SOCIAL DETERMINANTS OF ENERGY USE IN LOW-INCOME METROPOLITAN HOUSEHOLDS IN THE WESTERN CAPE

FINAL REPORT

PREPARED FOR THE ENERGY BRANCH, DEPARTMENT OF MINERAL AND ENERGY AFFAIRS

ANTHONY MEHLWANA
AND
NOMAWETHU QASE

ENERGY AND DEVELOPMENT RESEARCH CENTRE
UNIVERSITY OF CAPE TOWN

FEBRUARY 1996

FINAL PROJECT REPORT

PREPARED FOR THE DEPARTMENT OF MINERAL & ENERGY AFFAIRS BY:

Energy and Development Research Centre
University of Cape Town
Private Bag
RONDEBOSCH
7700

Duration of Project	:	May 1995 - March 1996
DMEA Division	:	Energy Branch
Project Reference No	:	EO9420

CERTIFIED AN OFFICIAL FINAL REPORT

for DEPT OF MINERAL & ENERGY AFFAIRS DATE

TITLE	:	Social Determinants of Energy Use in Low-income Metropolitan Households in the Western Cape (Phase 1)
AUTHOR	:	Anthony Mehlwana and Nomawethu Qase
DATE	:	March 1996

Acknowledgment

We extend our thanks to the civic bodies in Khayelitsha, Site B, Joe Slovo and Langa for giving us the permission to conduct this research in their respective areas.

More importantly, we thank our respondents for being patient and co-operative during the course of the research. It has been a rewarding experience.

We acknowledge Amita Makan for giving us guidance during research and the initial writing up, the support of EDRC staff, particularly Prof. Anton Eberhard and Anthony Williams for assisting in the final writing of this report and Dr. Tim Jones for his useful editing.

We thank the Department of Mineral and Energy Affairs for funding this project.

This project forms part of a three-year national study that investigates as the title states, the energy consumption patterns or usage in low-income urban households in South Africa's four regions. In the Western Cape, four types of settlements - electrified and non-electrified - were chosen for in-depth, longitudinal study. This study is different from others conducted in this region because it adopted a qualitative approach (participant observation) as a key research method. International literature shows that this is the valuable way of predicting energy needs for the future and planning supply and demand-side strategies. Energy use is not simply determined by the supply of fuel resources, but by many social and behavioural factors which cross-sectional quantitative surveys tend to ignore. Thus this study was aimed at assessing the impact of energy policy actions on consumers over a period of time.

The findings from this phase of the research suggest that there is a myriad of both social and economical factors which determine energy patters of urban households in the Western Cape townships. It argues that purely economic explanations are not sufficient in dealing with the complex situations where energy end-use and decisions are carried out. The findings point out that such energy needs and decisions should be located within both the micro and macro contexts. The micro context includes social contexts and people's cosmologies around fuels and appliances (that is, perceptions of what is best suited for them).

An important spin-off from this research is that, in planning, the energy needs of poor households should be integrated with other households needs, such as health, employment and housing. Therefore, an integrated energy planning (which includes, for instance, the provision of proper housing units) could best alleviate the energy poverty faced by poor households.

In the past, energy policy was generally developed by technocrats and implemented in a top-down, commandist fashion. White male engineers used quantitative research methodologies which seldom took into account socio-economic and political contexts of their policies. More recently, however, the involvement of marginalised groups in the drafting of energy White Paper marked the beginning of a process of creative participation by communities in national household energy policy making and planning. Furthermore, there is also a growing consensus that conventional household energy policy research methodology is inadequate. Current research appears to be adopting more multi-disciplinary, gender-sensitive, and qualitative approaches.

This project (which is part of a three year longitudinal study being conducted in four of South Africa's provinces) focuses on energy use patterns in four types of housing settlements in the Western Cape: formal houses (core houses in Khayelitsha), site-and service (Site B in Khayelitsha), informal (transit) settlements (Joe Slovo squatter camp near Langa) and the backyard shacks (among the formal houses in Langa). The research seeks to inform energy policy-makers on issues which confront poor households. It represents an attempt to improve the accessibility and affordabilty of energy sources and appliances. The primary output of the research involves compiling and analysing data around the determinants of household energy use, the social context of decision-making, the fuel substitution process, as well as the impact of existing and new energy policies on households.

Energy sources and appliance ownership

Energy sources of choice are not always accessible either because they are unavailable or people cannot afford them. Even though some informal settlements are being electrified, many unplanned settlements remain without electricity. In Langa, although some backyard dwellers have negotiated with site owners for electric connection from the main house, these agreements vary from one household to the other - often, however, at extortionate prices. At present, there is no clear policy regarding the electrification of backyard shacks and informal unplanned areas.

Although electricity is considered to be the most desirable and convenient energy carrier, it was found to be under-utilised in many income households. Often it is too expensive for people to enjoy its benefits. Besides the costs of the electricity itself there are other 'hidden' costs. Electrical appliances are expensive and people can seldom afford to buy more than the most basic of these. Although hire purchase agreements are an option, the criteria for determining creditworthiness exclude most people, quite apart from the fact that the interest charges make it expensive. In addition, the cost of wiring the house is often overlooked. Ready-boards can be a problem: it is possible to overload the supply with many appliances being attached by adaptors; while the use of extension cords running to different destinations and the necessity of having to go to the readyboard to switch appliances on and off are also perceived as problems.

In informal unplanned settlements, the poverty often forces people to use hazardous fuels, particularly given the overcrowded nature of these areas. The combination of shack built of flammable materials and high densities results in a relatively high incidence of fires. Fires have both social and economic costs. As the fire spread from one shack to another, lives are lost property is destroyed and social relationships are damaged. In some cases, people have been forced to leave their homes as the result of the damage caused to other people's property.

Appliance use cannot be separated from fuel use, as each influences the other. Accessibility of fuels is a major influence on appliance use. People adopt different strategies either to save on fuels or to maximise appliance efficiency. The income of the household is an underlying factor - people's use of appliances depends on whether they can afford to buy them, or at least afford to buy the fuels they require. People prefer not to use appliances which consume too much fuel and preference is given to appliances which be used for multiple purposes with

minimum expenditure, such as paraffin heaters (which are also used for cooking, reheating food, baking and boiling water).

Sharing and credit systems: energy use in social context

Social relationships, including the credit system between households and spaza shops and wider kin network are effectively used to channel fuel related activities. Women are particularly active in keeping these relationships alive.

The sharing of energy and appliances is deeply embedded in poor people's social relations. Existing relationships are utilised to channel energy-related activities and resources. This sharing between households has an impact on the constitution of the household: the sharing of resources, especially fuels, results in fluid boundaries between households. In some households, these activities may lead to the disappearance of boundaries altogether. However, inter-household sharing should not only be understood in terms of the relatively obscure notion of *ubuntu* (humanity), but should also be seen as a result of poverty. Most poor households have erratic incomes which cannot sustain all their energy needs. Sharing of resources is an adaptive strategy under the conditions of poverty and instability.

The spazas provide credit to households at critical time which is important given the irregular nature of cash flows in many households. Even though the spazas may be expensive, people rely on them for energy related needs. For holistic understanding of the prevalence of spazas, it is important to go beyond classical economic explanations. The credit system relationships and the types of resources that are frequently exchanged must be also examined. The precarious economic conditions faced by most of the sample households, make their relationship with spazas crucial for their survival. Any policy initiative that undermines this relationship could be counter-productive and have a negative impact on many households.

Furthermore, the relationship between spaza shops and households is based on a socially defined credit system. Credit is seldom if ever extended to households not known to the spaza owner, and very often based on kinship relations. Sharing and credit system are calculated decisions by poor people in their quest for survival.

Thermal Performance

There is direct link between the dwellings' physical structure and fuel consumption. Although few people are conscious of this direct link, they have, nevertheless insulated their dwellings. In response to the climate, residents, especially those living in Khayelitsha area, are obliged to make their dwellings warmer. Different types of insulation contribute to the differing thermal performances of the dwellings.

An important key to improved thermal performance depends on two closely linked supporting factors:

- *Individual income of households.* The types of insulation found in respective dwellings can be used as a barometer to measure the households' economic status. In cold weather, poor households spend much of the fuel budget on space-heating. Poor insulation may account for this.
- *Type of settlement.* The constraints imposed by the physical and tenure environment in which people live have a direct correlation to the thermal performance of their dwellings. The lack of proper housing in informal settlements of Site B and Joe Slovo and the backyards of Langa, contributes to the lack of suitable thermal efficiency in dwellings in those areas. Insecure tenure in these places prevents people from investing in thermally efficient building materials.

Therefore, one of the most important factors determining energy use in poor households is the thermal efficiency of their dwellings. This is particularly relevance in the Cape Peninsula which is cold in winter and windy most of the year. There is a need for policies which will not only address the energy poverty of low-income households but also the acute housing shortage in these communities, with thermally efficient dwellings.

Safety and Health

Spot observations and anecdotal evidence suggest that people's use and management of fuels and appliances is hazardous. Fires in the informal settlements are feared, and they are the result of energy poverty experienced by the urban poor. People do not voluntarily choose paraffin, but are forced to consider this type of fuel because it is cheap and accessible. The same is true with the types of appliances they use.

There were no reported fires in the electrified settlements. In Site B, an informal settlement, fires have been reduced since the area was electrified. It is in the informal non-electrified settlements and the backyards that most fires are reported. An additional factor which is important for energy policy is the type of structures in which people use.

Policy implications of the research findings

This study has drawn attention to three important research areas. These concern the social context where decisions about energy are carried out, and the role of women and children in household energy use. The patterns of energy use in poor households have deep socio-economic roots, and are not as simple as energy planners would like them to be. It is therefore imperative that policy options be demand-driven, flexible and broad enough to give household decision-makers and energy-users, primarily women, sufficient space within which to operate. The principal end-users and managers of household energy and indeed household budgets are generally women. Yet we know very little about how they make decisions on expenditure, particularly when survival is an issue. Furthermore, little is known about women's perceptions of energy and the use of energy appliances. In short, household management and survival strategies in poor households are complex, and deserve serious consideration when formulating household energy policy.

Most of the energy policy issues relating to children have focused on health and safety aspects, but have not addressed the ways in which children use energy in the household. Children, unlike men, are actively involved domestic activities such as cooking and other household chores, sometimes with little adult supervision. It is important that they be considered by policy-makers particularly if there educational campaigns are run around energy use.

Table of Contents

List of Figures

List of Tables

CHAPTER ONE

Introduction

> I use this [brazier] to heat this house of mine. It was just a lot of money [when I used a primus stove for space heating] because this house would not be warm. If it was warm it would be only for a short while. Now I use wood and it is not only difficult to collect, but it is dangerous for all the people inside here . . . but it is useless to complain.
> – *A housewife in Site B*

> We are like relatives because we have been neighbours for ten years. Others in the street might come and go, but we have been here since 1985. We share everything. If I do not have soap, she lends me ... she does not expect me to return it. When she cooks something nice ... she sends me a plate. She uses my refrigerator whenever she wants to store something. I borrowed her my [electric] iron because she only has these heavy [metal] irons. We are like a family here: we share.
> – *Woman pensioner in Khayelitsha*

1.1 Context of the study

In the context of growing isolation during the apartheid era, South African government energy policy was driven by the need to be self-sufficient in energy. The result of implementing an energy policy driven by narrow security concerns was that two-thirds of South Africans were denied access to electricity and were forced to compromise their household energy needs (Eberhard & van Horen 1994: 1; DMEA 1995: 64). As shall be shown by this study, low-income households currently spend most of their incomes on fuels and they often have to resort to using dangerous and inefficient fuels and appliances. In an attempt to make energy – particularly electricity – more accessible to the majority of South Africans, the Government of National Unity (GNU) aims to electrify 2.5 million homes by the year 2000, an average of 500 000 homes each year (DMEA 1995: 65).

In the past, energy policy was generally developed by technocrats and implemented in a top-down, commandist fashion. Further, the energy policy research which informed government policies, was undertaken mainly by white male engineers who used quantitative research methodologies. Interaction between policy makers, energy policy analysts and end-users was limited. Decision-makers seldom understood the socio-economic and political contexts of their policies nor did they take into account the energy needs of the people for whom they were planning. More recently, however, the involvement of marginalised groups in the process of formulating the GNU's energy White Paper marked the beginning of increased participation of users and communities in national household energy policy formulation and planning. Furthermore, there is also a growing consensus that conventional household energy policy research methodology is inadequate. Current research appears to be adopting more multi-disciplinary, gender-sensitive, and qualitative approaches which are interactive. It is to be hoped, that as a result, new and emerging policies will become increasingly informed by users themselves to address their needs more directly.

This study, 'The social determinants of energy use in low-income households in urban areas – Western Cape region' is part of a three-year longitudinal study funded by the Department of Mineral and Energy Affairs (DMEA 1995). It is the first national study to be conducted simultaneously in four different settlement types: electrified formal planned houses, newly electrified site and service houses, informal settlements and backyard shacks. The study is being conducted in four of South Africa's provinces: Gauteng, KwaZulu-Natal, the Eastern Cape and Western Cape.

At present, policy-makers possess insufficient understanding of the manner in which underdeveloped areas of South Africa[1] use energy, the reasons why electrified homes

[1] Underdeveloped areas are defined as mainly poor black communities which either do not have electricity for household energy requirements (Ebehard 1990: 2), or have very marginal infra-structure.

continue to use a range of other fuel types, and the decision-making dynamics that govern fuel and appliance use at the household level. This project seeks, therefore, to inform energy policy-makers on issues which confront poor households. It represents an attempt to improve the accessibility and affordabilty of energy and energy appliances. The primary output of the research involves compiling and analysing data around the determinants of household energy use, the social context of decision-making, the fuel substitution process, as well as the impact of existing and new energy policies on households (Eberhard & Makan 1994: 1).

