy resource.

⁴⁸ Sparknet, Tanzania Country Report Synthesis

<http://db.sparknet.info/goto.php/TanzaniaCountrySynthesis> Accessed 12 June, 2004

⁴⁹ Key Informant Interview, Assistant Commissioner, Ministry of Energy and Minerals

- **Electricity**

Tanzania has a national supply of 860 megawatts with 65-70% generated by HEP dams and the rest by diesel and coal fired turbines (i.e. thermally produced). It is not possible for the country to have a stable fuel mix as fuel swapping between cheaper HEP (6c per unit) and more expensive diesel (15c per unit) generated electricity is sometimes necessary when the rains are poor.⁵⁰ It needs to be noted that 70% of foreign exchange goes towards developing electricity.⁵¹ Although there are marked differences across the country in the cost of producing electricity there is only one domestic tariff, irrespective of location.

TANESCO, a 100% government owned parastatal is responsible for the national electricity supply. Not only is it currently charging the highest tariffs in Eastern Africa⁵² but it also has *technical shortcomings involving massive load shedding, low financial returns and management problems spanning cumbersome organisation structures, overstaffing and poor operation and maintenance*. Kigoda (2003) The government is in the process of restructuring and divesting TANESCO which has been plagued with a litany of problems. Katyega et al. (2001) cite 2002 review of energy sector policies and the restructuring of TANESCO and has recently entered a contract management deal with a private sector company in South Africa which has already resulted in changes to top management.

Approximately one tenth of households in Tanzania report a connection to the National Grid but this is largely in urban areas. Dar-es-Salaam, Kilimanjaro and Arusha are the regions with the highest number of households connected to the Grid. Only 2% of rural households report a connection⁵³. Affordability is a key constraint to electricity use in urban areas as was borne out by this study.

- **Renewable Energy**

In energy planning the focus has been to talk a lot about renewable energy but when it comes to implementation there has been minimal allocation of funding⁵⁴. Although a number of renewable energy sources are being researched. These include micro-hydro, natural gas, geothermal, solar and coal. (Kironde:1998)

The major problem with solar energy is the high tariffs on imported solar energy equipment, especially batteries, which make initial installation costs high⁵⁵. Also it is limited to non-productive end uses since a solar home system essentially provides enough energy for 3 lights, TV and radio. Its major advantage is its reliability and negligible running costs.

C.6.3 Urban energy

Energy supply is critical in urban areas for supporting economic activities and social infrastructure for providing lighting and power for domestic, commercial and public use. Urban areas suffer from constant power interruptions as a result of inadequate supply due to technical problems⁵⁶. Hosier (1993) notes that Tanzanian cities have

⁵⁰ If the rainfall is good, HEP is run; if there is not enough water, then thermal has to be run and the government is making an effort to replace diesel turbines with open cycle gas turbines in an attempt to reduce the costs of electricity generation.

⁵¹ Key Informant Interview, Assistant Commissioner, Ministry of Energy and Minerals

⁵² CHAPOSA, 2002

⁵³ HBS 2000/01

⁵⁴ Key Informant Interviews, Ministry of Energy and Minerals

⁵⁵ TSh400,000 – 500,000 per 100 watts. There is a tax exemption on solar panels but this is more difficult with batteries since these could be for household use or for use in vehicles.

⁵⁶ Ageing machinery, lack of fuel or spare parts, low water levels especially during the dry season

weak energy infrastructure and this results in the limited use of modern fuels for most urban energy needs. He cites three main reasons for the heavy reliance on traditional fuels for urban energy needs: (i) low income levels; (ii) the limited nature of energy infrastructure and (iii) erratic supplies of modern fuels.

Figure C.10: Proportional use by type of energy in domestic energy sector

Energy Source	Mainland Tanzania		Urban Areas (except Dar-es-Salaam)	
	91/92	00/01	91/92	00/01
Lighting				
Electricity	6.6	9.2	20.7	28.6
Solar Energy	N/A	0.6	N/A	0.5
Gas	0.5	0.2	0.6	0.1
Kerosene	89.8	83.9	78.7	69.6
Candles	0.0	0.4	0.0	0.3
Firewood & other	3.1	5.7	0.0	0.7
Total	100.00	100.00	100.00	100.00
Cooking				
Electricity	1.5	0.9	4.8	2.4
Solar Energy	N/A	0.9	N/A	0.8
Gas-industrial	0.2	0.3	0.6	0.1
Gas-biogas	N/A	0.1	N/A	0.1
Kerosene	5.2	5.0	13.3	8.9
Coal	0.2	0.1	0.3	0.3
Charcoal	10.6	14.2	36.6	53.3
Firewood	81.5	78.5	43.4	33.8
Other	0.8	0.1	1.0	0.2
Total	100.00	100.00	100.00	100.00

Source: HBS 2000/01

Household energy surveys (Hosier and Kipondya:1993)⁵⁷ revealed that:

- household energy consumption responds to price and local availability
- charcoal is the dominant household fuel
- in recent years households have begun making greater use of electricity and kerosene because these fuels are sold at subsidised rates. This has led to resource misallocations at the national level⁵⁸ but has been justified on the grounds that it will help the poor and alleviate pressure on woodfuel resources.

As shown in table 2.5 charcoal, firewood, kerosene and electricity are currently the major energy sources for urban areas. The dominant fuels being charcoal and

⁵⁷ Conducted in 1990 in Dar-es-Salaam, Mbeya and Shinyanga

⁵⁸ e.g. (i) cost of supplying electricity is far greater than its consumer price; (ii) kerosene is cheaper than charcoal; (iii) LPG is the household fuel for which consumers pay closest to the economic marginal cost but there is poor uptake..

firewood which together account for 80% of cooking usage. 69.6% of households use kerosene for lighting and a further 30% use electricity.

Many urban households are not connected to electricity.

Hosier and Kipondya'a study provided two interesting observations, specifically that:

- *energy transition in urban Tanzania appeared to be proceeding slowly with positive shifts towards modern fuels away from traditional fuels dominating⁵⁹; and that*
- *urban energy use is neither uniform nor monolithic within a country: a range of energy-use patterns may exist depending on the population of a city and its position in the urban hierarchy. This means policies that are beneficial in one urban area may be inappropriate in another.*

C.6.4 Supply and use of energy in Arusha

- **Energy supply**

Biomass

There is a huge deficit between the supply and demand for wood and charcoal in Arusha District.⁶⁰

Charcoal is obtained from Tanga, Manyara and Dodoma. Suppliers of charcoal to Arusha are required to have a trade licence (TSh80,000 per year) and also to pay income tax in Arusha. The bulk of the wood (approximately 90%) comes from the government owned Mount Meru Forest Plantation and the remainder from farms. Wood is stockpiled in the dry season⁶¹.

Electricity

The Arusha network is substandard and poorly maintained because of lack of funds resulting from failure by customers to pay. Currently there is an annual shortfall in income to TANESCO of nearly a half a billion Tanzanian shillings.

Tanesco is adopting a number of strategies to improve payment of charges and repayment of debt. (Box H)

Box H: TANESCO strategies for improving bill payment

Considering :

- lowering tariffs
- pre-payment system (this is only operative in Dar-es-Salaam)
- load limiting for low-income people
- improved debt collection
- improved connection time to not more than a month

Source: Regional Manager, TANESCO

- **Energy use**

⁵⁹ However, it must be remembered that urban households in Tanzania have to be flexible in their use of energy. This is because there is no one-to-one interchangeability between fuels (e.g. kerosene can not be used for ironing) and the supply of modern energy is unreliable

⁶⁰ Currently there is a regional demand of 3.2 billion cubic meters. The current regional supply is 2 million cubic meters (if all the wood supply was depleted). The sustainable capacity (without degradation) is 100,000 cubic meters.

⁶¹ Key Informant Interview, Regional Forestry Officer

Restaurants and guest houses are all significant users of woodfuel. In addition Arusha's textile industry and brewery have also reverted to using woodfuel because of high electricity costs. Because of the size of their demand, this further reduces the availability and hence raises the cost of this energy source for domestic consumers⁶².

Data on energy use in Arusha taken from the HBS shows that most households in Arusha currently use firewood and charcoal in preference to electricity and gas. Very few use electricity for cooking. A detailed breakdown of energy used for cooking and lighting is given in table 3.6? Figure 3.9?.

**Figure C.11: Comparison between Tanzania urban areas and Arusha
Proportional use by type of energy in domestic energy sector
2000/01**

	Cooking		Lighting	
	Tanzania urban areas ^a	Arusha	Tanzania urban areas ^a	Arusha
Firewood	33.8	75		
Charcoal	53.3	10		
Kerosene	8.9	11	28.6	42
Electricity			69.6	57

^a - Excluding Dar es Salaam
Source HBS 2000/1

C.7 Gender

C.7.1 The cultural paradigm

The cultural paradigm still considers women, despite evidence of changing male and female economic roles and responsibilities (discussed below), as subservient to men. Men are still expected to be the bread winner and women to be married and perform all the reproductive work including care for children, the old, sick and disabled. These responsibilities are rarely supported by improved technology.

The customs of most ethnic groups oppose women having either inheritance or ownership rights over land or other immovable property. This lack of ownership of collateral has implications for their ability to secure credit. (Omari and Koda)

Boys are commonly preferred over girls. This social preference for boys by family, community and the legal system gives them more options to succeed than girls. Girls are nurtured to become women who are non-argumentative, non assertive and quick to accept defeat and subordination. *In school, they (girls) are often assigned domestic activities, such as fetching water for teachers and cooking for the bachelors, limiting their time for study. Boys are given more time after school for sports, while girls are usually assigned household chores.* (Mzinga:)

C.7.2 Household structure

The household⁶³ structure varies considerably between urban and rural areas. The nuclear economic family comprising a married couple with children is more common in urban areas than the large extended families that predominant in rural areas. Although as shown in this study such extended families are still relatively common in some poor urban areas. There is a growing tendency for married man to have concubines and even children outside marriage. Bitter and often life long hatred

⁶² Key Informant Interview, Regional Forestry Officer

⁶³ Household both a socio-economic and political unit comprising members of different sex, ages, educational and political status.

frequently arises between the 'official' wife and the concubine because available resources are drained away from the official household thus reducing the ability of the father to meet basic household needs. (Trip:94)

C.7.3 Growth in number of female headed households

According to the household budget survey over a quarter (28%) of all urban households (excluding Dar-es-Salaam) were headed by women in 200/1 (HBS: 2002). This is a growth of 4% over the decade from 1991/2. This increase is attributed to divorce or separation of spouses or because of death of the husband. The first two result from men taking more than one wife for cultural reasons or working away from the marital home and establishing a second household. An increase in broken marriages is credited to result from the social havoc resulting from globalisation and structural adjustment programmes. The increase in widowhood appears, in large part, to result from the impact of HIV/AIDS.

During 2002 the number infected with HIV/AIDs reached 2.2 million (6.5% of population)⁶⁴. The work by SIDA (2000) which estimated an overall rate of 10% suggests that these current estimates may be low. The infection rate has not declined from that prevailing in 2001 when between 7-10% in rural areas and between 20-24% in urban areas were infected. Statistics indicate that infections are higher in urban centres than in rural areas. *A government agency (TACAIDS) was established in 2001 and the increased percentage of the government budget allocated to this agency in 2003/04 indicates the seriousness of the HIV/AIDS problem.* (Mramba:(2003)⁶⁵

C.7.4 Education and literacy

Consideration has been given in 3.3.2 above to the relative position of females compared with males in regard to education in general and literacy in particular. As explained above there is evidence, including from this current study in Arusha, that entrenched traditional patriarchal attitudes permeate the culture and restrict girls' access to education at all levels. (THDR:1999 and authors' fieldwork). In 2002, in Arusha approximately two thirds of those deemed illiterate were female.

C.7.5 Productive role

The 1970s and 80s saw a marked increase in the economic participation rate of women from 7% (1971) to 65% (1990). (Trip:1994) In all probability this rate will have increased still further since then due to the growing pressures of structural adjustment and globalisation in the 1990s and early 2000s.

As explained by Koda (1995) *the gendered nature of economic activities reflects culturally defined roles and expectations with micro enterprises, such as food processing and marketing, which tend to be extensions of women's reproductive roles* dominating. Young and old women are engaged in beer brewing; operating small mobile food stalls selling doughnuts, peanuts, and ice cream; gardening, poultry keeping, pig keeping and selling charcoal and firewood.

• Finance and credit

As head of the household husbands usually control household finances.

Female entrepreneurs working in the informal sector have little access to credit due to the limited size of their ventures, lack of collateral and their inability to generate

⁶⁴ These figures are based on the number of people that are tested at health centres and hospitals. A high proportion of HIV/AIDS sufferers are not tested and go unreported in the statistics.

⁶⁵ 0.5% in 2001; 0.4 in 2002; 1.6% in 2003. Mramba (2003)

savings. (Omari and Koda: 1991) Although some women in towns use formal savings and credit societies and postal savings accounts the major saving mode for most women is 'upatu' (*kibati*). Women have less access to credit than men and less money to save but could benefit from expanded micro-finance and training in its use' (THDR, 1999)

C.7.6 Power relations

Women's increasing economic responsibilities and power has failed to relieve them of their productive roles. With the result that they have an increased workload. As explained by Bok men's tendency to ignore household responsibilities has not been sufficiently challenged.

Instead the increasing involvement of women in both waged employment and the informal sector has affected power relations within and between households. The changed roles clash with the established patriarchal system which defines women as dependent rather than independent social beings.

While some men recognise the benefits they have gained from their women's improved economic strength, others do not. The latter group experience women's relatively new found economic power as a challenge to their self-esteem. Their reactions range from passivity to withdrawal of the cash support they used to give to their women. More serious is the sexual harassment (domestic violence) directed to some women (wives) who possess more economic power than their husbands.

The division of labour, development of the labour force (male and female) and changes in the decision making process at the household level are key to the alleviation of poverty. For this reason the authors support Biermann's (1997) plea for more research into understanding household allocation of resources, in order to enable policy makers to devise social policies which will affect changes at household level for the better (Biermann:97).

This study contributes to this understanding by clarifying the relationships around the energy decision making process in urban households, and by raising awareness, of poor households and other stakeholders, of the importance of the energy process and the access to energy services for improving the sustainability of livelihoods.

APPENDIX D - METHODOLOGY

- D1 Semi-structured interviews**
- D2 Key informants**
- D3 Case study guidelines**
- D4 Participants in focus group discussions**
- D5 Transect walk - observation guidelines**
- D6 Full list of workshop participants**
- D7 Structure of sample**
- D8 Press release and press cuttings**
- D9 Students' fieldtrip TOR**

APPENDIX D1 SEMI STRUCTURED INTERVIEWS

Guidelines

1. Introduction
2. Size of family (determine how many children and dependents)
3. Complete well-being matrix.
4. Daily activities (reproductive, productive, community) – women/men; girls/boys
 Establish daily activities which require use of household energy and what types of energy for each activity.
 Establish whether these are typical activities for the week. Are there particular activities on other days which require energy which are not mentioned? If so, what types?
N.B. Establish **time** taken by all energy related activities.
 Who is responsible for repair of energy using appliances/stoves? Effect on time if appliance or stove broken/can't afford to repair? What strategies are used?
 Ask about energy needs for children's education at home.
5. Decision-making

How are household decisions made about: (*don't restrict your comments merely to words that fit in the box*):

	Woman only	Man only	Usually woman	Usually man	Both	Boys/Girls
Types of energy used? Why?						
Cooking stoves? Why?						
Household appliances that require energy? Why?						
Any other relevant issues raised						

6. How could women/girls/boys save time in carrying out energy related activities?
7. What would women/girls/boys do with any time saved?

APPENDIX D2

LIST OF KEY INFORMANTS

- Delphina Rushohora, Ward Community Health Extension Worker
- John Laiser, Ward Executive Officer
- Dr. Mwanahamisi Ally/Dr. Kingasi/Dr. Monani, Kaloleni Health Centre
- Sarah Shipway, Coordinator, CCF (Street Children Initiative), Mashariki
- Jackson, Muro, OOPA, Solar Energy Project, Mashariki
- Paul Laiser, Mayor, AMC
- Mary Mrema, Deputy Head, Kaloleni Primary School
- Lydia Kilevo (+ visits), K. Ward Livestock Officer
- Mr. Temu, K. Ward Education Officer
- Mr. Faustin Mponeja, Municipal Comm. Health Officer
- Mr. Jusuf Munga, Head, Kaloleni Secondary School
- Group interview: 5 children (14-17): Mashariki: Welly; Rita and Catherine; 200 Metas: Natasha and Neema
- Mr. Godwin Benne, Director, Sustainable Arusha Programme, AMC
- Dr. Job Laiser: AMC Medical Health Officer/Victoria Alute, Health Data/Marlaw Msuya, Cold Chain Operator
- Dr. Kessy : Mianzini Dispensary, 200 Metas
- Dr. Wanjara/Dr. Kisanga, Arusha Hospital for Women and Girls, 200 Metas
- Mr. Joshua Moshumbusi. 200 Metas Street Leader
- Mr. Maturo, Ward Education Officer, D2
- Jane Mandari, Community Health Officer, D2
- Mrs. Regina Mngassa: Ward Livestock Extension Worker, D2
- Mr. Joachim Mdongwe, Deputy Head, DII Primary School
- Mr. Samson Sarakikya, AMC Community Development Officer
- Mrs Matilda Bela, Regional Trade Officer, 0744 [CAMARTEC R&D under this office]
- Ms. Fatuma Laiser, Municipal Education Officer.
- Mr. Muya, Director, Adult Education, AMC
- Christopher Lema, Regional Officer, Forestry
- Mr. Masasi, Regional Manager, TANESCO
- Mr. Zephania Darema, Consultant, FAIDA (Adult Business Education Centre)
- Eng. N.C.X. Mwihava Assistant Commissioner, Renewable Energy, Ministry of Energy and Minerals
- Ms. Justina P.L.Uisso-Rusali, Senior Research Officer (Statistician) Ministry of Energy and Minerals
- Mrs. Edina Mangesho, Director of Gender Development, Ministry of Community Development Gender and Children
- Mr. Estomih N. Sawe (MSc), Executive Director, TaTEDO [Tanzanian Traditional Energy Development and Environment Organisation]
- Maneno Jackson Kateyga, Principal Researcher, TANESCO
- Ms. Lidey Kibona, Ministry of Community Development Gender and Children
- Dr. Huba Nguruma, UCLAS/Mr. Byabato, UCLAS [0744 389403]

APPENDIX D3

CASE STUDY GUIDELINES

The case-studies should give you an opportunity to explore individual households in more depth – i.e. provide a full picture of the household beyond the energy issue but also provide more information about the energy issue. You need to make clear the contextual constraints that **women and girls** in both rich and poor households are labouring under. Please also try and obtain photos as these are very useful for making or illustrating a point.

Begin by referring to the previous interview. Explain that you were pleased with the information that you received and would like to discuss a number of things in more detail.

Name of persons interviewed (woman/girls) _____

Location: _____ Date: _____ Time: _____

Category of household:

MHH		FHH	
R		R	
P		P	

In the box below, select 3 important points that you would like to explore in more detail from the **first** interview. These can be introduced in Part 2 or Part 3 of the interview, as appropriate.

Livelihood Issue(s)	1. (2).
Energy-related Issue(s)	1. (2).

Notes: You should use the SL Framework as a way of structuring the interview and reporting it. The framework gives an opportunity to consider aspirations – remember women and girl’s short and long-term objectives. You should explore issue relating to desired aspirations for time saved from energy-related activities. The boxes should contain as much description as possible and therefore it will be necessary to **probe**.

<p>1. <u>Natural Assets</u> e.g.</p> <ul style="list-style-type: none"> • Land (on which house built/other) • Garden • Livestock • Spring water/well 	
<p>2. <u>Physical Assets</u> e.g.</p> <ul style="list-style-type: none"> • House (describe construction) • Owned/rented • Sanitation/drainage • Water supply • Electricity supply • Toilet • Furniture • Furnishings (carpet; curtains) • Household equipment • Car/motorbike/bicycle/tractor/handcart etc. 	
<p>3. <u>Financial Assets</u> e.g.</p> <ul style="list-style-type: none"> • No. of wage earners in household • No. permanent/temporary jobs • Pension • Idea of size of income (if possible) • What things do they have difficulty paying for? • When don't have enough money, 	

<p>what do they do? [e.g. loans? credit? priorities, economies?]</p> <ul style="list-style-type: none"> • Where do they get loans? 	
<p>4. <u>Human Assets</u> e.g.</p> <ul style="list-style-type: none"> • Contributions from household members (money/in kind) • If in kind, specify what and by whom • Dependents (babies, young children, elderly relatives). 	
<p>5. <u>Social Assets</u> e.g.</p> <ul style="list-style-type: none"> • What social groups do they belong to? (kibati, mosque, church, women's group). • Does membership provide assistance? If yes, what? • Does membership incur costs? If yes, what? 	
<p>6. <u>Shocks/Trends</u></p> <ul style="list-style-type: none"> • What are present difficulties facing household? (e.g. Sick dependents? Price increases? Need money for child's education?) • How are they coping with these difficulties? 	
<p>7. <u>Aspirations</u></p> <ul style="list-style-type: none"> • What 3 things would you most like to do or need to happen to improve your present situation? 	

A Study of the Impact of Energy on Poor Urban Livelihoods in Arusha, Tanzania

Fuel	Firewood	Charcoal	Kerosene	Electricity (units)	Sawdust	Sawdust briquette	Gas (biogas/LPG)	Solar
1. Availability (<i>in terms of supply, whether collected or bought and where?</i>) • Dry season								
2. Cost [<i>state unit size</i>] • Dry season								
3. Quantity used per ? (<i>state period of time</i>) • Household needs • Cooking								
	• Lighting [Are candles used?]							
	• Productive needs • Cooking							
• Lighting [Check other forms of lighting – e.g. pieces of tyre]								

A Study of the Impact of Energy on Poor Urban Livelihoods in Arusha, Tanzania

	Firewood	Charcoal	Kerosene	Electricity (units)	Sawdust	Sawdust briquette	Gas (biogas/ LPG)	Solar
4. Cost per ? (<i>state time period</i>)								
<ul style="list-style-type: none"> • Household needs • Cooking 								
<ul style="list-style-type: none"> • Lighting [Check cost of other forms of lighting]								
<ul style="list-style-type: none"> • Productive needs • Cooking 								
<ul style="list-style-type: none"> • Lighting [Check cost of other forms of lighting]								
5. Preferred fuel								
<ul style="list-style-type: none"> • cooking Why?								

A Study of the Impact of Energy on Poor Urban Livelihoods in Arusha, Tanzania

	Firewood	Charcoal	Kerosene	Electricity (units)	Sawdust	Sawdust briquette	Gas (biogas/ LPG)	Solar
• lighting Why?								
• ironing Why?								
6. Problems experienced with present fuels used?								
<p>7. What would you do with the time saved from using quicker and more efficient energy and/or stoves? [<i>N.B. If you have established from the previous discussion that energy-related activities are perceived to be time consuming</i>]. You should explore issue relating to desired aspirations for time saved from energy-related activities.</p>								

APPENDIX D4

PARTICIPANTS IN FOCUS GROUP DISCUSSIONS

Daraja Mbili

4 December, 2003 - 14:40-16:30

Ward Extension Workers

Juma Ali Kitumbo (M), Ward Executive Officer
Regina Mngassa (F), Veterinary Extension Officer
Yasinata J Ngui (F), Revenue Collector
Jane Mandari (F), Community Health Officer
Anna Kisaka (F), Community Health Assistant

6 December, 2003 - 10:30 - 13:20

Youth Group

Mariam Sinoni (F)
Clara Bashiri (F)
Mahija Kasimu (F)
Emanuel Gidion (M)
Juma Selemani (M)
Saumu Juma (F)
Idd B Mfinanga (M)
Diana Msangi (F)
Editha George (F)

8 December, 2003 - 10:40 – 13:45

Elected Ward Leaders

Sulaeman Shabani (M), Street Leader, Sanare
Ramadhani Saudi (M), Sanare
Halima Semiboja (F), Ally Nanya
Huseini Dudu (M), Jamhuri
Abdallah Higilo (M), Kati
Dominic Massawe (M), Ally Nanya
Mama Diwani (Hilda Steven) (F), Sanare
Kafimbi Jumaa (M), Ally Nanya
Mohamed Msuya Katibu (M), Jamhuri
Bachidi Msaji (M), Ally Nanya

Kaloleni

12 November, 2003

11:30 – 13:45

Ward Extension Workers

Blandina Nkini (F), Community Development Officer (F)
Lydia R. Kilevo (F), Livestock Officer (F)
Agness Kivirilo (F), Assistant Revenue Collector (F)
Delphina Rushohora (F), Community Health Officer (F)
John Loussa (M), Revenue Collector (M)

12 November, 2003

17:25 – 19:15

Youth Group

Ewald E. Mwenda (M)	Magharibi
Tumaini Mushi (M)	Magharibi
Alpha Luke (M)	Magharibi
Zubeda Amah (F)	Magharibi
Elisha Magogo (F)	200 Metas
Joeli Paulo (M)	200 Metas
William Denis (M)	200 Metas

13 November, 2003

17:30 – 19:05

Elected Ward Leaders

Emanuel Kessy (M), Street Leader, Mashariki

Rose Njau (F), Secretary, Mashariki
Expery Shayo Katibu (M), Magharibi
Kurthumu T (M)
Jushua Mushumbusi (M), Street Leader,
Evans Manyota (M), Secretary, Meta 200
Ephraim Laanyuni (M), 10 cell leader, Meta 200
Aretas A. Tarimo (M), 10 cell leader

APPENDIX D5
TRANSECT WALK OBSERVATION GUIDELINES

Transect Walk _____ (Place name)
Whole of ward ? or named part? _____

Variable	Observation
Wall materials used	
Roofing materials used	
Ventilation	
Density of housing	
Land use	
Type of IGAs	
Energy related IGAs	
Energy appliances on sale	
Type of water sources	
Existing drainage	
Available physical structures	
General activities	
General cleanliness	

APPENDIX D6

WORKSHOP PARTICIPANTS, PROGRAMMES, ISSUES AND EVALUATIONS

A. Preparatory Workshops

Daraja Mbili: 7 February, 2003

Total Attendance: 15

Jamhuri	:	4
Ally Nanya	:	2
Sanare	:	9

Kaloleni: 3 and 12 February, 2003

Total Attendance: 14

3 February: Ward officials	:	7
12 February: Community members	:	7

B. February Workshops

Daraja Mbili: 18 February, 2003

Total Attendance: 31

Community: Jamhuri	:	4 (3F; 1M)
Ally Nanya	:	5 (1F; 4M)
Sanare	:	9 (6F; 3M)
Ward Extension Workers	:	3 (2F; 1M)
Ward Elected Leaders	:	4 (1F; 3M)
Municipality	:	2 (1F; 1M)
NGO	:	1 (M)
Press	:	3 (2F; 1M)