As the South African energy sector exhibits severe racial and gender imbalances (Eberhard & van Horen 1994: 26), an important (indirect) output in the first phase of this study - particularly in the Western Cape - involved building capacity among female and black researchers. In this regard, the new skills acquired by the researchers ranged from, amongst other things, project management and co-ordination to sampling methods and practical fieldwork experience. Although two of the new recruits had little previous experience or knowledge of South Africa's energy sector, they were soon able to develop a good understanding of a range of issues facing the sector through their involvement in the study, their involvement in the energy White Paper process, as well as their participation in weekly departmental seminars.

1.2 The motivation of the study and its relevance in the current South African energy debate

This research, and the methodology it has adopted, is directly relevant to the current household energy debates in South Africa as enshrined in the RDP and the *South African Energy Policy Discussion Document* (DMEA 1995). It assumes that few in-depth and longitudinal studies have been done in the metropolitan areas of South Africa. It shows that it is important not only to examine the supply side of energy: the demand side is equally if not more important. Further, this research emphasises that energy use is not simply determined by supply of fuel, but also by a myriad of social and behavioural factors which quantitative surveys ignore.

The research comes at a critical time when the present government aims to enact energy policies that are equitable, efficient and sustainable, and which take into consideration all energy users particularly women (DMEA 1995). Briefly, the current household energy discourse in South Africa as appearing in the *Discussion Document* (DMEA 1995: 64-79) can be summarised as follows:

- Although energy is not a basic need in itself, its end-uses and services do meet basic needs such as cooking and lighting. Therefore, there is a need for an energy policy which takes account, generally, of the needs of households - especially poor households, and, in particular, the role that women play in the utilisation of fuels. A gendered energy policy will go a long way in recognising the voices of specifically historically disadvantaged women (Makan 1994).
- There is a need for sustainable energy security for poor households. This will contribute to alleviating poverty.
- Household energy-use patterns have deep socio-economic roots and implications. The cash-flow patterns of many poor households restrict them to certain energy sources and carriers. Policy should be demand-driven and take these problems into consideration.
- There is a need for an integrated energy policy which will take into consideration all the types of fuels and appliances that people use. Although access to electricity is improving, this does not mean a dramatic change from, or substitution for, other energy sources. For instance, most poor urban households are using illuminating paraffin and liquefied petroleum gas (LPG) to meet their energy needs. Therefore it is important for the energy policy to cover these fuels and reduce the health and safety risks that their use entails.
- Lastly, one of the most important elements of the RDP is the provision of suitable housing to millions of poor South Africans. Therefore there should be a co-ordination of energy and housing policy and planning. In the interests of energy equity, efficiency and sustainability, the thermal efficiency of houses needs to be taken into account.

This research seeks to feed in to the current energy debate in South Africa by contributing to an understanding of the complex patterns of energy demand amongst the poorest sectors of

society. The research findings presented here are not concerned with theoretical tenets and issues arising from the past and current energy discourses. These are discussed elsewhere (see, for example, EDRC's Epret Paper series; Eberhard 1990; Eberhard & van Horen 1994). This report is more concerned with practical experiences of poor black households in the new South African dispensation. It is hoped the preliminary research findings of this phase will contribute to energy policy formulation and aims of the RDP by providing much-needed qualitative information on household energy use.

1.3 Objectives of the study

This research project's broad aim is to extend knowledge of the factors influencing household energy use at the household level, investigating the context in which energy-related decisions and activities are carried out over time to inform policy and to enable tracking and prediction of energy policy impacts.

1.3.1 Specific aims

To meet the above broad objective, specific aims of the project that were covered in the 1995 phase are:

- To collect data by means of questionnaires in electrified and non-electrified households.
- To document the process, extent and determinants of fuel-switching – the extent to which fuel-switching takes place in response to environmental, social, economic and policy-related factors.
- To examine the ways in which decisions about fuels are made within the household, and to determine the extent to which people who make such decisions are the same people who actually use the fuels or appliances on a daily basis.
- To examine the criteria for the purchase of appliances, relating such socio-economic data to the national energy use database and other ongoing research, and to provide information to policy-makers, utilities, appliance marketing companies, financing institutions and national service-delivery forums.
- To record individual attempts to solve problems of thermal performance of houses by (a) tracking thermal performance; (b) recording attempts to improve such performance; and (c) generating ideas for cost-effective means of improving it, and to facilitate community empowerment by generating and disseminating information relating to thermal performance problems.
- To document fuel- or appliance-user interactions including critical incidents and relate these to socio-economic characteristics of the households, situational factors, and the end-user's behaviour and thinking.

1.4 Central arguments informing the study

There are cross-cutting arguments or issues (that is, applying to all settlements) that inform this study. These issues have strong policy implications at the household level. In brief these are:

- Most poor people do not have easy access to fuels of choice. Although some fuels (paraffin in particular) are readily available, some people cannot afford to buy them because of their precarious economic position.
- Related to the above is the influence of income which, to a large extent, influences use of fuels. In this context, multiple use of fuels and fuel backswitching, although they can be viewed as coping strategies by poor people, are determined by respective households' income.
- Decisions made regarding household energy use are more complex and cannot be sufficiently explained by gender and income alone. Having children in the household, for example, plays a role in decision-making about fuels and appliances.
- The kinds of fuels available influence people's purchases of appliances. The reverse is equally true: people may have a wide choice of fuels but fuels available to them may be under-utilised or used inefficiently because of the unavailability of appliances. The truth here is that one may not divorce the question of fuel from the question of appliances.

- Poor people are forced to use certain appliances - unsafe and inefficient as they may be - because they cannot afford more expensive and energy-efficient appliances. Hence, for example, people still use flame and primus stoves which have been found to be dangerous.
- People's use of fuels and appliances cannot be satisfactorily explained in crude economic terms. The social context influences the way that fuel and appliances are used. The credit system between householders and spaza shops, and the sharing relations between neighbours and kin are cases in point.
- Most people live in thermally inefficient dwellings: there is a direct relationship between the fabric of dwellings and the amount of fuel consumed.
- Although few cases of health and safety hazards regarding fuel and appliance use emerged during the present research, fuels and appliances that people use and ways that they are used constitute a heath risk. It cannot be concluded - because of the limited examples here of fuel and appliance danger - that people are using appliances and fuel safely.

1.5 Report outline

To deal with these central arguments the remainder of this report is divided as follows:

- Chapter Two conveys the research methodology employed in the study, problems encountered, and background information on the four settlement types considered: namely Khayelitsha (formal houses, and site and service houses); Langa (backyard shacks) and Joe Slovo, an informal unplanned settlement in Langa.
- Chapter Three highlights the complexities of fuel use in low-income settlements, focusing on the determinants that shape fuel use - including physical access and affordability, settlement type and housing structure, residential history, and gender.
- Chapter Four investigates the appliances used in these low-income households and the coping strategies employed to compensate for the lack thereof.
- Chapter Five examines the social context of fuel use, focusing mainly on the extent that households have to go to secure fuels or appliances, using existing social relationships such as kinship, neighbours and spaza shops.
- Chapter Six draws a link between energy poverty and the thermal performance of households. It shows the close relationship between the construction of people's dwellings, thermal performance and the energy consumption of households, and suggests that the poorest sectors of the community spend more on energy, partly as a result of improper housing.
- Chapter Seven focuses on the health and safety issues resulting from energy poverty. It points out that poor people continue to use fuels and appliances that are unsafe and dangerous. They do not choose to use them, but are compelled to do so - by external forces, such as under- and un-employment, and generally impoverished living conditions.
- Chapter Eight summarises the key research issues and findings, makes policy recommendations and suggests possible future research areas.

Research areas and methodology

2.1 Research overview

The research project started in May 1995. The first month was spent identifying the four research sites and the sample groups. While the relevant community structures gave the go-ahead in the formal electrified households and backyards, the informal planned and unplanned settlements initially proved more problematic. Eventually permission was given. In June preliminary surveys of the areas were conducted among 60 households to establish the household types and income details. Participant observation started in July. Each selected household was visited twice or thrice a week for an average of two hours. Interviews and general discussion around particular research topics were held with mainly adult members of the selected households. However, in particular cases, children who were observed to conduct domestic chores such as cooking were interviewed. The response was positive, although later some households showed signs of fatigue. The winter survey was implemented from mid-August 1995. In September 1995, four shacks in the informal unplanned settlements were identified to measure the shacks' inside and outside temperatures. The thermometers used were user-friendly and were administered by the householders themselves and supervised by the research team. In the same month of September, an in-depth questionnaire was implemented in all areas.

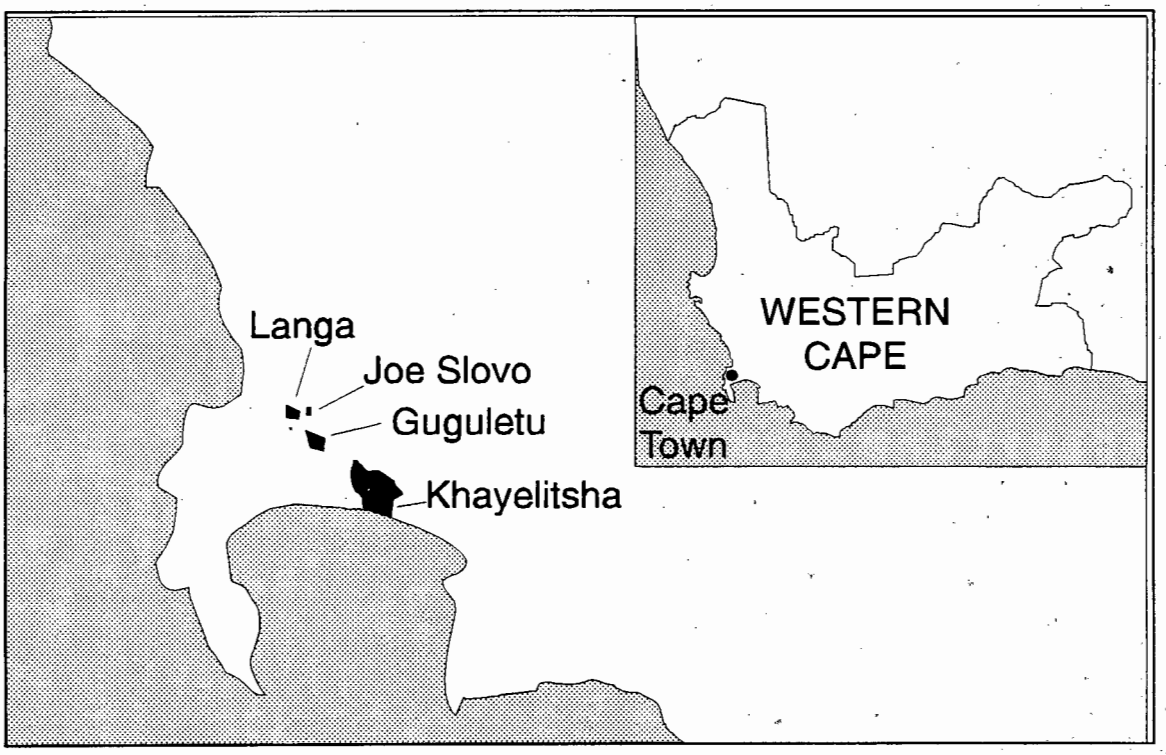


Figure 2.1 The research areas

2.2 Synopsis of research areas

There were four types of housing settlements selected in the Cape Peninsula area on the basis of their exhibiting different characteristics. Permission to do research was sought and given. These four areas were (a) the formal houses (the core houses in Khayelitsha); (b) informal planned or so-called 'site-and-service' settlements (Site B); (c) informal unplanned or transit settlements (Joe Slovo near Langa); and (d) backyard shacks (in the formal houses in Langa township).

Khayelitsha and Site B settlements are situated in roughly the same geographical area and are served by the same local authority. Langa backyards and Joe Slovo are situated next to each other. However, the distance between Khayelitsha and Langa is about 20 km. Spreading the sample over different areas - albeit near each other - allowed for the observation of area variations and, at the same time, easy access to research areas.

2.2.1 *Khayelitsha: Formal housing*

Khayelitsha is situated about 28 kilometres from the city centre of Cape Town on land that belonged to the South African Defence Force (van Heerden 1985: 16). It is today the largest black residential area in the Western Cape (cf. Cooper et al. 1990), estimated to be around 2 085 hectares with a population of 359 600 people (SALDRU 1993). However, this might be a conservative estimate since the size and population of the area is in constant flux. The core or formal houses of Khayelitsha were built in 1984. Then it was less a housing solution than a political one. It was hoped that only people that were legal residents of the Cape Peninsula would live there. Moreover, Khayelitsha was seen to offer a chance to 'promote ethnic solidarity required by the Nationalist Party ideology and by the defence strategists' (Black Sash 1984: 3), since the buffer zone between Africans and Whites would be Coloured settlements such as Mitchell's Plain. The idea and creation of Khayelitsha were thus part of a broad influx regulation mechanism, although in a modernised form of apartheid with a more humane feel. The government had realised that stringent influx control had failed to produce its intended effects.

Khayelitsha includes a conglomeration of housing units that cater for a variety of people. It comprises roughly five kinds of residential units:

- the core houses which were initially intended to re-house people from Old Crossroads in 1984 (in which the sample is taken);
- areas of formal squatting or informal housing on serviced sites which includes Site B (see below);
- houses which are made from sandbags for people who can afford to pay rent;
- houses for upper income residents (1988); and
- 'unauthorised' and mushrooming squatter settlements (Cooper et al. 1990: 12).

The 'core houses' are subdivided alphabetically into ten sections, from A to J. All the standard core houses have two rooms (bedroom and kitchen), though some have been extended. All the core houses of Khayelitsha were electrified between 1989 and 1994; SALDRU estimates that almost 90% of formal houses have, at present, electricity.