Kaloleni: 19 February, 2004

Total Attendance: 32

Community: Magharibi	:	5 (3F; 2M)
Mashariki	:	4 (2F; 2M)
200 Metas	:	3 (1F; 2M)
Ward Extension Workers	:	4 (2F; 2M)
Ward Elected Leaders	:	5 (1F; 4M)
Municipality	:	4 (1F; 3M)
NGO	:	2 (1F; 1M)
Dar-es Salaam (NGO)	:	1 (M)
Press	:	4 (3F; 1M)

C. Intervention Workshops

<p>KALOLENI Ms Dorah Amin Kisamo Ms Halima Bakari Mr Kalutu Koshuma Ms Rose Njau Mr E.E. Mwenda Mr Samson S.S. Sarakikya Mr John Singoyan Mr Joshua Mshumbusi Mr Ally Sudi Rajabu Mr Abdul Kibwana Ms Theresia N. Elias Mr E.L Kessy Mr Godfrey F. Mnzava Ms Agnes Msaki Mr Patrick Mzungu Mr Laanyun Ephraim Ms Miriam Sakita Ms Kuruthumu Tassama Ms Grace Mambali Mr Expery W. Shayo Mr J. Kileo Ms Lyne T. Ukio Mr Peter Msaky Mr Mustafa Ieu</p>	<p>Kaloleni Mashariki Kaloleni Mashariki TEMDO Kaloleni Mashariki Kaloleni Magharibi MCDO – Arusha WEO- Kalolen Kaloleni mashariki Kaloleni mashariki Kaloleni magharibi CDTI- Tengeru Kaloleni Mashariki CDTI- Tengeru SCDO –Arusha Municipal Meta 200 Meta 200 Meta 200 Kaloleni magharibi Kaloleni mashariki Kaloleni magharibi Councillor- Kaloleni General Secretary –WODSTA Used Oil Stove MDOMEWO Media (Journalist)</p>
<p>DARAJA MBILI Mr Godfrey F. Mnzava Mr Mstafa Leu Ms Haloma Samboja Mr Bashiri Msangi Mr Idd Mfinanga Mr peter j. Msaki Mr Mussa Y .Kijiko Mr Naftali Maturo Mr Valentini Akonay Mr Neema Sempanga Mr J. A Kitumbo Mr Peter B.Mushi Ms Magdalena Mmary Ms Anna Mbeswa Ms Evelina Samweli Ms Resulaz Kirway Ms Benadetha Boniface Mr Seleman Shaabani Mr Husein Dudu Ms Hilda S .Lyinga Mr Nathanael Lotha Mollel Ms Theresia Elias Mr Samson S.S. Sarakikya Ms Maryam Msangi Ms Jane Mambari Ms Agnes Msaki</p>	<p>CDTI –Tengeru Media (Journalist) Daraja Mbili Daraja Mbili Daraja Mbili Used Oil Store –MDOMEWO Daraja Mbili W.E.C Daraja mbili Daraja Mbili Daraja Mbili WEO –Daraja mbili KIDTI – Moshi Daraja Mbili Daraja Mbili Daraja Mbili Daraja Mbili Daraja Mbili Daraja Mbili Daraja Mbili Daraja Mbili Daraja Mbili Councillor –Daraja Mbili Daraja Mbili CDTI – Tengeru MCDO –Arusha CDO Daraja Mbili Health Officer – Daraja Mbili SCDO -Arusha Municipality.</p>
<p>FACILITATORS Mr Crescent .N. D Muhandi Mr Amanulas . A .Kibona Mrs Blandina Nkini Ms Lyne T. Ukio Ms Lydia Joachim</p>	<p>Tutor –CDTI –Tengeru Community Development Trainer-WODSTA Community Development Officer –Kaloleni General Secretary-WODSTA Chair person-WODSTA</p>

D. DPU Workshop

Name	Institution	Tel. No	Email Address
Alison Bannister	Future Energy Solutions	+44 1235 432035	alison.bannister@aeat.co.uk
Andrew Barnett	University of Sussex, Freelance Researcher		andrew@sussex-research.co.uk
Bipul Borah	MSc student, DPU		b.borah@ucl.ac.uk
Elizabeth Cecelski	Director for Research and Advocacy, ENERGIA	+1 919 408 0387	ececelski@yahoo.com
Joy Clancy	Technology Development Group, University of Twente	+31 53 489 3537	j.s.clancy@tdg.utwente.nl
Pascale Hofmann	Lecturer, DPU	020 7679 5806	p.hofmann@ucl.ac.uk
Dick Jones	GVEP – Global Village Energy Partnership		r-jones@dfid.gov.uk
Andrew Long	Social Development Specialist, Central Research Department, DFID		longs@freeuk.com
Sheilah Meikle	Course Director, Social Development Practice, UCL	020 7679 1109	s.meikle@ucl.ac.uk
Babar Mumtaz	Director, Development Planning Unit	020 7679 1090	b.mumtaz@ucl.ac.uk
Patrice North	Lecturer/Research Assistant	020 7679 1110	p.north@ucl.ac.uk
Denise Oakley	Future Energy Solutions		denise.oakley@tesco.net denise.oakley@aeat.co.uk
Louise Oakley	MSc student, DPU		e.oakley@ucl.ac.uk
Theo Ubani	Theme Group Leader, JUNP	020 8489 2499	theo.ubani@haringey.gov.uk

2. WORKSHOPS - PROGRAMMES AND ISSUES EXAMINED

2.1 Preparatory Workshops

Community Preparatory Workshops Suggested Procedures

1. Reason for Preparatory Workshop

There will be two workshops in February; one on 18 February, 2004 in Daraja Mbili and one on 19 February, 2004 in Kaloleni which will provide a forum for members of the community to raise issues and propose local initiatives concerning household energy (e.g. problems with different types of fuels; better alternatives; improved stoves etc.). Community leaders, Municipal leaders, Regional managers and policy makers from Dar es Salaam will be invited to the February Workshops and they will be able to offer advice, support and possibly command resources for community proposals.

The Workshops will not promise specific projects or funds but provide an opportunity for the local community to raise issues and propose local initiatives that will provide alternative solutions to energy problems. It is therefore necessary that people who took part in the study are able to put forward their views at these Workshops.

2. Short Description of Research

2.1 What we did

Study of urban energy, poverty and gender in Kaloleni and Daraja Mbili (i.e. 2 urban wards in Arusha) spending 3 weeks in each ward..

Semi-structured interviews (160); key-informant interviews (30+); focus group discussions (6); and case studies (8).

2.2 What we found

Overview (taken from Inception Report)

The initial findings are grouped under three headings:

1. those relating to the types of fuel used and the way it is used;
 2. the energy decision making process in female and male headed households;
 3. the issue of education for women and girls in poor households.
-
1. It is clear that access to energy is a serious problem for the poor in urban areas. Despite its expense and declining quality the majority of households use charcoal and wood for cooking. Currently electricity is expensive and unreliable and even the richest households do not use it for cooking. Only two households have been identified as using gas for cooking. In large part this is due to concern over its safety. Very few households use energy saving stoves.
 2. In both male and female headed households the decisions are most likely to be made by men. This means that men's preferences, for example for a new radio take precedence over women's choices, for example for a new energy saving stove.
 3. Any time saved by women and girls by using energy more efficiently is unlikely to be used on education. Boys are given preference over girls. Moreover poor households see education as a luxury that they cannot afford. Instead they need all household members to earn money for daily living expenses. Therefore any time saved by women and girls is likely to be used for this.

Discussion

1. Are these facts right? Is there anything surprising about them?
2. Is there additional feedback that group would like to give?

Group Work

In groups brainstorm each of the 3 issues.

1. Alternative types of energy: What feasible alternatives are there? How would the community have to mobilise? What type of advice may be needed? What kind of financial resource 'pooling' may be needed? Is there a need for credit/loan for bulk buying? How can awareness be raised about load management or safety issues (especially LPG)?
Energy-saving stoves: Why aren't they used? What could be done to promote their use locally?
Is there a need for a local community energy focal point? What kind of services would be useful?
2. What kind of activities (if any) would women and girls do with any time saved from using more efficient energy for cooking/lighting? What kind of local support might be needed to make these activities successful?
3. What initiatives can be taken to influence mens' attitudes so that decision-making regarding household energy is more equitable and women's needs are met?

2.2 February Workshops

The Study: The impact of energy use on poor urban women and girls' livelihoods in Arusha, Tanzania

Study funded by UK Department for International Development (DFID)

This study aims to improve the understanding of the linkages between the provision of energy use and the achievement of Millennium Development Goals (MDG), specifically in relation to:

MDG 2 -Achieving universal primary and secondary education;
MDG 3- Achieving gender equality and women's empowerment.

Thus it is concerned with:

- collecting micro level evidence about the use of energy in poor urban households including the energy decision making process in female and male headed households;
- understanding how poor women and girls can optimise their use of energy through the use of cleaner and more efficient energy;
- testing assumptions concerning the relationship between energy and the achievement of MDGs 2 and 3.
- informing urban energy/poverty policies;

Urban poverty is relatively poorly researched and there is currently a paucity of micro level studies on energy use its impact on the livelihoods of the urban poor. This despite the fact that there is evidence that urban families may spend 29% of their income on fuels.

Preliminary Findings

These are grouped under three headings; those relating to the types of fuel used and the way it is used; the energy decision making process in female and male headed households; and the issue of education for women and girls in poor households. It is clear that access to energy is a serious problem for the poor in urban areas. Despite its expense and declining quality the majority of households use charcoal and wood for cooking. Currently electricity is expensive and unreliable and even the richest households do not use it for cooking. Only two households have been identified as using gas for cooking. In large part this is due to concern over its safety. Very few households use energy saving stoves.

In both male and female headed households the decisions are most likely to be made by men. This means that men's preferences, for example for a new radio take precedence over women's choices, for example for a new energy saving stove.

Any time saved by women and girls by using energy more efficiently is unlikely to be used on education. Boys are given preference over girls. Moreover poor households see education as a luxury that they cannot afford. Instead they need all household members to earn money for daily living expenses. Therefore any time saved by women and girls is likely to be used for this.

The Workshop

The objectives are

- The dissemination and discussion of preliminary findings from the study;
- To identify community energy solutions

Participants

- Representatives of Ministries of Energy and Minerals and Community Development, Gender and Children
- Representative of Regional Commissioner's Office
- National and Regional representatives of TANESCO
- Representatives of Arusha Municipal Council
- Ward Extension workers
- Representatives of national and district NGOs
- Representatives from local government primary and secondary schools
- Men, women and youths from poor and non-poor households in Kaloleni and Daraja Mbili who took part in the study

2.3 Intervention Workshops

<p>Objectives of the workshops</p> <ul style="list-style-type: none"> • Expectation of the participants (about the workshop) • Brief overview of the outcome of the study findings • Exhibition/demonstration of the stoves: sawdust, charcoal, briquettes, used oil, wonder basket in order to assess and make comparison on effectiveness and efficiency, cost saving(of stove and energy), energy saving, workload, time saving • Community energy solution strategies: (Group discussion) and groups presented(feedback) • Focal point: structure of the group, responsibilities, strategies, resources (Action Plan) • Brief comments on the workshop proceedings • Evaluation of the workshop • Closure of the workshop
--

2.4 DPU Workshop

10.00	Welcome and introduction to the day
10.30	+ Energy and the Millennium Development Goals - DFID's perspective: Dick Jones
10.45	Coffee Break
11.00	Introduction to KaRs energy projects: + Gender as a key variable in energy interventions in developing countries: are we asking the right questions? Speaker: Elizabeth Cecelski + Enabling urban poor livelihoods policy-making: understanding the role of energy services Speaker: Joy Clancy + Energy, gender, poverty linkages Speaker: Denise Oakley
12:00	+ The impact of energy on the livelihoods of poor women and girls in Arusha, Tanzania Speakers: Sheilah Meikle/Patrice North
13.00	Lunch
14:00	Discussion: The nature of the problematic for energy MDGs
15:00	Tea
15:15	Plenary Session
16:00	Closing Remarks

3. February Workshop Evaluations

3.1 Daraja Mbili

n=23

	Very poor	Poor	Average	Good	Very good
Presentation				52%	48%
Discussion			4%	44%	52%
Venue				48%	52%
Food			4%	57%	39%

How did you find the day?

Not useful at all	Useful	Very useful
	35%	65%

Where from?

Community Member	Civil servant Local/central	Elected leader	NGO	Press
70%	17%	8.7%	4%	

3.2 Kaloleni

n=32

	Very poor	Poor	Average	Good	Very good
Presentation			9%	25%	66%
Discussion			6%	22%	69%
Venue		9%	9%	44%	44%
Food			22%	34%	44%

How did you find the day?

Not useful at all	Useful	Very useful
	25%	72%

Where from?