Since there are many core houses, section H of Khayelitsha was selected because of its clearly defined boundaries. Moreover, the area is next to other housing types, for example, the informal planned settlement of Site B. Within section H, the focus was only on households that were not renovated at the time of sampling. These are houses that are in their original state - not extended in any form - except when there is a backyard shack. The speculation was that unrenovated houses represent the socio-economic status of the majority of people in the area. There are 545 sites in the sampled section, although only 435 were of standard housing units. Others were either upmarket portions situated at the boundary of the area, or community structures such as churches, schools and other community properties.

Female-headed households were over-represented in the sampled core houses of Khayelitsha sample *vis-à-vis* other household structures. Eight households were headed by females; two households were inhabited only by males; two were of the extended type; and three were the so-called nuclear -type households .

2.2.2 *Site B: Informal unplanned (site-and-service)*

Site B is a huge informal planned shantytown which is considered part of Khayelitsha, with which its history is entwined. Although the greatest part of Site B is serviced, there are some parts inside Site B that are unserviced. This area was targeted since it is very near to our research site in Khayelitsha. Indeed, the two settlements are separated by a road. Like the Khayelitsha 'core houses', Site B is subdivided into 13 sections which are numbered alphabetically from K through W. A section closest to section H of Khayelitsha is Section L that is itself large - it contains precisely 800 sites. For better sampling, we had to divide the

section into two subsections, and only focused on one (a road which cut through the section was our boundary). The subsection of Section L contains 315 sites.

2.2.3 *Langa: Backyard shacks*

Langa, an old African township, is situated approximately 10 km from the centre of Cape Town, on the Cape Flats. It covers about 210 hectares, and its population has been estimated at 75 700 (SALDRU 1993). The formal housing units in Langa are supplied with electricity by Cape Town City Council. It is also a conglomeration of different housing units catering for different income groups. The largest section or unit is called the 'zones' - numbered from one through twenty-seven. This section consists of:

- the migrants' hostels (known as 'The Flats');
- the converted hostels that are occupied by people who in the apartheid era had rights to live in the Cape Peninsula;
- the 'location' - formerly `Bantu locations', perhaps the oldest part of Langa;
- the upmarket housing units - the residents of which are financially better off than those of other areas;
- the mushrooming 'squatter' area found mainly in spaces between the hostels and along the western boundary of the area;[1]
- the backyard shacks, which do not occupy a distinct geographical position. SALDRU (1993) estimated the number of people lodging in the backyards to be around 11 500. The backyard shacks are mainly found in the hostel area, 'locations' and in the converted houses.[2]

In Langa, the letting out of backyards to tenants is common, as it complements the income of the landlords. There were many backyard shacks in this area - an average of four per site. Two zones (zones 12 and 15) were chosen, because of the high number of backyard shacks there - 160 sites which had more than 400 backyard shacks; and it is accessible and small enough to cover with less than five minutes of walking around the area.

2.2.4 *Joe Slovo (Langa): Informal unplanned*

Joe Slovo shanty settlement is on the eastern side of Langa township, in the narrow strip of land between Langa hostels and a 'coloured' formal area of Bonteheuwel. Because of the crowded nature of the settlement, it has not been possible to ascertain the number of shacks occupying this area; suffice to say that Joe Slovo is in a state of flux, as many people continue to move in. Most people here have moved from the overcrowded 'males-only' hostels, called New Flats, nearby.

The people who occupy Joe Slovo come from Langa hostels, and some were former lodgers in the formal houses of Langa. Because of overcrowding in their former areas, they occupied this open piece of land, which is about 300 metres away from their former places. The settlement was occupied in the beginning of 1994 - by the middle of the year the settlement was saturated. This triggered a response from the Cape Town City Council, which subsequently evicted 'squatters' since it viewed their occupation as illegal. The land is not earmarked for residential purposes, given the electricity power lines which run parallel to the settlement. Some residents have even admitted that they think these electric lines are dangerous, and others have been affected by the electric currents which are believed to come from these lines. Because of the housing crisis, people have no option but to expose themselves (and children) to such dangers. Residents spoke of experiencing electric shocks whenever they put up their laundry on the washing lines to dry. In addition, there is a constant disturbing noise from these lines which the residents have to adapt to. Although some residents are fearful of making wood fires - because of the fear of the electric current - many continue making them. Wood fires have been observed in cold and rainy days when most people used woodfuel not only for space-heating but also for drying out areas affected by rain.

---

[1] The latter has lately been the source of conflict as attempts to relocate them were met with strong opposition (see the section on informal unplanned below).

[2] By this we mean the housing structures which were converted into family units in the late 1970s to accommodate the 'legal residents'.

However, the eviction alone contributed to massive overcrowding, as more and more shacks were built in a narrow strip of land.[3] One of the dangers this state of affairs poses is that when there is a fire it spreads to adjoining dwellings and many shacks burn down. Since the settlement is unserviced and has no running water, it is difficult to quench fires, as the nearest water taps are about 500 metres away.

The Western Cape Union of Squatters (WECUSA) is the major local civic committee which takes care of Joe Slovo's internal relations. However, there is also a rival committee, SANCO, that recently went on a recruitment drive in Joe Slovo. This has triggered conflict amongst the residents which manifested in violent confrontations between the contending civic committees. To date, the political rivalry still rages on as each committee claims legitimacy. The South African Police Services have been brokering peace between these rival parties after sporadic sieges that each had conducted against each other (*New Vision Weekly*, 22 June 1995).[4]

2.2.5 *Process of consultation*

The process of consultation with relevant local structures started in earnest at the end of May 1995. It was important to contact these structures so that they could inform their constituent members accordingly. Indeed, the researchers were advised, especially in informal areas, to inform the civic committee before any study could be undertaken. A series of evening meetings were held with local civic committees of the four areas. Although the process of consultation was very slow - it took more than four weeks - it was successful. It was rather a difficult undertaking since the researchers had to negotiate and overcome problems of a political nature from contending local (political) structures - especially in Joe Slovo (see above). Sound working relations were, however, attained with all the local stakeholders through meetings.

2.3 Research methodology

The following research approach and methodology was utilised:

Energy use pattern survey

One in-depth survey was done in the winter. The survey was used to collect quantitative energy use and socio-economic data from 60 households. It is hoped that in the next phase the sample will be broadened to make it more representative.

Multiple fuel use and monitoring fuel substitution

Spot observations, fuel-use logging and in-depth individual interviews with respondents, mainly women, were conducted.

Decision-making

This element consists of two sub-elements, namely budgetary decision-making and the dynamics of household decision-making. The principal research methods for these two sub-elements were participant observation and in-depth interviews with adult household members.

Appliances

Participant observation was the most important research method, and was supplemented by quantitative data from the end-use survey. It was not possible in this phase to approach the hire purchase companies in order to establish the most frequent energy appliance purchases.

Thermal performance of dwellings

This is one of the elements that will be carried over to the next phase. In this phase, thermal performance was measured in Joe Slovo. Adult household members of three households were

---

[3] This place us also used as a waste disposal area. Construction lorries drive by to deposit construction waste material - which residents have found very useful: dumped bricks and sand are used for paving and making floors, pieces of timber are used to light fires by some households. The latter is not encouraged by the civic committee for obvious reasons. The committee have even banned the use of candles, although most people continue using them.

[4] At present, the civic committee is invisible. Because of its failure to fulfil promises of obtaining land, generally people have shown tremendous apathy. When the civic calls meetings few people turn up.

requested to measure the temperatures inside and outside of their houses over a week in September 1995. The research team monitored this process to ensure that the tempreatures were indeed measured and recorded. In the next phase, the monitoring of the temperatures will be broadened to include a sample in all settlement types.

Fuel and appliance-user interactions
This element consists of two sub-elements: efficiency and safety. This is an ongoing element which will continue to be documented. The safety sub-element is covered in detail in this phase (see Chapter 7).

Other elements of research that are going to be carried out over the next two phases are:

- domestic activity analysis which consists of (a) strategic fuel use and allocation functions, (b) determinants of fuel-use times, and (c) meal patterns and changes in dietary patterns;
- energy-related needs stemming from community and income generating activities;
- impacts of existing and new policies.

2.4 Sampling

Initially, a sample of 50 households in each settlement was to be identified for purposes of a longitudinal study with a 'common' systematic method. This common method would ensure that the sample is representative of the general population of each settlement type. From the bigger sample of 50 in each settlement, 15 households would then be selected - depending on the willingness of informants - for participant observation, spanning three years. However, because the research started later than was projected, only 60 households (15 in each settlement type) were identified for participant observation. The process of consultation with relevant community organisations took longer than was anticipated. As a result, no systematic method was employed in choosing the households in each area. Households were selected randomly, based on the consent of the householders.

2.4.1 Problems encountered

Research fatigue by the householders was the main problem that the research team faced. At first the sampled households were enthusiastic about the project, but after months of repeated visits they showed signs of fatigue. In the early months of the research nine households were substituted: one in Khayelitsha, four in Site B, three in Joe Slovo, and one in Langa.

Another problem concerned the movements of people from one area to another. By the end of October 1995, three households - one in Joe Slovo and two in Langa - moved to other settlements. These households were not substituted since they dropped out of the study at the late stage of the research.

2.5 Description of the sample

Before the research findings are presented, it is important to give a short socio-economic description of the sample. It should be noted that the sample is not necessarily representative of the respective areas. Therefore, no conclusion based on this description will be made, however the description does give a sense of the socio-economic context.

2.5.1 Household types

The most common household types in all these settlements were the nuclear family and the female-headed households (see Figure 2.2).

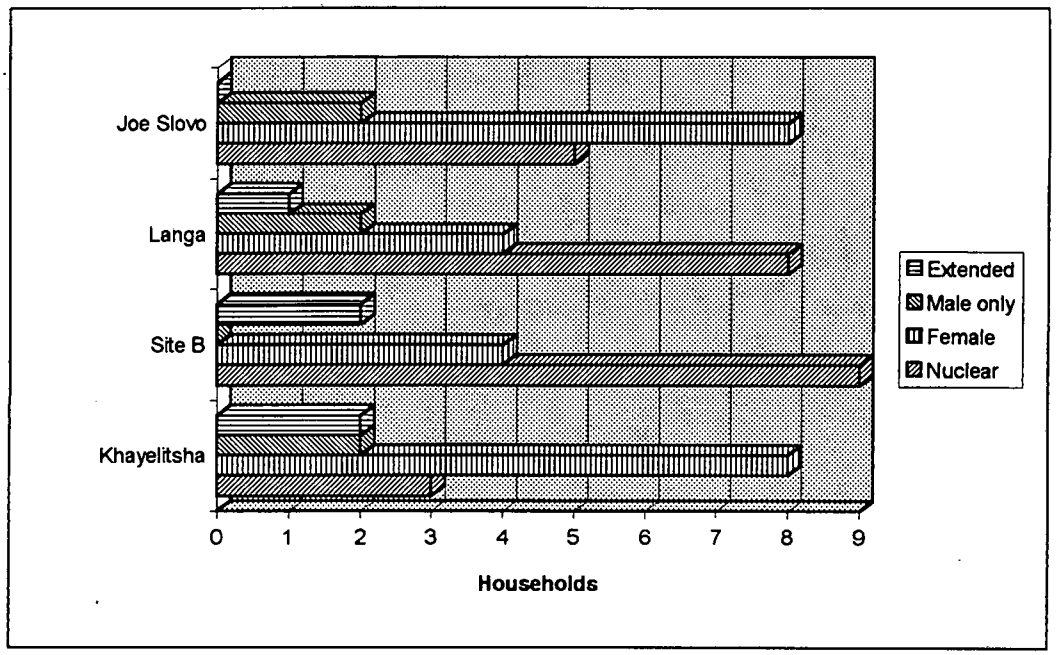


Figure 2.2 Household types

In the formal area in Khayelitsha and informal unplanned Joe Slovo, more women in the sample owned houses, in line with the general trend of more women heading households. In the latter settlement, the reason is that most of these women previously stayed in the migrant hostels in Langa and moved to Joe Slovo because of overcrowding. In Site B and Langa, the dominant household type was the nuclear family where both parents stayed with their offspring. Even in these settlements, a significant number of women headed their households.

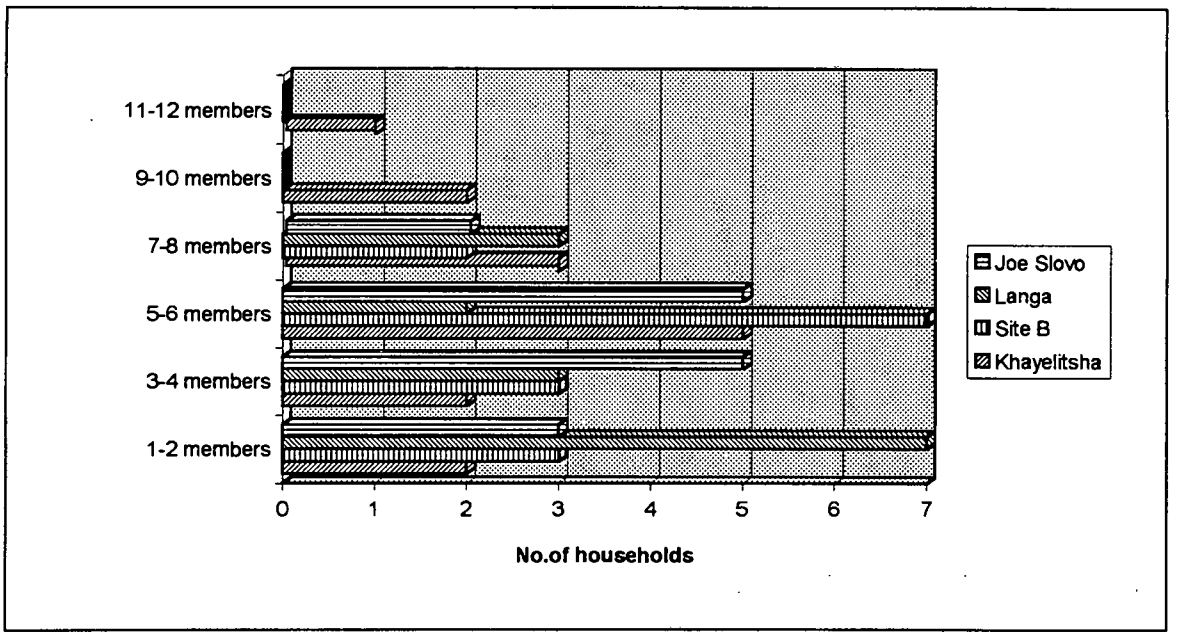


Figure 2.3 Comparative household sizes

There were no significant trends in terms of current household sizes (Figure 2.3).[5] However, it is worth noting that household sizes in the backyard shacks were smaller than in other settlements, relating to the fact that backyard dwellings are very small (see Chapter 5), and are

[5] The figures above include only members living in the sampled households when the survey was carried out. It should be remembered though that the number of household members was not as static as Figure 2.3 suggest.

not able to accommodate most household members (see Note above).

2.5.2 *A short residential history of the sampled households*

There is a direct relationship between the households' period of residence and the history of the settlement. Khayelitsha was established in the early 1980s, and most of the sampled households there arrived between 1985 and 1989 (Figure 2.4).

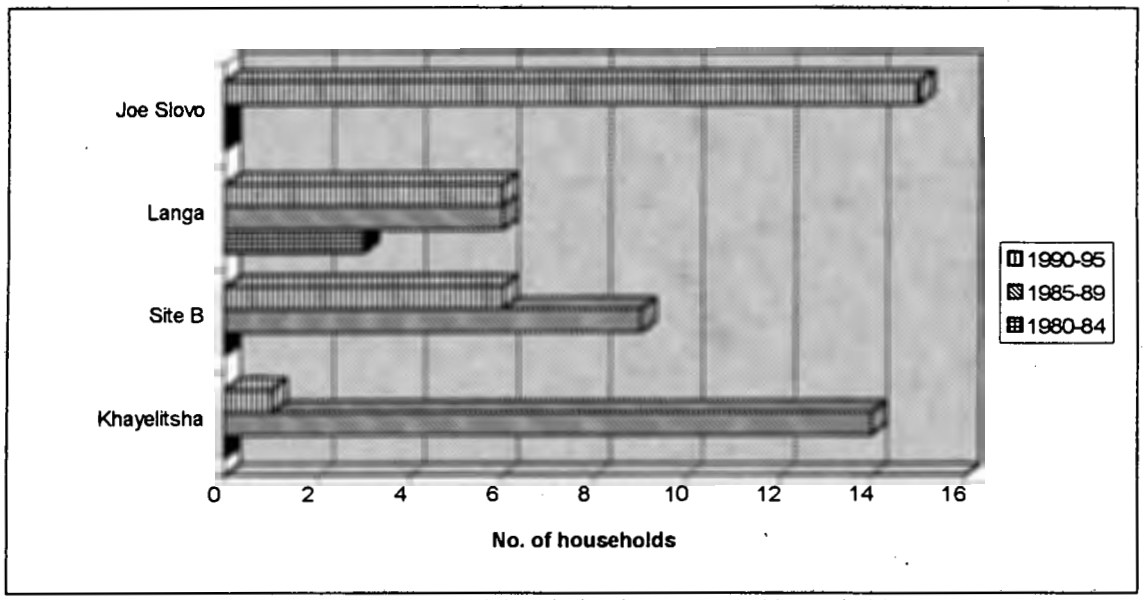


Figure 2.4 Residential periods of the sampled households

In Joe Slovo, most residents came in 1994. In Langa backyard shacks, partly because it is the oldest settlement of the three, the residents came between 1980 and 1995. In other settlements, except Langa, all its residents came between 1985 and 1995.

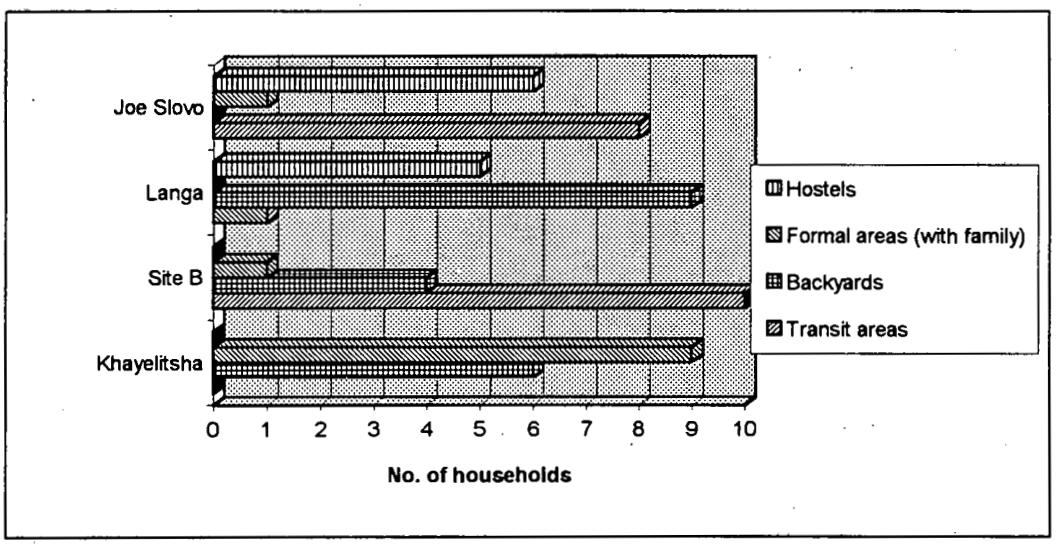


Figure 2.5 Previous places of residence

Households came to these sites from a diversity of areas in the Cape Peninsula: hostels, old formal areas, the backyards, and transit or 'squatter' camps (Figure 2.5). It should be noted that the majority of backyard dwellers in Langa come from other backyards in the same area, and some of them come from the hostels. In Joe Slovo, the majority of respondents come from the overcrowded hostels while most respondents in Site B come from transit settlements. The respondents in Khayelitsha come mainly from formal areas and backyards. People in the Khayelitsha sample have been in Cape Town the longest (as mentioned, the core houses in

Khayelitsha were built for those whom the apartheid state saw as legal residents of 'white' South Africa).

2.5.3 *Household income*

Information as to the income of the sample households cannot be seen as reliable, partly because some people did not want to disclose the exact household income, and partly because some income is not from formal sources and therefore is difficult to quantify. What can be read from Figure 2.6 is that in terms of income the selected households in all four settlements exhibit more or less the same characteristics.

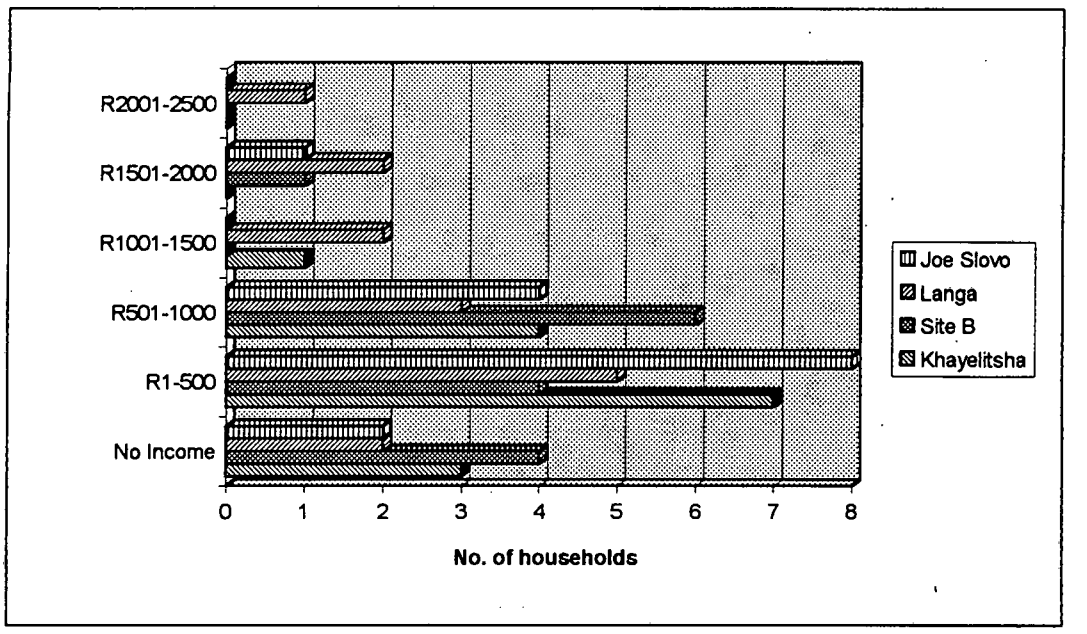


Figure 2.6 Monthly household income

2.6 Conclusion

The research findings in the following chapters should be understood in the broad context reflected in this short history of the researched areas and the description of the households. Factors apparently not immediately related to energy - including household type and size, and income - were found, as shall be shown below, to have direct energy relevance. Chapters 3 and 4 discuss how this socio-economic context imposes constraints on the sampled households.

CHAPTER THREE

The complexities of energy use in low income urban households

3.1 Introduction

This chapter focuses on some influences on the use of fuels within and across settlements. Fuels that are used in all settlements include gas, electricity, candles, paraffin, batteries (dry cell and car batteries) and wood. However it is important to remember that only two settlements are formally electrified. The use of fuels especially among the urban poor is complex and requires a holistic analysis in the sense that it is influenced by a number of factors which sometimes co-exist. The broader environmental context within which households operate is an important factor which determines what fuels are used and how these fuels are used. In essence the impact of socio-political and economic factors cannot be separated from the ways in which fuels are used. As Ross (1993: 130) points out, fuel choices and decisions made regarding fuels are not fixed but change according to context. Like all other decisions, they are a process and function of the particular environment in which people find themselves.

Although all the households in the sample share some commonalities in that they are low income and urban, there are differences that are unique to households within and across settlements – for example, the number of earners or the power relations within households. The first part of the chapter will deal with issues that affect households in all settlements. The discussion will then turn to focus on issues that are specific to each of the four settlements. This will be in the context of the broader, underlying issues, with emphasis on how these influence fuel use in each settlement. The main issues that will be discussed and which should be seen as underlying factors are:

- **Accessibility of fuels**. Accessibility as used in this context refers not only to physical access but also to affordability. Can people afford to buy the fuels that are made available to them? The main argument is that even though some of these fuels are *available* to the people, because of the costs involved in utilising them they remain *inaccessible* to the poor. On the other hand, to some residents in certain settlements access to energy sources is limited, in that some of the fuels are not even available to them, for example electricity.
- **Fuel switching and multiple fuel use as methods adopted by the poor to cope with energy poverty**. Income is the most important factor influencing multiple fuel use and fuel switching. As used in this text, multiple fuel use refers to the use of different fuels for one or different end-uses within a household – for example the use of either gas or paraffin for cooking. On the other hand fuel switching refers to the move away from or to a fuel. More importantly, the focus is on fuel backswitching whereby people switch from using so called 'modern' fuels to 'traditional' poor quality fuels – for example from electricity or gas to paraffin or wood. The main aim is to highlight some of the reasons behind multiple fuel use and fuel backswitching. The role of income in influencing fuel use behaviour and fuel choice will be highlighted.
- **The importance of age and gender in influencing fuel usage**. Here, the discussion highlights the importance of looking beyond just gender as the determinant of fuel use. The role of children in either fuel use or fuel related activities will be demonstrated using case studies from different settlements. Although the focus is on age, gender of children will be highlighted to illustrate respective contributions to either fuel use or fuel related activities. Is there any gendered division of labour when it comes to allocation of fuel related tasks in households?

3.2 Urban dwellers and access to different energy sources

'Even if you can have food, without paraffin or electricity there is nothing you can do'. This comment from Doris, a single woman in Joe Slovo, gives the basis for this discussion as it shows the importance of energy to life. It is important in that it contrasts different fuels: paraffin which is normally associated with the poor and electricity that is used predominantly by those who are 'better off' than others in terms of access to resources. The underlying argument here, is that for the user who relies on the specific fuel, its accessibility is important. It is important to see energy needs in the context of other needs, for example food as a basic need: to have food is not enough if one does not have an energy source to prepare it. In a domestic fuel context, energy *per se* is essential for the survival of all living things (metabolisms) which need heat to function (without which life cannot be sustained).

We will now look at the different fuels used in the four settlements and how these are accessed. The details of which fuels and appliances are used for particular end-uses will be discussed in Chapter 4. Here the main focus is on the different energy sources used, how these are accessed and where.

3.2.1 *Overview of energy sources used in the four surveyed settlements*

The principal end-uses of energy in the home are cooking, lighting and space heating. These have been selected to give an overview of the energy sources used by the households in the sample.

- More than 50% of the households across the settlements use paraffin for cooking. One notable observation is that in the informal *electrified* households in Site B, more than 90% of the households still use paraffin for cooking (Table 3.1). Generally, electricity in both formal and informal areas is under-utilised. However, in formal Khayelitsha households seem to be equally using gas and paraffin for cooking. It is important to mention the high level of multiple fuel use for cooking in almost all households across all the settlements, as is shown by the totals being above 100%.