Community Member	Civil servant Local/central	Elected leader	NGO	Press
41%	25%	16%	6%	12%

APPENDIX D7 STRUCTURE OF SAMPLE

Kaloleni

Sample: 60 households
80 interviews

Total no. households on list (after eliminating commercial premises):

Mangharibi : 111 (18%)

Mashariki : 126 (20%)

200 Metas : 385 (62%)

Total ——— 622

Proportional no. of households (adjusted slightly for even distribution across categories MHH/FHH and R/P)

Mangharibi: 10 (Sample: 20 using RNT⁶⁶)

MHH (3) ♀ (1)	MHH (3) ♀ (1)
5 interviews	5 interviews
Poor	Rich
FHH (2)	FHH (2)
2 interviews	2 interviews

Mashariki: 14 (Sample: 28 using RNT)

MHH (4) ♀ (1)	MHH (4) ♀ (1)
7 interviews	7 interviews
Poor	Rich
FHH (3)	FHH (3)
3 interviews	3 interviews

200 Metas: 36 (Sample: 72 using RNT)

MHH (8) ♀ (3)	MHH (8) ♀ (3)
13 interviews	13 Interviews
Poor	Rich
FHH (10)	FHH (10)
10 interviews	10 Interviews

Daraja Mbili

Sample: 60 households
80 interviews

Total no. households on list (after eliminating commercial premises):

Jamhuri : 151 (13%)

⁶⁶ Random Number Table

A Study of the Impact of Energy on Poor Urban Livelihoods in Arusha, Tanzania

Ally Nanya : 149 (12%)
 Sanare : 897 (75%)

Total 1,197

Proportional no. of households (adjusted slightly for even distribution across categories
 MHH/FHH and R/P)

Jamhuri: 8 (Sample: 16 using RNT)

MHH (2) ♀ (1) 3 interviews Poor FHH (2) 2 interviews	Rich	MHH (2) ♀ (1) 3 interviews FHH (2) 2 interviews
--	------	--

Ally Nanya: 8 (Sample: 16 using RNT)

MHH (2) ♀ (1) 3 interviews Poor FHH (2) 2 interviews	Rich	MHH (2) ♀ (1) 3 interviews FHH (2) 2 interviews
--	------	--

Sanare: 44 (Sample: 88 using RNT))

MHH (11) ♀ (3) 19 interviews Poor FHH (11) 11 interviews	Rich	MHH (11) ♀ (3) 19 Interviews FHH (11) 11 Interviews
--	------	--

APPENDIX D8 PRESS CONFERENCE

PRESS RELEASE

Tuesday 17 February 2004

The press conference began with the following statement by Sheilah Meikle

INTRODUCTION

- Good morning ladies and gentlemen
- My name is Dr Sheilah Meikle from London University (www.ucl.ac.uk/dpu)
- These are my colleagues from CDTI Tengeru and this is Mr Selenge - principal of CDTI and Patrice North, my colleague from London
- We are also working with a local NGO, WODSTA (Women's Development for Science and Technology)

The nature of the study

- Currently we are working together on a *poverty and energy research study* and that is why I am meeting you this morning.
- The study is funded by the UK's Department for International Development (DFID)
- The field work has been undertaken in two wards in Arusha - Daraja Mbeli and Kaloleni

The workshops

- We are holding two workshops this week in the communities
- The purposes of the workshops are:
 - to discuss the preliminary findings from the research; and
 - discuss and explore local energy interventions which could address some of the energy related problems that have been identified

HIGHLIGHTS OF FINDINGS

Some of the findings we have identified are already in the public domain

- Fuels
 - These communities have a high dependence on Charcoal and firewood. This is problematic because of supply issues
 - Communities preference for electricity is also problematic because:
 - it is unaffordable by poorer members of the community (witness disconnections and lack of connections)
 - where the better-off can afford some electricity they still have preference for using other fuels for cooking
 - Kerosene is popular but expensive and therefore less available to poorer members of the community
 - Very limited use of other types of fuel e.g. LPG, solar or biogas

Energy decisions

- Use of energy impacts more on time and life of women and girls compared with men, e.g. collecting and using fuel
- However most of the decisions around energy are made by men, e.g. in relation to the type of energy used and the stoves and appliances purchased.
- This is unfortunate because men tend to be conservative about energy decisions especially in poor households.

- Women tend to be more aware of alternatives and where they have freedom to do so they tend to be more creative and open in their approach to energy.

Lack of knowledge

- There is a lack of knowledge within the communities about different types of energy and how to use energy safely and efficiently. For example:
 - Misunderstanding of the cost of using different types of fuels - they only take account of purchase cost and not management time of using fuel. E.g. Fuel wood very expensive re management time.
 - There are also genuine concerns and misunderstandings about the safety of using l.p.g.

CONCLUSION

- These issues and others will be explored in detail at the workshops
These workshops will give the community the opportunity to contribute their opinions and ideas.
- There will be a report produced in the autumn
- You are welcome to attend the workshops.

APPENDIX D9 STUDENTS' FIELD TRIP TOR

**DEVELOPMENT PLANNING UNIT
UNIVERSITY COLLEGE LONDON
MSc Development and Planning: Social Development Practice
Arusha – Field Study 2004**

Terms of Reference

BACKGROUND

A poverty assessment profile was undertaken for Arusha Municipal Council (AMC) in 2000. This revealed there were many factors underlying poverty. Specifically:

- ❑ poor households, with fewer adult members contributing to the household labour tend to be poorer;
- ❑ coping strategies of the poor are very limited and in most cases, individuals and households are faced with a trade-off between allocating minimal earnings to subsistence (food) and meeting their other important expenses such as school fees or medical care;
- ❑ the rural-urban sector is interdependent. The urban poor are found in marginalized occupations;
- ❑ influx of street children from neighbouring regions who are begging and working as child labourers;
- ❑ little co-ordination and collaboration amongst organisations (NGOs and CBOs) dealing with the poor and the government through its relevant ministries; and
- ❑ poverty eradication efforts as advocated at the Central level have not been successfully translated into local government's plans and programmes.

However this study failed to address the specific link between energy and poverty. A later, 2002, DPU/CDTI study analysed the energy/poverty relationship. In doing so it highlighted the significance of the energy/gender relationship in poor households. As with earlier rural studies the DPU/CDTI work:

- ❑ identified the role of women as major users and suppliers of energy resources; and
- ❑ showed that gender plays a role in determining whether or not women will benefit from improved technology and thus that technical solutions and more efficient energy use *per se* cannot be isolated from social processes

A current DFID research study (October 2003-July 2004) is undertaking a review of the relationship energy/poverty/gender nexus in poor urban households in Arusha. Initial findings provide substantial information about the reproductive use of energy (Annex 1)⁶⁷ but fail to provide information on or make interventions around productive activities.

OBJECTIVES

- ❑ To prepare a report for the Arusha Municipality on the energy/poverty/gender nexus in two communities in Arusha and make a detailed recommendation for an energy related intervention which could address the productive strategic energy needs of men and women in these two communities.
- ❑ To demonstrate an understanding of the concepts explored on the MSc. in Social Development Practice and an ability to use selected tools and skills introduced on the MSc. Programme.

SCOPE OF WORK

The consultants' task is to extend the understanding of the study on the Impact of Energy on Poverty in Arusha, Tanzania. Specifically by:

- ❑ undertaking a study of the relationship between household energy and poverty in two communities, Kimandolu and Ngorenaro, of Arusha Municipality; and
- ❑ by making a detailed recommendation for an energy related intervention which could lead to an improvement in the livelihoods of poor families.

The consultants' work should build on the understanding expressed in 'A Participatory Poverty Assessment Study for Arusha Municipal Council, November 2001'. In particular any proposal should demonstrate an integrated approach, be participatory and gender sensitive.

⁶⁷ Article 'Urbanisation' and Arusha Times

OUTPUTS

The consultants will submit the following outputs:

- Presentation of findings and draft ideas in Arusha (Ideally all DPU participants and those CDTI participants wishing to do so will contribute)
- Presentation of draft final report in London (This will include will incorporate a power point presentation and all five DPU participants will contribute to the participation)
- Final Report (This will also include a logframe and Gantt chart and all other relevant supporting materials)

APPROACH

The consultant group will comprise an integrated team of DPU students and CDTI staff. This team will work in close collaboration with other relevant stakeholders.

The consultants will as appropriate use primary information and make use of relevant published documentation. They will adopt a participatory approach throughout the work and demonstrate their use of relevant social development tools.

The consultant group will adopt a sustainable livelihoods approach to the work undertaken and will therefore use, as appropriate, relevant indicators.

PROGRAMME OF WORK

1. Preparatory work in London by DPU and in Arusha by CDTI – April - 3 May 2002
2. Field work, including collection of information; preparation of draft proposal; presentation of findings and draft proposal – May 8-18
3. Preparation of final draft report, DPU London – 20 May – 5 June
4. A power point presentation of final draft report by all DPU team to DPU colleagues in London 27 May.
5. Submission of final report to DV - 5pm June

PROJECT MANAGEMENT

Overall field management of the project is the responsibility of Sheilah Meikle, DPU. Logistical arrangements are the responsibility of CDTI.

The integrated consultancy group will be responsible for all other aspects of the work and for delivering the relevant outputs at the required times.

APPENDIX E

E1	Primary school exam places and secondary places awarded
E2	Estimated number of livestock kept in Kaloleni
E3	Family size
E4	Case studies' Assets
E5	Energy uses: focus group discussions
E6	Fuel and appliances costs in Arusha
E7	Decision making in male headed and female headed households
E8	Kaloleni – amount of time spent on cooking beans using charcoal
E9	Kaloleni – amount of time spent on cooking beans with firewood
E10	Kaloleni – Amount of time spent on boiling water for tea using kerosene
E11	Kaloleni – Amount of time spent on boiling water for tea using electricity
E12	Daraja Mbili - amount of time spent on cooking beans using charcoal
E13	Daraja Mbili - Amount of time spent on boiling water for tea using kerosene
E14	Daraja Mbili - Amount of time spent on boiling water for tea using electricity
E15	Controlled experiment

Appendix E1

Primary school exam passes & secondary places awarded, 2000-2003: Kaloleni and Daraja Mbili:

Kaloleni

Yr	No. sitting exam			No. passed			No. failed			No. selected for secondary school		
	♂	♀	Total	♂	♀	Total	♂	♀	Total	♂	♀	Total
2000	94	86	180	49	37	86	45	49	94	10	14	24
2001	84	78	162	67	49	116	17	29	46	23	24	47
2002	87	95	182	35	48	83	50	47	97	6	19	25

Source: Kaloleni Primary School

Daraja Mbili

Year	No. sitting exam			No. passed			No. failed			No. selected for secondary school		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
2000	71	73	144	18	27	45	53	46	99	18	27	45
2001	50	77	127	13	14	27	37	63	100	13	14	27
2002	83	100	183	12	8	20	71	92	163	12	8	20

Source: Daraja Mbili Primary School

Appendix E2

Estimated number of livestock kept in Kaloleni

Type of Animal	Estimated Number
Dairy cattle	125
Pigs	?
Goats	88
Sheep	70
Hens Layers	∠1500
Broilers	∠2000
Local chickens	∠400
Ducks	∠155

Source: Ward Livestock Officer

Households with Livestock (estimates)

Jamhuri (10%); Ally Nanya (10%) Sanare (20%)

<i>Type of Animal</i>	<i>Estimated Number</i>
Dairy cattle	400 ⁶⁸
Pigs	
Goats	281
Sheep	157
Hens + Layers	4,000 – 6,000
+ Broilers	
+ Local chickens	
Ducks	∠100

Source: Ward Livestock Officer

⁶⁸ 65 owners of dairy cattle. All women.

Appendix E3

Family Size and Median

Day-to-day responsibility	Kaloleni		Daraja Mbili	
	Non-poor ⁶⁹	Poor	Non-poor	Poor
MHH	7 (Range 3-10)	6 (Range 3-13)	6 (Range 1-10)	5 (Range 4-11)
FHH	6 (Range 4-11)	7 (Range 3-19)	5 (Range 1-14)	6/7 (Range 3-9)

Source: Household Interview Data

Households with Servants

Only 1 poor female-headed household in Kaloleni recorded having a servant. Servants are nearly always in non-poor households.

Ward	MHH (N-P)	FHH (N-P)
Kaloleni	47%	33%
Daraja Mbili	33%	-

Source: Household Interview Data

⁶⁹ Servants have been included in family size for non-poor households

**APPENDIX E4
CASE STUDIES
ASSETS**

Kaloleni					
		MHH		FHH	
		N-P	P	N-P	P
Natural	Inherited land from grandparents and house built there. Not surveyed and access for car difficult. No land for garden. Large farm outside town. Owns land in Simanjiro and Arumeru Districts - grows . Keeps 2 dairy cattle - Fresian and Ayrshire. 2 goats (improved breed) as an IGA and milk for family use.	Land on which house built on inherited from his parents. Keeps 10 goats and 25 sheep in stall outside house. Grazes his animals in open spaces in Arusha during night. Has a 10 acre farm at Ngaramtoni and approx. 15 acres at Oljoro (both in Arumeru District) Grows maize and beans & nephew manages farms. Visits at least 1x per month during non-farming season ⁷⁰ .	Land bought by late husband in 1990. No land available for garden or livestock.	No natural assets	
Physical	House concrete blocks and built himself. . Connected to Municipal water supply and electricity . Electricity basically for lighting and appliances. Little cooking. Both pit latrine and WC are used. Expensive carpets, curtains and furniture. Wide range of household appliances. Owns bicycle and a wheelbarrow.	Owns house. No well or piped water. Spring water not accessible. House constructed of cement blocks; corrugated iron roof. A family pit latrine. Simple furniture; no soft furnishings. Doesn't own any type of vehicle.	Owns house. Concrete blocks; plastered and painted inside walls. Piped water disconnected because of non-payment of bills. Plans to pay off debt. Gets water from public water kiosk nearby. Flush toilet but now uses bought water to flush. Can be reached by Municipal septic tank drainage truck. Sofas, cupboard, TV. Good range of household appliances. No vehicles.	Rents a room in a house; stones with earth mortar and plastered. TSh10,000 /month. Planned area. No drainage system. Built a kiosk outside for her chip business Which she owns. Pit latrine shared by 2 other families. No piped water. Naura river ½ km away but doesn't get water there. Water from public water kiosks and nearby houses. Tsh20/20ltr bucket Electricity costs are shared among all users proportionately. Now disconnected. Simple sofa set, table 2 beds and 2 cupboards; all in one room. Few inexpensive cooking utensils & chairs. No vehicles of any sort.	