	Paraffin	*Gas*	*Electricity*	*Total*
Khayelitsha	50	50	21	**121**
Langa	85	38	15	**138**
Site B	93	27	13	**133**
Joe Slovo	100	21	0	**121**

Table 3.1 Energy sources used for cooking (percentage households using)

- Paraffin, electricity and candles are the sources of energy used for lighting. It is significant to note that even in the electrified settlements, there is a high level of use of paraffin and candles for lighting, and the reasons for this are discussed later. Paraffin is the most used fuel for lighting (Table 3.2). There is a low use of candles in all settlements, the reasons for which will also be discussed later. Candles are mainly used in emergency situations such as electricity black-out, or when a household has run out of paraffin. Again it is interesting to note the multiple use of energy sources for lighting.

	Candles	*Paraffin*	*Elec. - Pre*	*Elec.-Met*	*Total*
Khayelitsha	7	14	100	0	**121**
Langa	23	85	0	23	**131**
Site B	13	47	100	0	**160**
Joe Slovo	21	93	0	0	**114**

Table 3.2 Energy sources used for lighting (percentage households using)

- Again, paraffin is the most common fuel used for space heating in all settlements (Table 3.3). The reasons for this are discussed in detail in Chapter 4. In Site B, some households use wood-fuel mainly because it accessible. In Joe Slovo, instead of wood, some households use discarded pallets for space heating. There are very few households that use electricity for space heating, as it is perceived that its use for this purpose is very expensive. It is interesting to note here that there is no apparent multiple energy source for heating.

	Paraffin	*Electricity*	*Wood*	*Total*
Khayelitsha	64	36	0	**100**
Langa	92	8	0	**100**
Site B	73	0	20	**93**
Joe Slovo	86	0	14	**100**

Table 3.3 Energy sources for space-heating (percentage households using)

3.2.2 *How people access different energy sources?*

In Site B and in Khayelitsha, people have electricity which is acquired through the pre-payment code and card systems respectively. In Langa, backyard shack dwellers and Joe Slovo, residents do not have direct access to electricity (although, ironically, as was mentioned earlier, the residents in Joe Slovo live below the electricity power lines). The same is true of many backyard shacks, as the landowners of the plots use electricity in their houses. As a result some backyard dwellers have negotiated with the owners of the sites to get electricity by means of an extension cord from the main house (see section 3.5.4).

Although in an urban environment it is not expected that much wood will be used, poverty forces people to use it. As in rural areas this wood is collected by women. It is mainly used for income-generating activities to help supplement households' incomes. In Site B people have access to wood so women have developed ways in which they can make effective use of this fuel. However, this means walking long distances early in the morning to collect it 5 km away from the area where they live.

> I [Lumka] wake up early in the morning so that by 6 a.m. I can leave the house. I do this because I want to be among the first people to collect wood. Also I want to be there before there are many cars on the freeway. And when we collect wood, you know, we collect only the dead tree trunks. We do not cut trees.

It is not only people in Site B who in their poor circumstances would prefer to use wood but the main problem is that this fuel is not available in other areas. Thus, in Joe Slovo some residents use discarded drum pallets as firewood, but only for space heating.

For other fuels such as paraffin, dry cell batteries and candles, the distance to large retail outlets is of significance. For example, as Khayelitsha is far from the city centre, people in this area depend on spazas and local supermarkets for fuels. Joe Slovo residents have to walk either to Langa or Bonteheuwel (black or coloured township) to access most fuels.

Regarding gas cylinder refilling and car battery recharging, there are limited outlets. For example in Langa there is a gas shop in the local business centre and a garage where most people refill gas cylinders and recharge car batteries.

In general the further people are from the supermarkets the more they depend on spaza shops for paraffin purchases. They are also convenient in that they open later than supermarkets. Table 3.4 illustrates the popular use of spaza shops for paraffin purchases.

	Spaza + African Store	Spaza	African Store	Private Home	Service Station	Total
Khayelitsha	3	9	3	0	0	**15**
Langa	0	4	9	1	1	**15**
Site B	0	14	1	0	0	**15**
Joe Slovo	0	9	5	1	0	**15**
Total	**3**	**36**	**18**	**2**	**1**	**60**

Table 3.4 Places where people purchase paraffin

3.2.3 How do the costs of energy sources and appliances influence their use?

In most cases the costs associated with an energy source are the main determinants of its use. This is particularly so for modern fuels like electricity and gas. Apart from running costs, the capital cost of gas and electrical appliances are high, which prevents their effective use since people cannot easily afford them. In other words the cost of these energy carriers cannot be looked at in isolation from the appliances needed to use them. For these reasons, electricity and gas are not used extensively by most low income households. The following case illustrates people's perceptions about electricity.

Case 3.1 The cost of electricity influences people's effective use of this energy source

> Nokulunga, aged 39, lives with her spouse Prince in a backyard shack in Langa. They have four children. They have a TV and a washing machine. Since they are backyard dwellers, they have a connection by means of an extension cord from the main house. In their previous residence they were using both the washing machine and the TV, but now the washing machine is not used because she says it consumes too much electricity. Nokulunga says they used it before because they shared its services with the owner of the site so that is why she did not mind.

The services provided by electricity no matter how effective and efficient, are negatively affected by its high cost. Even though electricity improves people's lives, for most people it is difficult to maintain this standard because of the running costs. In this case, Nokulunga has stopped using her washing machine because it is perceived to consume too much energy.

3.3 Strategies for reducing energy use and costs

Since the affordability of fuels is generally directly linked to household income, what strategies do the poor employ to save on fuels and fuel expenditure? Although this is a complex issue, the discussion aims to highlight some of the reasons for both multiple fuel use and fuel switching. Most of the households surveyed did not have reliable sources of income and their fuel use patterns reflect this situation. For this reason the strategies adopted, such as fuel backswitching and multiple fuel use are described as coping or survival strategies. In other words they are strategies employed either to save on fuel or to meet energy requirements in times of tight financial constraints. Thus, since 'modern' fuels are expensive, they are often supplemented with or substituted by less expensive fuels like paraffin and in some instances wood – hence, multiple fuel use. Although only a few cases have been selected it should be realised that multiple fuel use is a prevailing feature in the surveyed households (See Table 3.1 and 3.2).

3.3.1 Fuel switching behaviour

The greater the income of a household the more people switch to better and more efficient energy carriers. This is partly because the higher incomes are the more people are able to budget, and in general it becomes more convenient to budget for fewer fuels rather than many. For example Eunice who uses gas for cooking and electricity for other energy needs says:

> I only use electricity and gas in my house. I have a 19 kg gas tank which costs R57 to refill and it lasts for six weeks. Since it is consistent then I am able to budget for it every

month, I like gas because it keeps the house neat and clean. I buy electricity once every second month for R100.[1]

Instead of using electricity for all her energy needs the respondent prefers to use gas for cooking. It can be seen that Eunice chose only 'modern' energy sources for the advantages that they have over other fuels. For example, as she points out gas is cleaner, and it is such attributes that improve people's living standards. However, this depends entirely on people's income.

In the following case, Belinda shifted from using gas and electricity to electricity alone, a change that was influenced at least in part by her access to appliances.

Case 3.2 From multiple fuel use to electricity

Belinda, a divorced mother of four aged 40, stays in a two-roomed house in Khayelitsha. She is a domestic worker earning R1 000 a month. She has worked seven years for the same employer and has a good relationship with him, and has acquired many electrical appliances from him. In her house she has been using gas and electricity but changed during the study. She says she realised that 'there is no difference between using electricity and gas and electricity alone, so I decided to use electricity only'.

3.3.2 *Fuel backswitching*

Due to either shortage of income or inaccessibility of 'modern' fuels some people are forced to switch from 'modern' energy sources to lower quality ones such as paraffin and wood.

Case 3.3 Fuel backswitching due to shortage of income

Agnes aged 55 stays with her daughter Zukiswa and her grand-children, Papama and Nocwaka, in Joe Slovo. She is involved in an informal sewing business, and runs a crèche. However, these do not provide her with a stable income. She has gas appliances (a four-plate stove and a gas cooker) and paraffin appliances (two wick stoves), but she mainly uses paraffin. She cannot afford to refill her gas cylinders. Although she prefers gas because it is quicker and cleaner, she is forced to use paraffin because it is cheaper. Ideally she says she would like to use paraffin only in winter because gas is not good for space heating and is expensive.

Although she has all the appliances that she needs, the cost of gas is too high for her. Hence she switched to using paraffin. From this case, although without doubt income is the main reason behind backswitching, for space heating the respondent still prefers paraffin.

3.3.3 *Multiple fuel use*

The use of different fuels in low income households is a strategy mainly employed to save on fuel costs. This is predominant in households where gas and electricity are some of the energy sources used. Although these are both quick and efficient, they are also expensive so people try to minimise costs by using other fuels. In certain instances it is, however, doubtful if this strategy really saves on fuel costs. On the other hand with limited cash flow it is difficult to assess this difference.

Case 3.4 Multiple fuel use as a fuel saving strategy

Nothembile, aged 53, lives with her spouse Livingstone who lost his job in February 1995 due to illness. At present there is no one bringing income to the household and they are waiting for his UIF (Unemployement Insurance Fund) money, which has been delayed in coming. Nothembile has decided to sell snacks to schoolchildren but this is not a reliable source of income. Nothembile says that since her spouse lost his job they have stopped using electricity for cooking and only use it for lighting, refrigeration, and television: 'We try to save costs, we cannot afford to use electricity for everything. Therefore we use gas for cooking but it is expensive, like electricity, so we cannot use it alone'.

[1] This is one of the better-off households in the Khayelitsha sample. Both Eunice and her spouse are working full-time. The combined household income was at the time of research more than R2000.

Fuel saving strategies employed in this household changed twice during the survey. Firstly, the household used gas for cooking some foods and paraffin for others such as samp. However, this changed as Nothembile decided that everything should start on a paraffin stove, to boil before it is transferred to a gas stove to simmer. This is particularly done on Sundays when they cook different foods. However, when cooking samp and tripe only paraffin is used. In winter, this is done on a paraffin heater so that it can serve two purposes at the same time: space heating and cooking.

From this case one sees the ways in which income fluctuation influences fuel use. Although it is not clear whether the strategies adopted really solve the problem or not, it highlights the difficult conditions under which decisions regarding fuel use have to be made. Since women are the primary users of energy in the household, Nothembile manages the decisions pertaining to energy usage. She has chosen multiple fuel use, in order to save fuel. At first she decided that only meals that take longer to cook will be cooked on paraffin. However this strategy was not enough as the cash flow was reduced so she reviewed her decision. This emphasises the fact that decisions regarding fuels, like all other decisions, change from time to time. In winter the decision to use paraffin has been coupled with the effective utilisation of the paraffin heater, by using it for two purposes at once, space heating and cooking. In most instances paraffin is preferred for energy intensive end uses like water heating, space heating and cooking, in the latter case mainly for foods that take longer to cook (see Chapter 4). If viewed in this context, then, the type of food cooked also determines which appliance-fuel combination is used.

We will now turn to two important social parameters influencing energy use in poor households.

3.4 The role of age and gender in energy use and energy related activities

Ross (1993) pointed out in her study that gender alone is not sufficient to explain household energy use patterns fully, as this tends to ignore the contributions made by children. Children contribute in various ways, for example in fuel purchase, or in end-use activities such as cooking. Although this varies from one household to another, there is also gendered division of labour when it comes to fuel purchase and this includes children. For example, men and boys are mainly responsible for recharging car batteries. Gas cylinders are also the responsibility of men in some household because of their weight. At this point we look at case studies to illustrate:

- the role of children in energy related activities; and
- gendered division of labour around fuel use and fuel purchase.

3.4.1 The role of children in energy use and energy related activities

Cases 3.5 and 3.6 show the contributions made by children in fuel usage. Case 3.5 shows the involvement of male children not only in fuel purchase but also in other activities. It is also worth mentioning that in both cases this work is performed in the absence of adult members of the household, that is, without supervision.

Case 3.5 Children's involvement in fuel related activities-a shift?

Samantha, aged 59, is a domestic worker. Samantha previously used gas for cooking but since she moved to Joe Slovo she has changed to paraffin. She fears for the safety of her children since she is not at home during the day. Thus, she gave her 9 kg tank and a stove to her eldest son for safe keeping. Her son, Xolile, a 17 year old, is responsible for cooking and cleaning the house. Her daughter Nothemba who was responsible for these activities went home in June and only returned at the end of the study in October. Xolile is also responsible for recharging a car battery at a garage in Bonteheuwel 15 minutes walk from where they live. The battery is used to power a black and white television which is mostly watched by children in the household.

Case 3.6 Children's roles in domestic activities including energy related activities

Nomonde, a widow aged 48, is a domestic worker. She stays with her four children plus her two nephews. Nomsa, aged 17, is the chief cook in this household. Nomonde works in Kenilworth so leaves home at 5.30 a.m. and returns after 5 p.m. The household uses two

paraffin primus stoves for cooking. Nomsa is the only one responsible for cooking so she often commands the younger siblings to help and participate in this task. For example Nolukholo, aged 10, helps to light the primus stove and sometimes cooks rice or porridge. Nompumelelo, is 8 years old but she is responsible for cooking since her mother taught her at an early age. However, Nomsa keeps an eye on her.

Both cases show the importance of gender issues, but particularly in terms of how these influence the roles played by children in either influencing fuel use or their contributions in fuel related activities. In both these cases, the households are headed by women and it is because of the changing roles they are playing that children are more heavily involved in household activities. In other words, because these women are now responsible for bringing in income, the children are responsible for carrying out domestic tasks. In case 3.6 for example, children have complete responsibility to perform domestic chores as well as care-giving. Thus they are forced at an early age to take on the roles their mothers used to perform.

In Case 3.5 a male child is responsible for performing all the domestic chores including fuel purchases. In recharging the car battery he performs the role which was found in the study to be generally performed by men. Furthermore, this case also shows that children are not only involved in fuel-related activities but they have an influence on fuel usage as well. For instance it is in their interest to watch television, hence they are the ones who are affected most if the battery is not recharged.