⁷⁰ This person is poor and clearly does not achieve maximum benefit from his farms. This could be because of bad management.; lack of capital to buy fertilizer/pesticides, poor irrigation and/or his relatives also sell produce.

A Study of the Impact of Energy on Poor Urban Livelihoods in Arusha, Tanzania

Financial	<p>Self-employed. Big farm over 100 acres; assesses as prosperous farmer. Wife deals with livestock as an IGA. Difficulty paying for education (2 children in private schools: TSh200,000 per semester for English-medium school (tuition only) and medical expenses for family because of poor harvest during drought. Vets fees are high in urban areas. Medical services for family expensive. When financial difficulties borrow from economically able friends and relatives. Don't borrow from banks and financial institutions - worried about conditionalities.</p>	<p>Wife has permanent job as matron of Enaboishu private secondary school⁷¹ in Arumeru District and main wage earner. Minimum wage TSh 50,000⁷² per month. He gardens and farms in Arumeru & keeps sheep & goats but mostly for family's own consumption & not an economic activity⁷³. Very adept at finding urban grazing for goats. Difficulty in paying for children's education and medical expenses. Sometimes problems paying for fuel. Soft loans available from employer. Do not borrow from financial and credit institutions – exorbitant interest rates.</p>	<p>Income from trading in second-hand clothing in markets. She doesn't pay tax. No transport costs. She has a servant who sells for her. No permanent job or pension. Assumed middle-income bracket. Financial assistance from parents-in-law and relatives of late husband. Does not get loans or credit because of high interest rate. Difficulty paying school fees and medical expenses.</p>	<p>No permanent income in form of pension. Has small food (chip) business. Major customers primary and secondary school children. Av. monthly profit btw 40,000-50,000. Cost of charcoal per month is 80,000 (in dry season) and 96,000-112,000 (wet season). Cost of potatoes varies with supply. Av.20,000 per 90 kg bag which lasts for 1 week. Difficulty paying rent & medical expenses. Business doesn't pay enough money. Borrows money from relatives and gets some financial support from father of children. Also relatives and friends. Not reliable 7 sometimes only after 6 months depending on relatives ability. Will not borrow from financial institutions – interest.</p>
Human	<p>Mother contributes to family income. No in kind contribution from household members. 4 dependents - 3 daughters and 1 housegirl. 2 daughters in secondary school and 1 in primary school. Support elderly dependents financially and materially (don't live with them)</p>	<p><i>Dependents – 3 children (2 boys stay with father and daughter with mother) and 4 elderly relatives. His wife is absent during the week & comes home at weekends because of her job. Lunch is cooked by his daughter-in-law; supper is cooked by his sons – a form II student at Enaboishu Secondary School & a son in Kaloleni primary school.</i> Relatives and friends provide cash and in kind assistance (food; medicines; physical labour).</p>	<p>Husband died in 2000. 2 children, boy and girl, in secondary school. Son, 16 yrs. attends public boarding secondary school in Moshi. Girl, 14 yrs. attends a private secondary day school in Arusha and lives with her mother. Assistance from person appointed by husband's family. Elderly parents living with her but not dependents.</p>	<p>She has 3 children. 1 daughter cohabiting with fiancée. Temporarily at mother's because she'd been beaten by fiancée⁷⁴. Other 2 (boy and girl) children live with father in Moshi. Sometimes supports her grandchild. At time of study had to accompany daughter to hospital-had been beaten by her fiancée.</p>
Social	<p>Wife belongs to church women's group. Members provide in kind assistance (physical labour, food, firewood). Sometimes church provides financial assistance.</p>	<p>Wife belongs to church group. Also belongs to kibati group and contributes TSh 2,000/month. Helps pay school fees. Costs are mostly in terms of time for providing assistance. 10 cell leader. Not a paid job and time consuming in dealing with civil and social issues. Only benefits are some tokens/rewards given by clients when they feel like it.</p>	<p>Doesn't belong to any social group.</p>	<p>Belongs to women's church group. Choir member. Leader of a Christian group in Mashariki – group provides assistance to members. Secretary to Street Leader. Municipality started to employ street secretaries as a paid job. This means she will be laid off without any terminal benefits.</p>
Shocks/Ineds	<p>Bad harvests affects seriously affects income.</p>	<p>Bad weather affect agricultural production.</p>	<p>Price increases make it difficult to meet household expenses.</p>	<p>Sudden sickness. Granddaughter admitted to Mount Meru hospital and daughter recently beaten up.</p>

⁷¹ Under Lutheran church

⁷² Equivalent to £25.00 per month at exchange rate of TSh 2,000 = £1

⁷³ Keeping livestock in this case is very much a matter of status

⁷⁴ This required a visit to hospital

A Study of the Impact of Energy on Poor Urban Livelihoods in Arusha, Tanzania

Aspirations	To get TSH5,000,000 for improving education and health for family members or build a house to rent as an IGA To get a pick up truck for use in household duties, fast and reliable means of getting to various places including farm. Improve environment by growing fruit, trees around house. Everyone should get strive to improve their environment (urban and rural areas).	To get a loan of TSH1,000,000 to boost capital or farm. Lower tariff for domestic electricity. Lower medical costs and water bills	Soft loan of TSh 50,000 to open a business. Subsidy on energy, especially electricity tariff for domestic use. Cheap alternative type of energy.	Secure a soft loan from a financial institution TSh200,000 to boost business. Be connected to electricity so can use for her IGA. Price of electricity is reduced Cost of medical services reduced – for easier access. Education costs reduced
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**Case Studies
Assets**

DARAJA MBILI				
	MHH		FHH	
	N-P	P	N-P	P
Natural	Own land on which house built. Surveyed plot. Bought in 1974. No surrounding land. Stall for 3 (exotic) dairy goats. Produce 11/2-2 ltr of milk per day for family consumption. Farm Arumeru District	Bought land in 1979. Area not surveyed. No room for garden or livestock.	Owns land on which house built but area not surveyed. Bought in 1994 from original landlord. Previously lived in rented accommodation. No room for garden. No livestock	Bought land in 1972 and construction work on house began in 1973. All land used for house - no garden or livestock.
Physical	Own house - built 1974 Connected to urban water supply/piped water. Not connected to sewage pipe Electricity connection. - Main use - lights; ironing, fridge, radio, TV and telephone. Own pit latrine Well furnished - sofas; carpets No vehicles of any kind	Own house built of cement blocks; part still under construction. No piped water; well or access to spring water. Buys from neighbour at Tsh20 for 20 liters. Have a pit latrine. When full have to demolish a room and dig/build a new one. Minimal furnishings No vehicles of any kind	Owns own house Constructed from cement blocks. Municipal trucks can not drain septic tank when full. Has a flush toilet but not connected to water supply at present (plans to do so once economic situation better). Family pit latrine. Connected to electricity; only use for lighting. Basic furnishing and equipment; no carpet. No vehicles of any kind.	House mud and poles. Gradually added cement/plaster and marble ash. No piped water, well or access to spring water. Family pit latrine. Septic tank not yet full but can be drained by AMC. Waste water thrown in street or if very dirty thrown into small pit. Electricity disconnected since 1998. Couldn't pay after death of husband who was breadwinner. No curtains. Basic furnishing and equipment. No vehicles of any kind.
Financial	Father only wage earner. An accountant at a seed company – Popvriend Ltd. a Dutch co. based in Unga Ltd. Permanent job and pensionable. Size of income not disclosed. Problems paying electricity bills (TSh68,000/month). Able to borrow money from employer. Wife contributes to household income; sells 'vitenge' from home. Dependents cook chapati and buns and sell to neighbours. Goats kept in a stall within the compound. Does not like loans because potential problem of repayment if business fails	Husband works at Arusha Hotel Training Institute as a night watchman (Hans Seizel Foundation). Like casual labour. No pension. Difficulty paying school fees and medical expenses. Can try to get a loan from work but it is not guaranteed and often too small. Have to make do with inferior services.	No wage earner other than herself. Size of income not disclosed but gardens near railway line and has a grocery kiosk where sells garden produce. Difficulties paying school fees and medical expenses. Belongs to 2 groups: Kibati (40 members - TSh1,000 or 5,000/month depending on income). Draw according to amount paid in. Women's group (60). TSh1,000/month. Received TSh 30,000 non-refundable when mother sick.	<i>She has no income generating activities?</i> Elder son does casual labour and contributes some money. Elder sister an IGA and contributes. Children do some household chores. Difficulty with school fees for grandchildren & medical expenses

A Study of the Impact of Energy on Poor Urban Livelihoods in Arusha, Tanzania

Human	Dependants - 2 daughters (not married), 2 grandsons & 1 son. Elderly relatives who depend on them but don't live with them.	5 dependents - 4 children and 1 grandson <i>(Children all school age; any out of work?)</i>	Husband died in 1996. 5 school age children still dependent. Both boys and girls assist with household tasks after school and at weekends. Elderly parents in rural area whom she subsidises depending on earnings from IGA. Varies from 5,000-20,000 and sometimes once/twice a month.	Husband died in 2002. 9 dependents (2 daughters, 1 son and 6 grandchildren. Daughters are not married).
Social	Wife belongs to church group. Provides assistance in kind for weddings, bereavements, baptisms etc. Provides financial assistance on occasion. Husband doesn't belong to any group.	Wife belongs to Catholic Women's Group. In kind assistance; no costs incurred. [Costs – time. Meet once a week for 2 hours].	Groups give in kind assistance.	Doesn't belong to any social group.
Shocks/Trends	Mother of grandchildren died and father sick. Increasing prices & tough to live	Need to demolish a room for pit latrine and subsequent decrease in living space. This may result in some members of family sleeping with neighbours.	School fees for children's education. <i>Cost of education and living in general gone up drastically.</i> Difficulty to pay living costs.	Death of husband last year
Aspirations	TANESCO lowers electricity tariffs for domestic use. Improve accuracy of meter reading Subsidise medical expenses	To be connected to AMC drainage system Reduction in medical expenses Access to cheap and efficient energy (e.g. solar). <i>Once observed a German who generated solar energy using silver foil from a cigarette packet and boiled tea which they drank.</i>	Secure a loan of TSh30,000 to improve grocery and open a tailoring business. Assistance with educational expenses of children TANESCO lower domestic electricity tariffs so people could use electric stoves which are cheaper and efficient.	Prays to Allah - hopes will be shown a way out of difficulties Assistance to buy food Get electricity reconnected but too expensive.

APPENDIX E5

ENERGY USE: FOCUS GROUP DISCUSSIONS

Household Energy Use		
	Kaloleni	Daraja Mbili
Ward Extension Workers	<p>Cooking</p> <ul style="list-style-type: none"> + Charcoal, kerosene, firewood and electricity. 	<p>Cooking</p> <ul style="list-style-type: none"> + Charcoal, firewood, kerosene as well as electricity, which is used for light cooking, and sawdust
	<p>Lighting</p> <ul style="list-style-type: none"> + Most used sources of energy for lighting are electricity and kerosene. Alternatives are pieces of car tyres which are used for outdoor lighting along streets for IGAs e.g. selling roasted fish, groundnuts, cassava and maize⁷⁵. The other alternative is candles which are used in the house particularly during blackouts 	<p>Lighting</p> <ul style="list-style-type: none"> + Electricity and kerosene (all types of kerosene lamp) and candles (normally during blackouts).
Elected Ward Leaders	<p>Cooking</p> <ul style="list-style-type: none"> + Charcoal is and will remain the major source of energy. However, there is a need to use it efficiently by using energy saving stoves. + Electricity but it is too expensive. One solution is for the govt. to subsidise electricity as well as energy saving stoves which are more expensive than standard stoves + Kerosene – This is also expensive. Participants were of the opinion that tariffs should be reduced for domestic use in urban areas. 	<p>Cooking</p> <ul style="list-style-type: none"> + Firewood, charcoal, kerosene and electricity (for the well to do) – in order of preference. Sawdust is not widely used.
	<p>Lighting</p> <ul style="list-style-type: none"> + Electricity for those connected + Kerosene used by all the rest and even those connected to electricity during blackouts. The types of lamp used are ordinary wick lamps and <i>koroboi</i> for the poor. 	<p>Lighting</p> <ul style="list-style-type: none"> + Kerosene - high retail price + Electricity – high connection costs and monthly bills
Youth Group	<p>Cooking</p> <ul style="list-style-type: none"> + Charcoal, kerosene, electricity, firewood + Electricity – those connected use it for light cooking only because of the high bills 	<p>Charcoal, kerosene, firewood, electricity and sawdust as most frequently used fuels (in this order).</p> <p>Cooking</p> <ul style="list-style-type: none"> + Charcoal, kerosene, firewood and sawdust (in this order)
	<p>Lighting</p> <ul style="list-style-type: none"> + Kerosene and electricity. In Magharibi majority use electricity while in Mashariki and Meta 200 kerosene is used for lighting. 	<p>Lighting</p> <ul style="list-style-type: none"> + Kerosene and electricity.

⁷⁵ Meta 200 – area very well lit at night although many places are not connected to electricity.. Mostly stolen electricity – people from Mashariki and Magharibi go there at night to drink home brew. *Source: Personal communication – Meta 200 street leader.*

A Study of the Impact of Energy on Poor Urban Livelihoods in Arusha, Tanzania

Household Energy Not Used		
	Kaloleni	Daraja Mbili
Ward Extension Workers	<ul style="list-style-type: none"> + Solar energy - Lack of education and mobilisation of people towards the use of solar energy and lack of knowledge on how many solar panels are required to meet what needs; there is a belief among some people that there are radiation effects related to solar energy – belief that there are side-effects; high initial cost + Biogas - Not used because there are not enough animals to produce enough dung and also no space for plants (food) especially in Meta 200. Central biogas plant not viable for 2 reasons: (i) not sustainable because people may sell their animals for other priorities e.g. sending children to school, ceremonies (e.g. confirmation); (ii) in unplanned areas, plots or areas are privately owned so it is difficult for someone to give out his/her area for a central or communal biogas plant. This would have to be solved by ward workers going to discuss possibilities with members of community. Need to discuss other alternative energy sources. 	<ul style="list-style-type: none"> + Electricity - it is expensive; need to educate clients to reduce bills and wastage + Biogas - not all people keep animals; no space for keeping animals + Sawdust - no problems given + LPG - many people are not aware of it; also highly inflammable
Elected Ward Leaders	<ul style="list-style-type: none"> + LPG – This could be a second fuel to electricity but gas cylinders as well as gas cookers are expensive. Again, govt. should reduce tax (import duty) on gas appliances or subsidize the cost of gas. + Biogas – The initial cost of constructing a biogas plant is high thus not used by people. A central biogas plant? Good idea but its practicability questionable because of lack of space – particularly in unplanned areas like Meta 200 – guaranteeing an adequate number of animals to produce enough dung to make it sustainable. Few people keep animals and those who do have only one or two cows. Another obstacle was people's lack of awareness about such an initiative. + Sawdust as an alternative type of energy is good but the sawdust stove produces too much smoke and it dirties the roof and walls. 	<ul style="list-style-type: none"> + Sawdust - Lack of education + Biogas - Cost of plant installation/construction of digester is very high + Solar - High cost of installation; need for education about solar energy + LPG - Dangerous – highly inflammable
	<p>Lighting Solar energy is a good alternative but only if it can be supplied at a cheaper price</p>	
Youth Group	<ul style="list-style-type: none"> + Solar energy – it is not used because it requires high initial cost and the majority are unaware of it + Biogas not feasible in urban areas. There is a need for an awareness campaign. Possibility of a collective biogas plant to cater for unavailability of space. People with cattle may not readily provide dung for the plant because of individualism. Thus there is a need for education. 	<p>Cooking</p> <ul style="list-style-type: none"> + Biogas -Lack of enough animals to provide sufficient dung; lack of space for keeping animals and building a plant; high cost of construction materials + Electricity – Very expensive from provision of service line (connection) to actual bills + LPG - Not known by many people; fear– it is highly flammable; expensive in terms of connecting pipes, cylinder and stove + Sawdust - Fumes/smoke which makes the walls and roof dirty taking into account that most people rent 1 or 2 rooms only; cooking pans wear out easily; sawdust stove itself also wears out quickly <p>Lighting</p> <ul style="list-style-type: none"> + Alternative for lighting is solar but needs high initial capital to install

APPENDIX E6 FUEL AND APPLIANCE COSTS IN ARUSHA

1. Electricity

New Electricity Tariff (effective 1 June, 2004)

Consumers	Old subsidy (prior 1 June, 2004)	New subsidy (wef. 1 June 2004)
< 236 units Small domestic users	First 100 units subsidised - TSh 25/unit + Tsh 200/month service charge Above 100 units - TSh 90/unit	First 50 units subsidised - TSh 30/unit No service charge Above 50 units – TSh 115/unit
>236-7,500 units Large domestic, small industrial and commercial users	?	TSh 90/unit (flat rate) + TSh1,660/month service charge.
A small household consumer will now pay an additional 60%		
e.g. If consume 180 units /month - TSh 9,900 (old rate) TSh 16,950 (new rate)		

Source: Daily News, May 19, 2003

2. Gas (LPG)

Cost of LPG went down on 1st July, 2003 by TSh4,000.

3 Installation Costs

3.1 Electricity

Connection charge: 1 phase (if 100m from grid) TSh 100,000⁷⁶
Reconnection charge: 5% of bill

3.2 Solar

Solar panel (light/radio) : TSh 750,000
(light – simple) : TSh 60,000

3.3 Biogas⁷⁷

16 m³ : TSh 1,000,000

⁷⁶ Electricity is installed in phases.

1 phase : 0 - 250 watts
2 phases : 250 – 1,000 watts
3 phases : ≥ 1,000 watts

Poor households generally install 1 phase which will be sufficient for lighting, radio/TV and ironing.

⁷⁷ Costs quoted by CAMRTEC, an Arusha-based NGO

3.4 Appliance Costs

3.4.1 Electric Stoves

2 plate stove : TSh 36,000
Electric kettle: TSh 30,000

3.4.2 Gas Stoves⁷⁸:

Single ring: 35,000
Double ring : 55,000
Triple ring : 75,000

Regulators

Also have special regulator (AGIP gas safety regulator) which has a button safety trigger and if there is a leak in the pipe or the stove the button trips and cuts off the supply. TS8,000 but not available.

Ordinary regulator: TS15,000

3.4.3 Kerosene Stoves

Wick stove (large) : TSh 12,000
Small stove : TSh 4,000



Sahara charcoal stove on sale in Arusha from *machingas* –street vendor

3.4.4 Charcoal Stoves

- Ordinary scrap metal stove:
TSh 4,000–6,000⁷⁹
- 2 ring energy saving stove (standup model - illustrated)
Original price asked : TSh 35,000
Price paid : TSh 18,000

⁷⁸ LPG (Arusha Oryx dealer) as at December 2003

⁷⁹ Taken from case study data

FUEL COSTS, ARUSHA: 2002 – 2004

Fuel type	Usage/Unit	Notes	2002	2003 Kaloleni ⁸⁰	2003 Daraja Mbili ⁸¹	2004
Electricity	Lighting, radio/TV and ironing		20,000 - 30,000	17,000 for 100 units /month 18,000 for 150 units /month	68,000/month	
Petrol	1 litre		600			680 (700-50)
Diesel	1 litre					640
Gas	6 kgs (no cylinder)	For camping; no regulator				10,000
	6 kgs (with cylinder)					36,000
	15 kgs (no cylinder)					20,000
	15 kgs (with cylinder)					80,000
	25 kgs	Limited availability. Local supplier only buys once per year in Dar-es-Salaam				
	40 kgs	Rarely available				
Kerosene	1 litre		430	500	500	510 (550-600)
Charcoal	1 large sack		5,000	5,000– 7,000		5,000 (5,500-6,000)
	1 small sack		1,000			4,500
	Small bucket		250-300			400
	Small (4 kg) tin		200	300-500	350-400	200-300
Firewood	1 large bundle		700			800
	Big log		300			300-400
	Small log			200-500 ⁸² 500-700 ⁸³		
Sawdust ⁸⁴	1 sack		200-500			

Note: Higher and lower prices reflect seasonal price variation with the lower price in the dry season and higher price in the wet season.

⁸⁰ Costs taken from case study data

⁸¹ Costs taken from case study data

⁸² Seasonal price variation with lower price in dry season. Logs bought **outside** Arusha

⁸³ Seasonal price variation with lower price in dry season. Logs bought **in** Arusha

⁸⁴ In 2001, sawdust had no commercial value and was available from saw mills free of charge.

APPENDIX E7 -Decision-making in Male-Headed and Female-Headed Households

Kaloleni/Daraja Mbili

MHH

	1. Woman only				2. Man only				3. Usually woman				4. Usually man				5. Both			
	N-P		P		N-P		P		N-P		P		N-P		P		N-P		P	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
A. Types of energy		1							2/3	5 ⁸⁵ /5	4	6/3	3/5	2/5	4/1	4	5/1	7 ⁸⁶ /2	3/2	5/4
B. Cooking stoves	1/1	1							4/8	9/2	10/5	14 ⁸⁷ /19	5/1	3	4	3	3	4/2	1	1/3
C. Household appliances	1	1			1	1	1	2/1 ⁸⁸		1/3		2 ⁸⁹	4/9	5/5	7/8	9/11	5	7/6	3/1	2/4 ⁹⁰

Kaloleni/Daraja Mbili

FHH

	1. Woman only		2. Man only		3. Usually woman		4. Usually man		5. Joint (with husband, sons, relatives or children)	
	N-P	P	N-P	P	N-P	P	N-P	P	N-P	P
A. Types of energy	11/7	10/10			3/2	1/3	1 ⁹¹		1 ⁹² /1 ⁸	3/2
B. Cooking stoves	11/8	12/12 ⁹³			3/2	1/3				1
C. Household appliances	11/10	11/11			3	1/2		1/1		2/1

⁸⁵ 1 woman – husband always out on business

⁸⁶ Mother & son

⁸⁷ Depends on purchasing power

⁸⁸ Radio mostly used by father

⁸⁹ 1 woman- due to too much drinking husband can't always decide wisely

⁹⁰ Mother & children discuss; identify what need & inform father who buys when has money

⁹¹ Husband decided when alive now just follow

⁹² Decided with husband but husband now dead

⁹³ 1 woman used kerosene stove when husband was alive; now uses charcoal

Divergence between men and women about who makes decisions
 2=woman

1=man;

Kaloleni
 MHH N-P
 P

MHH

A. Types of energy

Usually man	Usually Woman	Both
A1		A2
B1	B2	
C1		C2
D2		D1
	E2	E1
F2		F1

Usually man	Usually Woman	Both
A1	A1	
B2	B1	
C1		C1
	D2	D1

B. Cooking Stoves

Usually man	Usually Woman	Both
A1		A2
B1	B2	
C1		C2
D2		D1
	E2	E1
F2		F1

Usually man	Usually Woman	Both
	A1	A2

C. Household Appliances

Usually man	Usually Woman	Both
A1		A2
B2		B1

Usually man	Usually Woman	Both
A1		A2
B2		B1
C2		C1
D1		D2

E1		E2
F1	F2 ⁹⁴	
G2		G1

⁹⁴ Woman says she makes the decisions because her husband drinks too much

**Daraja Mbili
MHH N-P and MHH P**

A. Types of Energy

Usually man	Usually Woman	Both
A2	A1	
	B2	B1
C2	C1	
D1		D2
E1	E2	
F1	F2	

Usually man	Usually Woman	Both
A1	A2	
B1	B2	
C1		C2
D1	D2	
E2		E1

B. Cooking Stoves

Usually man	Usually Woman	Both
A1	A2	

Usually man	Usually Woman	Both
	A1	A2
B1	B2	
	C1	C2
D1	D2	
	E2	E1

c. Household Appliances

Usually man	Usually Woman	Both	Mother +children
A1		A2	
B1		B2	
C1		C2	
D1			D2
E1		E2	

Man only	Usually man	Usually woman	Both
A2	A1		
B1			B2
	C2		C1

APPENDIX E8
Kaloleni - Amount of time spent on cooking (old) beans using charcoal

	01	03	04
1. Preparation time • lighting. How?	5 mins using kerosene	Collect, fill and light. 10 mins. g?	5 mins using pieces of cardboard (boxes) & matches
• waiting time for required level of heat for task	10-15 mins depending on kind of charcoal and wind	Depends on weather and type of charcoal. Average 30 minutes to heat	20 mins to reach required heat
2. Adding extra fuel • how often? • time taken	2x at least after 40 mins approx. 1 minute each time	1x only	2x after 45 mins. 1 min. each time to add.
3. Cooking time until boiled/ tender	1 hour 45 mins.	Between 30-45 mins.	Average 1hour 30 minutes
4. Type of stove used? Cost? • 3 stones	N/A	N/A	N/A
• ordinary stove ⁹⁵	TSh 6,000	TSh 6,000	TSh 4,000
5. Where do you cook? inside house	No	Yes	Sometimes (see below)
• outside house in separate covered kitchen • what are difficulties in wet season?	Yes Charcoal more expensive	N/A N/A	N/A N/A
• outside, no shelter what do you do in wet season?	N/A	N/A	Yes. Cook in room when rainy season.
6. Time take in disposal of residue/ ash • waiting for cold	Overnight	Overnight	Overnight
• disposal	1x every 2 days	1x every 3 days	Every day
7. How is residue/ash disposed of?	When ash has accumulated put in dust bin Use for cleaning utensils	Put in dust bin every 3 days	Every morning before starting cooking put in dust bin Use to clean toilet bowl, etc.
8. Effects of fumes, if any	With long use, fumes are dangerous	None	Due to long use, there are some chest problems

⁹⁵ Different costs are associated with size and materials used to make stove

APPENDIX E9 - Kaloleni – Amount of time spent on cooking (old) beans using firewood

	01	02
1. Preparation time lighting. How?	Use kerosene. 5 mins	Light with kerosene. Time?.
• waiting time for required level of heat for task	No waiting time	No waiting time
2. Adding extra fuel • how often? • time taken	5. times at least after ach ½ hour.	If necessary depending on type of firewood
3. Cooking time until boiled/ tender	1 hour 30 minutes	Until water boils: 30 mins Until tender: 1 hour
4. Type of stove used? Cost? • 3 stones ⁹⁶	Yes. No cost.	Yes. No cost
• ordinary stove		
4. Where do you cook?	No	No
inside house		
• outside house in separate covered kitchen • what are difficulties in wet season?	Yes Wet and difficult to light. Doesn't use in wet season.	Yes. Roof leaks. Not properly built
• outside, no shelter what do you do in wet season?	N/A	N/A
6. Time taken in disposal of residue/ ash • waiting for cold	Overnight	Overnight
7. How is residue/ash disposed of?	Put in dust bin	At least every morning. Put in polythene bags ready for collection by AMC every day. TSh1,000/month.
8. Effects of fumes, if any	With long use, chest problems.	Flu, headache, cough

⁹⁶ There is no firewood stove.