3.4.2 The role of gender in energy use and decision-making

In some households where there are no children to help with domestic chores the roles performed by women and men can more easily be defined along gender lines. So far it has been argued that the size of the gas canister determines who should be responsible for refilling it but in some households this remains the responsibility of the woman. One reason put forward for this is that a woman is responsible for cooking. In this instance what trade-offs do women make in order to complete their daily, routine activities?

Case 3.7 Gendered division of labour

Evelina, aged 28, lives with her spouse, Makaya in Joe Slovo. He is a driver, and they have a nine month old daughter. For cooking and all other related activities Evelina uses a 7 kg gas cooker. They use paraffin for lighting and a car battery to run their black and white television. Evelina is mainly responsible for all domestic chores except recharging the car battery. This is done by her spouse and he goes to a garage in Bonteheuwel 15 minutes walk from the settlement. Evelina says she is responsible for refilling the gas cylinder in Langa some distance away from them, because she does the cooking. Since she is also responsible for buying paraffin, she buys it from the spaza shop in the settlement closer to her shack. She says: ' I do not bother to compare prices I just buy from the spaza shop because it is convenient for me. I do not have a child to send to the shop and I do not like sending other people's children'.

From this case it can be seen that there is a definite division of labour along gender lines. It is Evelina's responsibility to refill the gas canister irrespective of its weight. The fact that she uses the gas for the benefit of the whole household has no influence on who performs this task. Due to her work load she has chosen a trade-off between convenience and cost when it comes to paraffin purchase. It is important to remember that in Joe Slovo residents also walk long distances to fetch water from Langa hostels, and she is no exception.

Case 3.8 Men's involvement in fuel purchase

Nolast, aged 27, stays with her spouse, Spencer, in Site B. For cooking they use gas. She owns a 9 kg gas tank which is refilled by her spouse at Eyethu supermarket in Khayelitsha 15 minutes walk from the settlement. He is responsible for this because of the size of the cylinder. Nolast and her niece are responsible for the purchase of paraffin. They buy it from the spaza shops around the settlement.

In contrast to Case 3.7, the use of gas in this household has brought in the involvement of men in the purchase of this fuel, because of the size of the cylinder and the distance to the store.

3.5 Specific issues that influence energy use in the four settlements

Since fuels are not always accessible and are used in a variety of ways by households it is important to look at what is happening in each settlement. The following are some specific examples that will be discussed.

- The use of wood by women for income generating activities in Site B.
- Multiple fuel use and under-utilisation of electricity in Khayelitsha.
- Restricted use of fuels in Joe Slovo.
- Backyarders' access to electricity.

3.5.1 Fuelwood use in Site B

Accessibility of fuels is one of the most important determinants of fuel use, and differs from settlement to settlement. As a result the strategies that are developed to deal with problems of accessibility also differ. For example, in Site B women have decided to make use of their access to wood effectively. These activities include the cooking of sheep heads for sale, selling of freshly slaughtered chickens and beer brewing. The activities selected are those that can be performed with minimal capital costs. However, they tend to be labour intensive. However, although much time and energy is invested in these activities there is little profit in them. Part of the reason for this is the lack of access to electrical appliances. Thus, for example, access to refrigerators would improve the profitability of selling chickens or sheep heads. Here is Nolindile's case as an example.

Case 3.9 The use of an easily accessible fuel for income generating activities in Site B

> Nolindile, aged 55, stays with her spouse, Plantation, in Site B. He is a caretaker at a primary school in Site B and earns approximately R800 a month. Nolindile has decided to sell sheep heads to supplement her husband's income. She buys a maximum of four sheep heads at R5.50 each, and sells these at R5.50 per half sheep head. Sometimes she is unable to sell all of them, for two reasons. First, sometimes once the wool is removed they are too small to sell at this price. Second, there may be no customers, and since she cannot keep them, she and her husband have to eat them. In preparing the sheep heads she collects wood 5 km away from the settlement. She buys the sheep heads at Site B station 15 minutes walk from the settlement. She then cleans them by burning the wool on an open wood-fire, then scrubs them with heated water, using the same fire. They are then cooked on the fire in a half drum. Her husband often helps with making the fire and cleaning the sheep heads, but never with wood collecting. Sometimes before being sold, they have to be reheated. If so, a paraffin primus stove is used.

3.5.2 Multiple fuel use and under-utilisation of electricity in Khayelitsha

Although all of this settlement is electrified, electricity is under-utilised in Khayelitsha for three principal reasons:

- the cost of both energy carriers and appliances; or
- people have already invested in gas cooking appliances; or
- there is no proper wiring in the house.

The factor underlying all these issues is income. For example, as was seen in the discussion on multiple fuel use, people often cannot afford 'modern' energy sources, and it is even more difficult for them to buy electrical appliances. For the above reasons, and because many residents have already invested in the necessary appliances, they continue to use gas for cooking. In some poorer households gas is supplemented with paraffin, or it alone is used.

> As regards house wiring, since most people cannot afford it, this means that they are restricted to using the readyboard, usually in the kitchen. This is obviously inconvenient, and has safety problems which are discussed in Chapter Seven. Given this situation, a number of respondents use other means to light the rest of the house, such as candles, paraffin lamps or sometimes the light from the television. Belinda uses her television as a source of light in her bedroom, as she feels it is inconvenient to have to get up and switch off the plug in the kitchen: `When I go to bed I just press the slip button and then the television will go off by itself. But I am worried now because we have lost the remote control and I do not have money to buy another one.'

Case 3.10 highlights the issues raised above.

Case 3.10 The high cost of electricity, main cause for multiple fuel use in Khayelitsha

Codelia, aged 58, is a domestic worker, helping at a surgery in Vasco. She is paid R500 a month. She stays with her eight children and grandchildren. For cooking she uses gas but sometimes she uses paraffin to cook samp since it is cheaper. She does not like using paraffin because she has chest problems and the smoke given off affects her. However, because gas is expensive she is forced to use paraffin to cook this particular food to save costs. In her house there is no proper wiring which means they have to switch the lights from the readyboard in the kitchen. To avoid this inconvenience she uses candles at bedtime, and electricity only for lighting in the kitchen. She also uses electricity to boil water and iron since she cannot afford to buy other electrical appliances.

3.5.3 Restricted use of fuels in Joe Slovo

In Joe Slovo residents do not have easy access to energy sources. In addition, there are limitations imposed on the use of certain fuels, because of the fire hazards they pose. For example, residents are unable to use candles and open fires, as WECUSA, the civic organisation in the settlement, has banned them. If people, because of their poverty, are forced to use these fuels, they are caught in a dilemma. As Samantha said: 'At the moment I am using candles for lighting since the glass of the lamp is broken. But, you know I can die if I can be caught by the civic because we are not allowed to use candles in this settlement.'

Clearly it is difficult to avoid these fuels completely and people are forced to take risks. For example, Thandeka continues to use candles in her household for lighting because she does not have enough money to buy paraffin lamps, but she avoids making open fires. She possibly takes this calculated risk because wood-fires can be easily seen by neighbours, whereas candles can only be seen by people who come and visit.

Case 3.11 Continued use of candles in Joe Slovo

Thandeka, aged 49 stays with her spouse, and three children in a two roomed shack in Joe Slovo. Her spouse is a Railway labourer, earning R646 a month. She saves paraffin by using it solely for cooking and other related activities and uses candles for lighting. She buys a packet of candles for R6 and these last for three days. Unlike other households in Joe Slovo she does not use woodfuel for space heating because of the fear of fire and, since its use has been banned by the civic. However, she would like to use it since a wood-fire is much warmer, and cheaper than paraffin.

3.5.4 Backyarders access to electricity

Backyard dwellers are dependent on the goodwill of the site owners for access to electricity. Thus, some backyard dwellers are able to negotiate with the owners of the sites to have a connection to their shacks. However, it must be pointed out that backyard renting is a business in Langa, and in one yard one finds an average of four to five shacks. In some cases this can increase to a total of ten shacks. Thus the possibility of having a connection from the main house is slim. Nonetheless, one finds a few shacks where backyarders have a connection from the main house. In these cases the agreements differ from one household to the next. Since this is the only option available to them these agreements are often of a 'take it or leave it' nature. Case 3.12 below illustrates this:

Case 3.12 Take it or leave it' - Backyarders' access to electricity

Vuyane aged 33 stays with his spouse Winifred in a backyard shack in Langa. Both of them have a high school education. Vuyane is a business consultant for an NGO while his spouse is a waitress. His monthly salary is R3 383 while his spouse earns R1 144 a month. They once stayed in Sea Point where they used electricity as their main energy source. Since moving to Langa in 1992 they have used gas and paraffin until they decided to negotiate with the site owner to have electricity connected to their shack. They knew that this would mean an increase in their monthly rental but decided to go ahead. They now pay a flat R100 for electricity every month which covers the monthly consumption of both households. He says:

> I chose not to challenge the fact that I am being ripped off, because I pay for electricity out of desperation.... I do not have other options. I have been using paraffin and gas for many years and I am tired of using them now.

It should be pointed out that very few backyard dwellers use this approach. The main arguments cited for this range from fear of being 'ripped off' since most people at present pay a minimal amount towards rent, to the fragile nature of the relationships between tenants and site owners. Therefore, although many residents would like to have electricity they would prefer to have a separate connection to alleviate some of these problems, and to give them a little bit of independence.

For Nokulunga and her spouse, electricity expenditure is even more difficult to budget since the main house is still using the credit system. In addition, four tenants share the electricity bill and they use it for different end-uses, thus making the calculation of individual contributions complicated. However people enter into these complex arrangements out of desperation, to get access to better energy sources.

Case 3.13: Complex arrangements related to backyarders' access to electricity

> When Nokulunga and her spouse came to this site they had a 51 cm television and a washing machine which they were using in their previous home, a backyard shack in a friend's house. Both households shared the use of the washing machine. When they arrived in this new site they also negotiated for electricity. The main house was in arrears and when their supply was cut off, Nokulunga and her spouse decided to contribute R80 even though they have not yet used electricity. They now use electricity only for lighting and television. Although there is only one backyard shack there are three other tenants in the main house. These others use electricity for different purposes, one for refrigeration, another for sewing, and the last uses it for cooking, ironing and lighting. The third tenant, who is related to the house owner, is responsible for calculating the respective contributions on the basis of the different end uses. It is not clear how he does it but Nokulunga and her husband pay less than others. For instance for one bill they contributed R25 while the remaining three paid R29 each. Unlike other backyard shack residents they are not paying rent so they only contribute towards the electricity bill.

3.6 Conclusion

This chapter looked at the use of energy sources, the main finding being that the sources of choice are not always accessible either because they are completely unavailable or people cannot afford them. In Joe Slovo, and in backyard shacks, people do not have access to electricity and even though some informal settlements are being electrified, areas such as Joe Slovo remain without electricity. Some backyard dwellers have negotiated with site owners for a connection from the main house. These agreements vary from one household to the other, but what is important is that people do not have free choice. Thus they are forced to make compromises, no matter how costly, to access this energy source.

It has been argued that energy is one area in which people will go to great lengths to improve their standard of living, although often with limited success. In Site B women use wood for income generating activities which are labour intensive, and with little profit. One reason for their unprofitability is the lack of access to appliances like refrigerators for the storage of perishable products.

Besides the problem of access to electricity in some settlements, the use of gas and electricity is further limited by the costs of the energy carriers and the necessary appliances. This forces people to use multiple fuels or sometimes to back-switch to other fuels like paraffin and wood.

Finally, it has also been pointed out that children, unlike men, who only become involved in fuel purchase, are actively involved in domestic activities like cooking and other chores usually performed by adult women. Therefore they play an important role in energy use and related activities.

CHAPTER FOUR

Appliance use and methods of acquisition

4.1 Introduction

Appliance-use cannot be separated from fuels. Access to fuels influences the type of appliances people use, and access to appliances dictates use of certain fuels. Moreover, sometimes the cost of either a fuel or appliance might influence the effective utilisation of the other - for example if one has an electric stove but cannot afford to buy electricity. Accessibility of fuels and income are the primary determinants of appliance use. Income is important in that it influences people's choice of fuels and the choice of appliances. Apart from this issue, this chapter will also look at how age and gender influence appliance acquisition and usage.

Briefly, the aim of this chapter is to demonstrate how appliances are used to fulfil different end uses and how this influences fuel use. This is done by, first, looking at appliance uses and constraints which determines the need and then how this need is satisfied, that is, different ways and means in which appliances are acquired. In both instances the discussion aims to focus on people's coping strategies as influenced by their socio-economic status. Therefore, the first part of the chapter looks at the different end uses, focusing on appliances used for each end use, and what influences the choice of a particular appliance. The last part focuses on different methods used to acquire energy appliances, particularly: second-hand buying, hire purchase, savings clubs, and gifts.

4.2 Appliance uses

4.2.1 Cooking

Cooking food, as a basic need, is one of the heaviest users of energy. The survey showed that the type of food cooked determines the amount of fuel used. Since women are mainly responsible for this activity (except in cases where there are no women in the household) they decide which appliance to use based on the type of food to be cooked. For example, in households where either gas or electricity is generally used for cooking, paraffin stoves are used for cooking meals that take longer to cook (like samp and tripe), since paraffin is cheaper - although gas or electricity might be used for reheating such foods, mainly because gas cookers and electric stoves are quicker. In the words of one respondent, Gladys, 'a gas cooker is quick to cook and quick to get used up'. In essence the cost of the fuel is the primary determinant of appliance use and the strategies adopted are mainly to save fuel costs, although in some instances appliance efficiency is the motivating factor.

In men-only households one finds few appliances, so there is no need to decide which appliance to use. For example, in one household in Joe Slovo comprising a single male whose name is Mncedi, there is only one paraffin flame stove which is used for most of the household energy end-uses. However there is a limitation in that it is difficult to use one appliance for everything, especially if one wants to cook different foods. The process becomes time consuming and when the last pot of a meal is cooked the first one is already cold. As a result Mncedi has devised a strategy to cope with this problem since he cannot afford to buy another cooking appliance:

> When I cook samp during the day, I boil eggs in the same pot so that I can have my lunch in the meantime, in this way I do not have to wait for samp to cook before I can boil eggs and at the same time I do not interrupt the cooking process.

For most residents in informal settlements, flame stoves are more popular than paraffin stoves because they are cheaper than primus stoves, and, most respondents argue, they do not burn food. On the other hand primus stoves are more expensive and noisy according to respondents. Table 4.1 indicates the types of stoves used by respondents.

	Khayelitsha	Langa	Site B	Joe Slovo	Total
Primus stove	0	5	3	4	12
Flame stove	2	1	4	6	13
Flame & Primus stove	1	2	3	1	7
Flame & other	2	2	2	3	9
Others (elect., gas)	10	5	3	1	19
Total	15	15	15	15	60

Table 4.1 Use of different types of stove

Chapter 7 will discuss safety issues related to appliances; suffice to say here that neither of them is woman friendly, since they explode anytime, which means that they require close monitoring. Both the appliance and the fuel are dangerous to use. Some respondents use what they call `beatrice stoves', which are similar to flame stoves but less smoky, are heavier and more stable, and are considered more reliable. Mqwathi, who lives with Jane in a backyard shack in Langa says: `If you use a beatrice stove you can relax, you can go to as far as Mowbray [about 10 km] without worrying that when you come back you will find your house burnt into ashes.' This type of an appliance is clearly more user-friendly - particularly if one looks at the rate of shack fires in informal settlements and their causes. Despite these advantages, these stoves are generally expensive and therefore not very popular.

4.2.2 *Heating or boiling water*

Firstly it is important to note that none of the houses surveyed in the four settlements have geysers. For many respondents heating or boiling water consumes a great deal of fuel, particularly in households where there are schoolchildren. It does not only consume energy but time as well. As a result of this most respondents prefer to boil water in one kettle so that it can be shared by two people instead of heating enough water just for one person. Hence, Nosandla is planning to buy an urn:

> My children are struggling in the morning to heat water to bath, we only have one kettle and a stove so two of them share one kettle. I am trying to save money so that I can buy them an urn next year so that at least they can all bath at the same time. I bought them an electric iron because my eldest daughter complained that it takes time for her to do school ironing for all of them with a flat iron.

Appliances used for heating or boiling water are commonly those used for cooking. People with access to electricity use electric kettles to boil water but mostly for hot drinks; to heat water to bath sometimes other appliances are used, since electric kettles are too small for the purpose. Mamokoena, from Site B, prefers not to use her electric kettle because she fears that it will consume too much costly electricity, so her children use a flame stove to heat water to bath in. In essence she basis her decisions on the quantity of water needed and the costs involved if she uses electricity. Table 4.2 indicates that few people use electric kettles. There are two reasons for this: firstly, most people do not own this appliance, particularly in Site B; secondly, it is inconvenient for heating water to bath in. The cost of electricity influences people's decisions to use alternative fuels and appliances like paraffin stoves.

	Flame stove	Primus stove	Gas stove	Electric kettle
Khayelitsha	1	4	2	7
Langa	5	6	2	2
Site B	5	7	0	3
Joe Slovo	9	5	1	0
Total	**20**	**22**	**5**	**12**

Table 4.2 Appliances used for boiling water

4.2.3 Space heating

In the winter rainfall area of the Western Cape, space heating is a necessity which is costly in terms of fuel consumption (discussed further in Chapter 7). For some, this activity though necessary, is seen as a waste of fuel so it is often combined with other activities; as one respondent said: 'When I see in the weather forecast that it is going to be cold I prepare a dough at night so that I can cook it when the paraffin heater is on, or I cook samp.' Owners of paraffin heaters find them useful in that they serve multiple purposes, either space heating plus cooking, as in this respondent's case, or space heating plus water heating for bathing, washing dishes, and so on. This is one reason that paraffin heaters are preferred over electric ones – they can be used for multiple functions at the same time, thus saving on fuel costs. In most instances they are used for cooking foods that take longer to cook or for baking.

For those who cannot afford to buy paraffin heaters in informal settlements the appliances that are used for cooking are also used for space heating. In rare cases this is combined with cooking but in most cases paraffin primus stoves or flame stoves are used solely for this activity since the heat of the stove is normally not enough to heat the house at the same time. a piece of corrugated iron on top of the stove when this appliance is used for space heating; it is believed to enhance the heat of the stove as the corrugated iron gets hot and disseminates the heat in the house (often the stove is placed in the middle of the room or shack). The amount of fuel used differs from one household to the next depending on the type of appliance used and the amount of time for which it is used. Depending on household income appliances used for space heating vary (see Table 4.3).

	Brazier	Paraffin heater	Paraffin stove	Bar heater	Hot plate	Bar heater + paraffin stove	Inapplicable
Khayelitsha	0	5	3	5	0	1	1
Langa	0	2	12	0	1	0	0
Site B	3	2	9	0	0	0	1
Joe Slovo	2	3	10	0	0	0	0
Total	**5**	**12**	**34**	**5**	**1**	**1**	**2**

Table 4.3 Appliances used for space heating

Table 4.3 shows that very few households use electrical appliances for space heating. In this case the cost of the fuel has a major influence on the use of the appliance: the electric heater, for example, is never kept on for longer than three hours at a time. When the room feels warm the appliance is switched off. The case studies below illustrate this.

Case 4.1 The use of electrical appliances for space heating

Brenda, a 27 year old single mother lives with her one year old son in a backyard shack in Langa. She is a domestic worker earning R242 a week. From her wages she pays R100 a month for rent of which R50 goes for electricity. She uses electricity for all her energy needs like cooking, lighting and entertainment. Although she does not own a fridge she has access to the fridge in the main house. For cooking and space heating she uses her hot-plate. Sometimes she combines these activities since she is staying in a single room: if she is not cooking and it is cold then she uses a hot-plate for a short while until the room is warm.

The cost of electricity is a cause for panic to most people. In this case, although the respondent pays a fixed amount for electricity every month, she still uses it with caution. Although she is forced to heat the house because of her child she does not use the hot-plate the whole day, instead she uses it in a much more careful manner. (Besides showing people's consciousness about the cost of electricity, this case study also points to the sharing of appliances (see Chapter 5) - the sharing of a fridge by two households. This is important in that for some backyard shack dwellers the relationship with the main house is often not strong, and sometimes extremely fragile.)

In Khayelitsha where electrified households have prepayment meters, space heating using electricity is said to consume much fuel, as people can witness the units going down. Unlike Brenda in Case 4.1, residents in Khayelitsha who use electric heaters for space heating pay much more in winter. If there is no money to buy enough electricity then nothing is used. In one household, people remained in bed throughout one cold and rainy Sunday. Case 4.2 illustrates the effects of prepayment meter electricity use, supporting the argument that people are always conscious of the cost of this fuel and this has an influence on the use of electric heaters for space heating.

Case 4.2 The effects of prepayment meters

> Lungiswa, a 25 year old final year student at Peninsula Technikon stays with her father in Khayelitsha. Her father is a butchery assistant earning R150 a week. His three nephews who stay with them but two of them occupy the backyard shack; the other is a Std 8 student. One of the nephews works at the same place as the household head, the other is a self-employed tailor. Lungiswa is responsible for buying most of the households appliances and contributes financially to fuel purchases using her bursary money. They have a one-bar electric heater which is used for space heating. She says that they use an electric heater when it is cold only for some time, but if the units are too low (equal to about R5 worth of electricity) then they do not use it.

This case reiterates the point that electric heaters are used with caution by most respondents. In this case it has been highlighted that the cost of electricity, since it is visible at the time of use, causes people to remain conscious of the expenditure on this fuel, especially for certain activities which then encourages the use of other fuels - in essence fuel backswitching as discussed in Chapter 3. Besides, electric heaters cannot be used for other purposes as paraffin heaters can be - no wonder they are less popular to the low income group.

For people who cannot afford either of these appliances, wood braziers are used for space heating. This is the only appliance that uses a cheap fuel, but it is costly in terms of the time and labour involved in wood collection (see Chapter 3). But not everybody has access to woodfuel; in Joe Slovo, for example, where wood is not available, discarded drum pellets which are also used as building materials, are used by a handful of households for space heating.

4.2.4 *Lighting*

In areas that are electrified, like Site B and Khayelitsha and a few backyard shacks, people use electric light bulbs for lighting. In Joe Slovo and most backyard shacks people use paraffin lamps, except one respondent who uses candles (see Table 4.4).

	Paraf lamp + candles	*Paraf lamp + electricity*	*Candles*	*Electricity*	*Paraffin lamp*
Khayelitsha	0	13	0	2	0
Langa	9	2	0	1	3
Site B	0	5	0	10	0
Joe Slovo	12	0	1	0	2
Total	**21**	**20**	**1**	**13**	**5**

Table 4.3 Appliances used for lighting

In most cases candles are used either as a substitute in cases of emergency or as a supplementary fuel (see Chapter 3). In Site B in particular most people still make use of

paraffin lamps since there is no proper wiring leading to secondary rooms. For most residents in Khayelitsha and in Site B, the cost of installing proper wiring is not affordable, so they use alternative fuels and appliances for lighting. Paraffin lamps, although preferred by many people, have a major shortcoming in that they are inconvenient in certain instances because of their fragility: for example, one cannot bring it next to the pot when cooking since the lamp of the glass can easily break if it contacts water or steam from the pot; further if not handled with care the glass can easily fall and break, which means that the maintenance costs of this appliance are too high. Hence they are supplemented with candles, which is the most dangerous fuel especially for people who live in shacks.

Case 4.3 Paraffin lamps safer than candles but too fragile

Mongameli (24) lives with his adopted brother in a backyard shack in Langa. His mother is a domestic worker and only comes home sometimes on weekends. She gets paid R490 a month. Mongameli works as a machine operator at Epping at a weekly wage of R356. Each month he sends R400 to his home in the Eastern Cape where his two sisters stay. For lighting the household uses candles when cooking, so as to avoid bringing the glass of the lamp next to water; once cooking is finished the candle is put out and the television set, powered by a car battery, is used for illumination. When they go to bed they use a paraffin lamp throughout the night since they feel insecure sleeping in the dark, and at least paraffin lamps are safer and can be adjusted.

4.2.5 *Ironing*

For ironing different appliances are used across the settlements varying between electrified and non electrified households. People in informal settlements with no access to electricity use old electric irons heated on paraffin or gas stoves. These are preferred because they are very low in fuel consumption compared to steel irons - since they are comparatively light they heat up quickly. (One respondent, Lulama, who also uses an old electric kettle on a stove-top points out, referring to the use of old electrical appliances, that in the township there is always an effective way of utilising anything you come across, which is why she brought the old kettle from work.) Table 4.5 shows different types of irons used in the sampled settlements.

	Converted iron[1]	*Flat iron*	*Electric iron*	*Steam iron*
Khayelitsha	0	5	8	2
Langa	6	6	1	1
Site B	5	7	3	0
Joe Slovo	5	6	0	0
Total	**21**	**24**	**12**	**3**

Table 4.5 Appliances used for ironing

In contrast, electric irons are perceived to consume too much fuel when used with electricity, although they are quicker than flat irons, because one does not have to repeatedly wait for the iron to heat up. For most domestic workers this has negative psychological effects in that the electric iron used at work is more efficient compared to the flat iron which they are forced to use at home. Hence Gladys, a domestic worker from Joe Slovo, has decided to take her laundry with her to work to wash and iron it there using electrical appliances. Generally ironing is perceived to be high on fuel consumption, whether it is a flat iron or electric iron. With regard to the flat iron it is even worse if one has only got one iron, because paraffin or gas is wasted while a person is busy ironing. To overcome this problem and to save fuel one woman, Ntombesibini, prefers to heat up the iron first and when she is busy ironing then she heats up water to bath.

4.2.6 *Entertainment*

Only a few households do not have any entertainment appliances. Table 4.6 shows that in most households there is either a radio or a television or both.

[1] 'Converted irons' are old electric irons heated on a paraffin stove.

	Radio + Television	Television only	Radio only	Not applicable
Khayelitsha	9	2	3	1
Langa	2	2	10	1
Site B	7	2	4	2
Joe Slovo	5	0	5	5
Total	**23**	**6**	**22**	**9**

Table 4.6 Entertainment appliances

These appliances are powered by either mains electricity, where available, or car batteries, and dry cell batteries for radios. Car batteries are used to run black and white television sets in informal settlements including backyard shacks, and hi-fis in some unelectrified households. In some instances these appliances are not used fully in order to save fuel costs - especially where dry cell batteries are mostly used. Case 4.4 shows that, in some instances, the use of these appliances is influenced by power relations within the households.

Case 4.4 Impact of power relations on appliance use

Gladys, a 47 year old married woman, stays with her husband and children in Joe Slovo. She used to occupy a 4m^2 shack which she extended during the course of the research to make another room because it was too small for her. She works in a hotel in Table View, where she is a kitchen hand, for R1 500 a month. Her husband is a clerk earning R1 800 a month. Gladys bought herself a radio when she was working 'sleep-in' and they are still using it. Although the purchase of a television was a joint decision her husband paid for it. When they were still occupying a backyard shack the TV used mains electricity but now it is powered by a car battery. She gave some of her appliances to friends who were more than eager to get them for free when she was evicted by the owner of the site knowing that she is moving to Joe Slovo. (She saved her vacuum cleaner and electric kettle for when she has access to electricity.) The TV has now been converted to run on a car battery. Gladys says that her husband wants the TV to be used for watching and listening to the news only. 'Although I like watching the CCV soaps between 16h30 and 18h00 in the evening, when my husband is around I cannot watch these. He says they are for children.' But he does not allow children either, to watch TV at night so they go to their friends. If they want to watch TV he complains that they are wasting the battery which is the fuel. On the other hand they cannot listen to the radio because he says that it is making a noise, so it can only be used to listen to the news broadcast.