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APPENDIX E10 - Kaloleni – Amount of time spent on boiling water for tea using kerosene

	01	02	03
1. Preparation time • lighting. How?	5 secs.	Fill tank and light wick. 5 secs.	3-5 seconds. Just light.
a. waiting time for required level of heat for task	No waiting time	No waiting time	No waiting time
2. Adding extra fuel how often? time taken	Not required	Not required	Not required
3. Cooking time until boiled/ tender	15 mins. For tea	20 mins. To boil water. Also use for tea and heating food.	Approx. 20 mins to boiling.
4. Type of stove used? Cost?			
• ordinary stove	Wick kerosene stove TSh12,000 (big size)	Kerosene stove TSh 4,000	Kerosene stove TSh 4.000
5. Where do you cook?			
inside house	N/A	Yes	Yes
• outside house in separate covered kitchen • what are difficulties in wet season?	Yes None	N/A	N/A
• outside, no shelter what do you do in wet season?	N/A	N/A	N/A
6. Time take in disposal of residue/ ash • waiting for cold	No residue	N/A	N/A
• disposal	None	None	None
7. How is residue/ash disposed of?	None	None	None
8. Effects of fumes, if any	None	None	None

APPENDIX E11 - Kaloleni – Amount of time spent on boiling water for tea using electricity

	01	03
1. Preparation time • lighting. How?	Switch on. 3 secs.	Switch on. 3 secs
• waiting time for required level of heat for task	None	None
2. Adding extra fuel • how often? • time taken	N/A	N/A
3. Cooking time until boiled/tender	15 mins.	Electric kettle needs 5 mins to boil tea.
4. Type of stove used? Cost?		Electric kettle 30,000/-
• 2 ring electric stove		Not in use
• electric oven (4 rings + oven)	TSh 200,000	
1. Where do you cook? inside house	Yes	

APPENDIX E12 - Daraja Mbili – Amount of time spent on cooking (old) beans using: charcoal

	05	06	07	08
1. Preparation time • lighting. How?	Short time – put charcoal and kerosene in stove and light	Short time – put charcoal and kerosene in stove and light	Short time – put charcoal and kerosene in stove and light	Short time – put charcoal and kerosene in stove and light (1 min.)
• waiting time for required level of heat for task	15-20 mins depending on wind	30 mins (depending on quality of charcoal)	About 15 min	Approx. 30 mins
2. Adding extra fuel • how often? • time taken	Add once/twice after about 1 hr. but maybe more depending on quality of charcoal	Add 3x, 1 min. each time after about 45mins. depending on quality of charcoal.	Add once or twice; takes 1 min.	2x about 1 minute each time.
3. Cooking time until boiled/ tender	Boil after 30 mins Tender after 1 hour 30 mins.	Boil after 45 mins. Tender after 2 hours.	30 mins. to boil. 2 hours until tender.	30 minutes to boil 1 1/2 hour until tender
4. Type of stove used? Cost? • 3 stones				
• ordinary stove	Yes	Yes	Yes	Yes
5. Where do you cook? inside house	In kitchen		In kitchen	Yes (<i>kitchen??</i>)
• outside house in separate covered kitchen • what are difficulties in wet season?	None	Yes None	None	None
• outside, no shelter what do you do in wet season?				
6. Time take in disposal of residue/ ash • waiting for cold	Overnight	Overnight	Overnight	Overnight
• disposal	1x per day	Remove ash once per day	After 2 days; small family	2x per day. before start to prepare dinner and before next lunch
7. How is residue/ash disposed of?	Throw in a skip bucket by paying a boy 100/-	Keep in a container. Later sent to skip bucket by family member.	Put in dustbin ready for collection	Disposed of in pit latrine as a way of disinfecting latrine

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8. Effects of fumes, if any	Chest problems	Bronchial problems	No	Bronchial problems especially when lighting
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APPENDIX E13 - Daraja Mbili– Amount of time spent on boiling water for tea using kerosene

	05 (Boil water)	06 (Boil water) 50cc koroboi	07 (Boil water)	08 (Tea)
1. Preparation time • lighting. How?	Approx 1 min, to strike match and light wick.	Approx 1 min, to strike match and light wick.	Approx 1 min, to strike match and light wick.	Approx 1 min, to strike match and light wick.

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• waiting time for required level of heat for task	2 mins	2 mins	2 mins	2 mins
2. Adding extra fuel • how often? • time taken	None	None	None	None
3. Cooking time until boiled/ tender	15 mins	10 mins to boiling. Kerosene left	About 20 mins.	15 mins
4. Type of stove used? Cost?				
• ordinary stove	Yes	Yes	Yes	Yes
5. Where do you cook? inside house	In kitchen		In kitchen	In kitchen
• outside house in separate covered kitchen • what are difficulties in wet season?		Yes		
• outside, no shelter what do you do in wet season?				
6. Time take in disposal of residue/ ash • waiting for cold	N/A	N/A	N/A	N/A
• disposal	N/A	N/A	N/A	N/A
7. How is residue/ash disposed of?	N/A	N/A	N/A	N/A
8. Effects of fumes, if any	Not aware of any fumes	Strong fumes when put out. Bronchial problems	Not aware of any fumes	Bronchial problems especially when putting out.

APPENDIX E14 -Daraja Mbili– Amount of time spent on boiling water for tea using electricity

	05	07
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1. Preparation time • lighting. How?	Just switch on	
• waiting time for required level of heat for task	None	
2. Adding extra fuel • how often? • time taken	N/A	
3. Cooking time until boiled/tender	10 min	
4. Type of stove used? Cost?		
• 2 ring electric stove	Use only for tea and bathing water for husband	Not in use (cost)
• electric oven (4 rings + oven)		
5. Where do you cook?		
inside house	In kitchen	

APPENDIX E15 -Controlled Experiment

Energy for cooking/lighting: Type/Time

Cook ¼ kg. Of beans [new Soya beans]

Method: The beans weighed into 3 portions of 1/4kgs each. Same amount of water was used (1ltr) with each portion of beans and increased slowly. 2 ½ litres of water was used when cooking with firewood and sawdust briquettes and 2 litres of water was used when cooking with charcoal (because heat less).

Cooking	Firewood	Charcoal	Sawdust briquette
1. Amount of energy used	25 pieces [TSh 500 used 24 pieces] [TSh 480]	One tin [TSh 300]	1 ½ pieces [TSh120]
+ waiting time for required level of heat for task	None	10 Minutes	None
2. Time for lighting	8.35 am Started with 6 big and 5 small pieces	8.35 am	8.35 am
3. Time started to boil	8.41 am (6 mins)	9.00 am (15 mins)	8.45 am (10 mins)
4. Adding extra fuel + how often? + time taken	Added at 08:50 3 pieces Added at 09:05 3 pieces Added at 09:20 2 pieces Added at 09:32 5 pieces	Added more from tin & finished but still heat remaining for extra cooking.	None added. Some heat left but not as much as charcoal. Produces good fuel for ironing.
5. Cooking time until boiled/tender	10.00 am (1 hr. & 24 mins)	10.30 am (1 hr & 45 mins)	10.00 am (1hr. & 24 mins)
6. Type of stove used?	3 stones	Energy saving stove [TS2,500]	Energy saving stove
7. Time take in disposal of residue/ash	Leave until morning before disposing	Leave until morning before disposing	Leave until morning before disposing
8. How is residue/ash disposed of?	In the dustbin	In the dustbin	In the dustbin

9. Where do you cook?			
<ul style="list-style-type: none"> inside house 			
<ul style="list-style-type: none"> outside house in separate covered kitchen What are difficulties in wet season? 	Outside under the separate covered kitchen No difficulties the kitchen is well built	Outside under the separate covered kitchen No difficulties the kitchen is well built	No difficulties the kitchen is well built
10. Effects of fumes, if any	+ eye and chest problems (cough) + produces a lot of smoke + pots get black/dirty + making the house dirty	+ eye and chest problem + small amount of smoke but has effects when cook inside	+ eye and chest problem + smoke but not as much as firewood + irritating smell + pots get black/dirty

NB:

- + Firewood needs a lot of attention. You need to keep adding pieces of firewood.
- + Sawdust briquettes starts slowly but later cook as fast as firewood
- + Charcoal takes too long to get heat and you have to increase another charcoal on the process.
- + Not usual to cook beans using kerosene. Too expensive..

APPENDIX F

F1	Kaloleni – ward intervention
F2	Daraja Mbili – ward intervention
F3	Kaloleni – comparison of fuels on set cooking task
F4	Kaloleni – analysis of stoves
F5	Daraja Mbili – comparison of fuels on set cooking task
F6	Daraja Mbili – analysis of stoves

APPENDIX F1

KALO LENI WARD INTERVENTION

1. Community Energy Focal Point and Ward Committees

After recognizing that there is a need to have/establish an Energy Focal Point, as realized in the February preparatory workshops, the participants were asked to brainstorm the roles/responsibilities and structure of Energy Focal Point.

Responsibility/Roles of the Focal Point

- To analyse the proper/correct energy to be used in Kaloleni
- To provide/create awareness to community members on proper energy to be used
- To conduct demonstrations in terms of:-
 - Comparative use of fuel
 - Technological variations
 - Cost of energy
 - Cost of stoves

The means to demonstrate include:-

- Posters
- Media
- Brochures
- Drama/songs
- The Focal Point should mobilize the establishment/use of alternative energy in the community
- The centre will be selling energy saving stoves in cheap price

NB The centre intends to collaborate with Kaloleni Technical School to make cheap and affordable stoves.

Structure of the Group/Committee

- Chairperson
- Secretary
- Treasurer
- Experts
- Six members, 2 from each street.

The centre is expected to start implementation of activities as soon as possible. Since it has no permanent office, Mr Ally Sudi the secretary, has volunteered to grant one room at his residence for temporarily operation of Focal Point activities. The committee members has shown a token of commitment by starting with the activity of making a wonder basket stove on 24th May 2004, WODSTA is going to facilitate this exercise. The stoves will be sold in order to generate a starting capital for operation of day to day activities of the Focal Point. The committee also proposed to initiate a program of fund raising to boost the capital. The elected committee members of Kaloleni Energy Focal Point are:-

- | | |
|-------------------------|-------------|
| 1. Mr. Joshua Mshumbusi | - Chairman |
| 2. Mr. Ally Sudi | - Secretary |
| 3. Ms. Kuruthum Tassama | - Treasurer |
| 4. Ms. Daines Mfangavo | - Member |
| 5. Mr. Ephraim Laanyun | - Member |
| 6. Mr. Kalutu Koshuma | - Member |
| 7. Ms. Fatma Mohamed | - Member |
| 8. Ms. Rose Njau | - Member |
| 9. Mr. Expel Shayo | - Member |
| 10. Mr. Abdi Kibwana | - Member |

Kaloleni - Action Plan and Projected Budget

The participants developed two action plans as follows:-

(A) ACTION PLAN FOR KALOLENI COMMUNITY ENERGY INITIATIVE/SOLUTIONS

DATE TO START	ACTIVITY/ TASK	RESOURCES	OBJECTIVE	BUDGET	RESPONSIBLE	DATE TO ACCOMPLISH
22 May	Conduct meeting (each street)	Microphones Expertise, key people	To create awareness to community members on energy issues	Tsh. 100,000	WEO, Street leaders Extension officers	December 2004
20 June	Training community on energy saving stoves and alternative energy	Facilitators Key people Training materials	To create awareness on energy saving stoves and alternative energy	Tsh. 200,000	WEO Extension officers	December 2004
1 July	Conduct practical demonstration on energy use	Camera Microphone Food stuff	To disseminate information on energy use, problems. and promote stoves and fuels	Tsh. 250,000	Key people WEO Committee	December 2004
1 August	Sensitise community on gender equality	Facilitators Key people	To educate community on gender issues; rights, roles, and decision making	Tsh. 300,000	WEO Cell leaders Street leaders Community	December 2004
5 Sept.	Sensitise community on outdated cultural practices	Facilitators Key people Training materials	To educate community on the effects of outdated cultural practices	Tsh. 300,000	WEO Cell leaders Street leaders community	December 2004
TOTAL				Tsh.1,150,000		

(B) ACTION PLAN FOR KALOLENI ENERGY FOCAL POINT

DATE TO START	ACTIVITY/ TASK	RESOURCES	BUDGET	RESPONSIBLE	DATE TO ACCOMPLISH
6 May	Seeking a site to set up an office/centre	Funds	Tsh. 20,000	Councillor Committee	July 15
5 May	Analysis of proper stoves/energy required	Expertise Funds	Tsh. 30,000	Committee	June 10
24 May	Making wonder basket stoves	Thread, needles, baskets, black cloth, polythene papers, saw dust, Trainer	Tsh. 20,000	Committee WODSTA (Trainer)	August 30
10 May – 10 June	Purchase of stoves required	Funds Expertise	Tsh. 150,000	committee	August 15
10 may – 10 June	Purchase of energy/fuel required	Funds Expertise	Tsh. 100,000	Committee	August 15
15 – 25 June	Prepare posters/ leaflets, slogan, brochure	Funds Expertise Artist	Tsh. 250,000	Committee	August 30
15 – 30 June	Community mobilization	Video camera Vehicle Music generator Drama	Tsh. 250,000	Committee	September 30
10 May – 10June	Purchase utensils	Funds	Tsh. 50,000	Committee	June 30
28 June – 1 July	Purchase food stuff for demonstration	Funds	Tsh. 30,000	Committee	July 10
1 July	Conduct practical demonstration	Funds, Expertise Key people, Stoves, fuel	Tsh.150,000	Committee Key people	September 30
TOTAL			Tsh. 1,050,000		

APPENDIX F2

DARAJA Mbili WARD INTERVENTION

1. Community Energy Focal Point and Ward Committees

The participants realized that there is a need to establish a community Energy Focal point in Daraja Mbili. This is a community based centre that will address the problems of energy use and suggest the possible solutions.

Responsibility/Roles of the Focal Point

- Provide education on the use of alternative energy.
- Promote alternative energy
- Repair (minor repair) of stoves. i.e energy saving stoves.
- Sales of energy saving stoves.
- Search other places where they can get alternative energy
- Keep records of sales of stoves and any other transactions.

Structure of the Group/Committee

- Chairperson
- Secretary
- Treasurer
- Two experts (for manufacture/repair)
- Six members one from each street.

The committee comprise the following people:-

1. Ms Hilda Lyinga – Chairperson
2. Mr J. A. Kitumbo – Secretary
3. Ms Mariam Msangi – Treasurer
4. Mr Seleman Msangi – Member
5. Mr Bashiri Msangi – Member
6. Mr Abdala Higilo – Member
7. Mr Naftari Mika – Member
8. Mr Issa Mwaimu – Member
9. Mr Tungaraza – Member

The structure of the committee for Daraja Mbili consisted mostly of the current Ward Officials and street leader as proposed by the participants hence the gender imbalance in the composition. In Daraja Mbili, the committee has an opportunity to use the expertise of Mr Tungaraza who deals with the promotion of metal works products. He is the key person of VIMEGRO (Vijana Metal Group) and he has a great exposure through participating in various exhibitions organized by SIDO – Arusha. Thus, it is expected that Mr Tungaraza's VIMEGRO initiatives will be utilized fully by making stoves and sell at an affordable price. On the other hand these initiatives will boost an employment to most of the youth, hence improve their livelihood.

The Committee members are very conscious to establish a Community Energy Focal Point. Due to its nature of composition, they are starting with conducting meetings within their streets to create awareness to community members on energy issues. They expect to rent a room for the office once the starting capital is acquired through various community initiatives and selling briquettes from WODSTA and stoves from VIMEGRO metal work.

The participants proposed the following action Plans for Community Energy Initiative and Focal Point respectively as follows.

Daraja Mbili - Action Plan and Projected Budget

(A) DARAJA MBILI COMMUNITY ENERGY FOCAL POINT – ACTION PLAN

STARTING DATE	ACTIVITY/TASK	RESOURCES	BUDGET	RESPONSIBLE	DATE TO ACCOMPLISH
10 May	Seek an office room to rent	Funds	Tsh. 240,000	Committee	10 July
3 May	Analysis of the stoves to be used at D2	Expertise	Tsh. 50,000	Committee	August 2004
1 June	Purchase of stoves	Funds	Tsh. 100,000	Committee	September 2004
10 June	Purchase energy/fuel	Funds	Tsh. 100,000	Committee	October 2004
15 June	Purchase cooking utensils, knives etc	Funds	Tsh. 50,000	Committee	November 2004
10 May	Community mobilization	Posters Brochures camera microphones	Tsh. 250,000	Committee Community Street leaders	December 2004
10 July	Purchase food stuff for demonstration	Funds	Tsh. 50,000	Committee	December 2004
15 July	Conduct practical demonstration	Funds, slogans, camera posters leaflets	Tsh. 250,000	Committee Community Street leaders Key people	December 2004
TOTAL			Tsh.1,090,000		

(B) DARAJA MBILI COMMUNITY ENERGY INITIATIVE – ACTION PLAN

STARTING DATE	ACTIVIY/TASK	OBJECTIVES	RESOURCES	BUDGET	RESPONSIBLE	DATE TO ACCOMPLISH
17 May	Conduct meeting (each street)	To create awareness to community members on energy crisis	Microphones Key people	Tsh. 100,000	Street leaders Cell leaders Street Executive Officers	December 2004
1 July	Conduct practical demonstration on Energy issues	To create awareness on energy saving stoves and environmental conservation	Key people Experts Microphones Slogan, food stuff	Tsh. 150,000	Committee Experts Community	December 2004
1 June	Conduct training on alternative energy	To educate the community on advantages of energy saving stoves and alternative energy	Trainers Key people Stoves Fuel	Tsh. 250,000	Committee WEO	December 2004
1 October	Sensitise ommunity on gender equality	To educate community on gender issues; rights, roles, decision making	Facilitators Key people	Tsh.300,000	Committee Community Street leaders WEO	December 2004
1 July	Sensitise community on the outdated cultural norms/traits	To educate community on the effects of negative cultural practices	Facilitators Key people	Tsh. 300,000	Committee WEO Street leaders community	December 2004
TOTAL	-	-	-	Tsh.1,100,000	-	-

APPENDIX F3 - Kaloleni – Comparison of fuels on set cooking task

TYPE OF STOVE	EFFICIENCY	COST OF ENERGY	AMOUNT/ QUANTITY OF ENERGY	COST OF STOVE	REDUCE WORLOAD	TIME TAKEN
1. Saw dust	High	Cheap Tsh. 200/= per bag i.e Tsh. 20/= per stove at a time	Full tank of a stove	Tshs.3,000/= to 5,000/=	Yes	10 minutes
2. Briquette	Very high	Cheap Tshs.85/= per piece	One piece per stove is sufficient to do the cooking of a meal of 7 people	Tsh.12,000/- for smallest stove; The price varies with size	Yes	8 minutes
3. Used oil	High	Tshs. 50/= for one time cooking	One litre of oil is sufficient to cook several times.	Tsh.150,000/- varies with size	No. It needs full time attention of the cook	10 minutes
4. Charcoal	Moderate	Tshs 600/= for one time cooking	Depends on the size of stove	Tshs. 2,000/= to 5,000/=	Yes . It doesn't require additional management activities	20 minutes
5. Kerosene	Moderate	Tshs. 300/=	½ sufficient to cook a fast meal	Tshs. 3,000/= to 4000/=	Yes. However, needs some close supervision in case of emergency	10 minutes
6. Wonder basket	Moderate	Low	It depends on the source of energy from other stoves used to start boiling and cooking	Tshs. 4,000/= to 6,000/=	Yes. It doesn't need extra attention	45 minutes to cook rice

APPENDIX F4 -Kaloleni - Analysis of Stoves

TYPE OF STOVE	ADVANTAGES	LIMITATIONS
1. Saw dust	<ul style="list-style-type: none"> ▪ Conserve environment ▪ Time saving ▪ Saw dust are easily available and cheap ▪ It is safe to operate 	<ul style="list-style-type: none"> ▪ It produces smoke during lighting ▪ It cannot operate indoors ▪ Destroys pans/utensils, i.e It needs heavy utensils for cooking ▪ It develops soot on pans
2. Briquette	<ul style="list-style-type: none"> ▪ Conserve environment ▪ The stove is made of steel hence has a long life span 	<ul style="list-style-type: none"> ▪ Produce smoke during lighting ▪ Unavailability of briquette ▪ It cannot be used indoors
3. Used oil	<ul style="list-style-type: none"> ▪ Conserve environment ▪ The exhaust can be extended to boil water for washing, bathing, etc ▪ Can be used indoors if the exhaust is extended outside the house ▪ It has up to three plates 	<ul style="list-style-type: none"> ▪ It needs close attention of operator/cook ▪ The cost of stove is high ▪ It is used for cooking only ▪ It is tedious to touch/hold oils (no smartness during cooking) ▪ Air pollution
4. Charcoal	<ul style="list-style-type: none"> ▪ Used indoors ▪ No visible smoke ▪ Does not require many additional management activities 	<ul style="list-style-type: none"> ▪ Desertification due to prolonged tree cutting. ▪ Take long time to light ▪ Take long time to cook ▪ The invisible smoke is harmful to human health
5. Wonder basket	<ul style="list-style-type: none"> ▪ You can travel with it while cooking is in process ▪ It reduces the cost of energy in other stoves ▪ Simplify work ▪ Not tedious 	<ul style="list-style-type: none"> ▪ It is not independent; It depends on other stoves to boil first. ▪ It may take short life span given the cloth materials of the stove.

Appendix F5 -Daraja Mbili – Comparison of fuels on set cooking task

TYPE OF STOVE	EFFICIENCY	COST OF ENERGY	QUANTITY OF ENERGY	COST OF STOVE	REDUCE	TIME TAKEN
1. Sawdust	Very high	Shs 200/- per bag 20/- per stove at a time	Full tank of stove	T.shs.5,000/-	Yes	10 minutes
2. Briquette	Very high	Shs.85/- per piece	One piece per stove is sufficient to cook	12,000/- for the smallest size	Yes	8 minutes
3. Used oil	High	Shs.50/-	One litre is sufficient to cook several times	Shs.150,000/-	No	10 minutes
4. Kerosene	Moderate	Shs.300/- for one time cooking	½ litre can cook a fast meal	Ranges from T.shs.400/-	Yes	10 minutes
5. Wonder Basket	Moderate	Low	It depends on the source of energy from other stoves	T.shs.4,000/- to 6,000/-	Yes	15 minutes

APPENDIX F6 - Daraja Mbili - Analysis of Stoves

TYPE OF STOVE	ADVANTAGE	LIMITATIONS
1. Sawdust	<ul style="list-style-type: none"> • Fast Cooking • Saves time • Cheap cost of sawdust (energy) • Long lasting burning • Affordable price of stove • It lightens quickly • Conserve environment <ul style="list-style-type: none"> - No cutting down trees - Reduce solid waste • It is possible to make/manufacture a stove using a very simple technology • It doesn't occupy much space/big space 	<p>It is mostly available in urban areas due to easy availability of materials to make the stoves</p> <ul style="list-style-type: none"> • It produces smoke • It makes/generates soot at the bottom of a pan • It is used outdoors • It needs a special pan/utensils (high heat produced)
2. Briquette	<ul style="list-style-type: none"> • Fast cooking • Cheap cost of energy (i.e. briquettes) • Long lasting burning of briquette • Saves time • It can be used in any other stove • The raw materials to make briquette are easily available • Compared to firewood and charcoal briquettes can be carried by any person regardless of gender, age and personality • It doesn't produce much smoke • The briquette don't occupy much space • Easy to carry briquettes due to their structure • Conserve environment <ul style="list-style-type: none"> ○ No cutting trees ○ Reduce solid waste 	<ul style="list-style-type: none"> • Produce little smoke during lighting • The cost of stove is high • Unavailability of briquettes • Once briquette contact with water, cannot light as it turns wet saw dust
3. Kerosene	<ul style="list-style-type: none"> • Fast cooking • Saves time • No soot developed • Can be used anywhere even indoors • Easy availability of fuel (kerosene) • Conserve environment 	<ul style="list-style-type: none"> • Cost of kerosene is high • Smoke is harmful especially when the stove is put off • It needs care when operating (explosion)

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4. Used Oil	<ul style="list-style-type: none"> • Cooks fast • The low cost of fuel and easy availability • You can cook more than one thing on the same stove (has up to three plates) • Conserve environment • Re-cycling of raw materials i.e. oil 	<ul style="list-style-type: none"> • High cost of stove • Its operation needs a close attention • It needs a big space compared to other stoves • It is dangerous when there is variation in the ratio of oil and water droplets • It is tedious due to oily materials thus needs washing hands every time you want to check food
5. Wonder basket	<ul style="list-style-type: none"> • Cheap cost of stove • Easy to manufacture/make the stove • Security i.e. not possible to be stolen • Saves time • Conserve heat, thus food remains warm • It is possible to travel with it • Creation of employment particularly to women and girls 	<ul style="list-style-type: none"> • It is not independent • Negative perception of other people due to its nature of formation i.e. black cloth, that is related to magic • Not recommendable for big families or institutions

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