This case raises a number of issues:

- Although the man in this household is not solely responsible for buying appliances, let alone for bringing in income, he retains control over the use of entertainment appliances. Power relations within the household have an impact on the manner in which appliances are used. The man, here, decides who watches what, when and for how long. Effectively, he uses the cost of the fuel as an excuse to prevent children from watching television.
- Children are then forced to watch TV elsewhere, which means they have to share with their friends in other households where this appliance is available.
- Access to fuels is also revealed as an important issue by this case; certain appliances are unusable because of the lack of electricity. Some electrical appliances are kept, in the hope that they will one day have access to electricity. The fact that it is not accessible to them now is a cause for fuel backswitching (see Chapter 3).

So far it has been shown that income and accessibility of fuels has an influence on appliance use. Case 4.4 has highlighted, in addition, the influence of gender on appliance usage.

4.2.7 Refrigeration

Although it is an important and useful appliance, only a few households have refrigerators because they are too expensive for the poor - whose burden is thereby increased, as they have to buy daily which is more expensive. Access to electricity is obviously a limiting factor. The importance of a fridge to households is well summarised by Nosandla, a woman from Site B.

Next year when it is my turn to get money from the savings club I am going to buy a fridge so that I can be able to buy food in bulk. If I can have a fridge I can buy a sheep, have it sliced and then keep it in my fridge. This will help us because I will not need to spend more money trying to make a gravy for every meal. I have already seen a small fridge in a shop nearby and it is sold for R999.

At the moment Nosandla buys samp, mielie meal, rice and sugar in bulk, but she has to buy milk and other perishable foods on a daily basis. In some households people cope by buying long-life milk or powder milk. In summer the problem is increased because, as mentioned above some people cook food in bulk to be reheated at different meal times, and food spoils quickly in the heat. Access to electricity is obviously a limiting factor. Table 4.7 highlights the inaccessibility of this appliance to many people. Its usefulness is shown by the fact that it is one of the appliances that are shared by most people (see also case 4.1).

	Electric fridge	*Neighbours'*	*Relatives'*	*No refrigeration*
Khayelitsha	7	3	0	5
Langa	1	2	1	11
Site B	2	0	0	13
Joe Slovo	0	0	1	14
Total	**10**	**5**	**2**	**43**

Table 4.7 Refrigeration

4.3 Low income households and appliance acquisition

As discussed, the number and type of appliances found in any household is influenced by household status, as well as income and age. In Case 3.1, Vuyane and Winifred live in a backyard shack in Langa, and are both working. They have a variety of electrical appliances, including a hot-plate, an electric kettle, a fridge, a frying pan, a snack-wich, a toaster, a drink mixer, an electric iron and a television. There are various ways in which people acquire different appliances and these are influenced by income:

- Second-hand buying, mainly requiring cash, but cheap compared to buying new appliances, from second-hand shops and auctions, or in response to newspaper advertisements.
- Hire purchase (HP), which is only accessible to a few due to the strict criteria used to assess whether people qualify for a credit or not.
- Savings clubs also play an important role in financing appliances.
- Gifts from employers, friends or children.

It is necessary to first highlight the problems related to second-hand buying (the commonest method amongst the poor), and, secondly, to contrast that with the use of HP. Even though HP offers access to new appliances it is expensive and the criteria used excludes most people - only people with a stable and reliable income at the time of purchase get credit. It should be remembered that most people in the sample fall within the low income category. The disadvantages of both entrance barriers and problems faced by people who have had access to credit will be highlighted in the case studies below.

From the onset it should be made clear that no single method is used to acquire appliances even within one households, let alone across different settlements. Nolast in Case 4.5 never buys second-hand appliances, preferring a variety of other methods like HP, lay-byes and a savings club.

Case 4.5 How different methods are used to finance energy appliances

Spencer (see Case 3.8 in Chapter 3), because of his employment status, is able to get credit from furniture shops. He bought a fridge and a music system through HP. Nolast, his wife, says that she bought a gas fridge on HP; when, a month later, the area was electrified she returned her gas fridge in exchange for an electric fridge. She has bought a paraffin heater on lay-bye for use next winter. Spencer is also a member of a savings club in Site B to which he pays R50 per week. They meet on Thursday

evenings and latecomers are fined R5. This additional fee is used at the end of the year to make a party and some of it is used to buy presents for the members also at the end of the year. For buying each other gifts the club members agree on the maximum amount to be spent on each gift. Towards the end of the year there is a draw and if you draw the name of a person you have to find out from that person what he or she wants as a gift. People can agree among themselves to buy gifts that exceed the said limit but this has to be refunded on the day of the party. Spencer asked his partner to find out from his spouse what she wanted and then Nolast suggested that she buys an electric hot-plate for her. Spencer bought his partner from the club, a music system, and he was refunded for the extra costs.

In this case one sees how employment and therefore income governs access to a variety of things in society: Spencer can get credit facilities as well as being a member of a savings club. Although HP is expensive, it is the only means by which the poor can access new appliances besides gifts and savings club. Savings clubs are important in that they play a dual role as in the case above. Firstly they help to overcome the entry barriers to HP buying as people can save enough to buy new appliances on cash. Secondly they form a useful exchange relationship in the sense that people buy each other appliances as gifts. The lay-bye method is not very popular in the sample. One reason for this is that it means budgeting in advance for an appliance, and budgeting is difficult without a regular and reliable income. Furthermore, one has to finish paying for the appliance before getting access to it.

4.3.1 The effects of children and gender on appliance acquisition

It is also important to note that decisions to buy appliances are also influenced by both gender and the presence of children, amongst other things. For example, Fiona shares a television with her sister; but she said;

> My sister has lent me this television but she comes to fetch it on weekends, I see my children's disappointment whenever she comes. I am planning to buy them a colour TV when I have saved enough money, as I did when they wanted a hi-fi.

Children play an important and influential role in the purchase of appliances; even though they might not be able to easily afford it, through pressure or concern parents can be forced to buy certain appliances (as also in the case of Nosandla's plan to purchase an urn). Case 4.6 illustrates how gender and economic power shape purchasing decisions.

Case 4.6 How gender, income and children influence appliance acquisition

> George (52) is a railway labourer earning R1000 a month. He lives with his 4 year old son while his wife Nowinile lives at Engcobo in the E. Cape with the other two children, aged 6 and 2. She sometimes visits Cape Town, and did so during the course of the research. One of the purposes of her visit was to bring her black and white TV for repair. George bought it on HP from Ellerines, Cape Town for R799. He bought this for children so he sent it home. Nowinile says that she can only recommend what to buy, but the final say rests with her spouse. She says that is how she was brought up to 'obey my husband at all times'. There are many things she wanted him to buy, like kitchen appliances, but he considered this a waste of money, though he never objected when children wanted a TV.

This case shows that the priorities between the man and the woman in this household differ. Because of his economic power he has the final say as to what is bought and when. In this case he prioritised a TV for children over the kitchen appliances that were more important to the woman. As has been said there is a psychological pressure on parents to satisfy their children's needs. Some parents share appliances because of their children - a TV can be lent to someone else so that children can watch it.

4.3.2 Second-hand buying in low income households

Second-hand buying remains the commonest method of acquiring appliances, via a variety of means - newspaper advertisements, second-hand shops, and auctions. It has, however, problems attached. Initially the appliance appears cheap but maintenance costs become too high, and it becomes difficult to take it for repairs. Hence, most people are stuck with faulty appliances - like one respondent who said she is only keeping her broken fridge to give her house some dignity. There is no guarantee on second-hand goods. If the appliance is faulty within a few weeks of purchase the costs of repairing it lies with the owner or buyer. For HP

purchases there is a minimum of 12 months guarantee whereby, if the appliance is faulty, the buyer can return it to the shop for repairs with no additional costs. People buy second-hand goods because of poverty. Cases 4.7 and 4.8 illustrate the commonness of second-hand buying and the problems that go with it.

Case 4.7 The use of cheap methods to buy appliances

Thuletu lives with her brother, sister and children in Khayelitsha, in a house formerly owned by her deceased mother. She is unemployed and is not getting any maintenance for her children. Her younger brother is working part-time and must therefore contribute financially to meeting household needs, including the purchase of appliances. Her 23 year old sister is getting maintenance from the father of her child which she uses to purchase food and fuels in the household. In June 1994 Thuletu's brother went to buy appliances from an auction. He was led to believe that the owner of such appliances was moving abroad. He bought a four-plate electric stove, a washing machine, a television and a fridge, for a total of R600 in cash. It seemed a bargain, but none of those appliances is now working. The stove that used to consume too much electricity stopped functioning during the course of the research in July 1995. They cannot afford to take them for repairs since they do not have enough money.

This case shows that purchasing second-hand goods can be a costly and unreliable method. However it is important not to lose sight of the context in which this method is used. Some people are able to get second-hand appliances that are in good working condition. Since one needs an understanding of the appliance that he or she buys, it is difficult for most people to separate a good second-hand from a bad one. There is no check-up mechanism to make it possible for them to be selective. In case 4.8 the respondent bought a television set from a knowledgeable person, who is in a position to tell the faulty area in the appliance and what it would cost to repair. Besides, it is easier to take a faulty appliance back to him than it was in Case 4.7.

Case 4.8 The purchase of second hand appliances from a reliable source

Prince (see Case 3.1) got a washing machine from his boss; it was faulty but they had it repaired. Unfortunately it is not being used because it consumes too much electricity. He bought a colour TV from a friend who repairs TVs and sells them if they have not been collected by their owners after some time. This television is still working since they bought it.

4.3.3 *Barriers to and problems related to hire purchase*

Although many people prefer HP to second-hand buying, most of them do not qualify for credit. Through HP one is sure to get a good quality product (though at a high cost compared to cash price), in addition to which, if the appliance is faulty within the guarantee period it can be returned to the shop for repair at no cost. HP is expensive, however, and the majority of people who do not have stable jobs are excluded.

Case 4.9 Access to HP is difficult to get

Nosandla (41) is married to Edward. They live in a three-roomed shack in Site B with their five children. The eldest son is 22 years old while the last-born Sakhiwe is 11 years. Edward is disabled and confined into a wheelchair. Nosandla is unemployed but her spouse gets a disability grant of R410 a month. In addition to that they get state maintenance for the four youngest children, which is R700 a month. Nosandla and her spouse contribute to different savings' clubs, R250 each every month. She uses the rest of the money for household needs. It is the money from the savings club that helped her to buy a TV for her children. She planned to buy a fridge on credit so that she could save on daily buying. She says 'I wanted to buy it on account at a shop in Mitchell's Plain, but you know I think that person looked at the way I look, you see my clothes, and he said I do not qualify. I tried to explain that I do have the money but he wanted a proof which I did not have at the time. So he refused.' Now she intends saving so that she can pay cash.

An issue emerging from this case is misunderstanding of cultural differences. The shopkeeper made conclusions only from looking at Nosandla from the outside. But she qualifies to be a member of a savings club - though the criteria here are less strict because

people know each other, and she does not have to prove an income. Some people are discriminated against because of the unreliability of their source of income. For example, Nosizwe says they wanted to buy a television but were not given credit because her spouse is not formally employed. In this case he is a self-employed photographer, while Nosizwe is a student.

Another problem with HP is that sometimes people who at the time of agreement have reliable incomes can end up in huge debt when they lose their jobs. And according to the purchase agreements, as long as a person has not finished paying for the goods, these remain the property of the owner. As a result most shops gain in this way since they repossess items from people irrespective of how much you have already paid. The latter is always a cause for panic among the poor although they do not have control over their employment status. Case 4.10 illustrates this.

Case 4.10 Living in fear

> Rose aged 53 is a divorcee. She is not formerly employed but a traditional healer. She could not state her income from this activity because she believes her work is not an occupation but a 'calling'. She only gets money from her 'students 'or neophytes. Nonetheless she managed to get access to HP from different shops. In her shack in Site B she has a portable radio, a fridge, two gas cookers and a television. She purchased a TV at a shop in Mitchell's Plain two years ago. Her purchase agreement was to pay R150 for 24 months. But she has not managed to pay it off since her only source of income is her 'students'. She says therefore 'I am worried that they can come and take it anytime since I have not yet finished paying according to the agreement'.

For some people it is easy to get credit even though they do not have a reliable source of income. In such cases one ends up in a situation like the one mentioned above. However the feeling is the same even for those who get credit while having a reliable source of income, but lose their jobs while they are still in debt.

4.3.4 *The role of savings clubs in financing appliances*

Due to the entry barriers on HP most people have decided to use savings clubs to finance the purchase of appliances. Here, people pay a fixed monthly contribution stipulated by members of the club. This money is then kept in the bank to accumulate interest. Only people who have a reliable income are allowed to be members. The above two cases indicate that people use the money from the savings club to finance appliances. In Nolast's case members of the savings club buy each other gifts, often energy appliances. Most people are able to overcome entry barriers to HP by using money from the savings club to purchase appliances. It has been pointed out that the advantage of savings clubs is that people at least get the chance to access brand new appliances.

4.3.5 *Appliances through gifts from employers, friends and children*

Although this is not a reliable form of appliance acquisition it is does play a certain role. For some people it is the only means of getting access to appliances. It is not reliable in the sense that the individual does not have control over it – for instance, the appliances that people get through this method entirely depend on other people's discretion. For most Khayelitsha respondents it has been the first means to get access to electrical appliances. For example Belinda says: 'I got this fridge, a hot-plate and a two-bar electric heater from my boss. When he heard that Khayelitsha is electrified he gave them to me as a present'. Her case study is described below, to show how she balances this method with others like HP to get appliances. It is only a supplementary method, which is helpful considering her financial situation. Even though she gets second-hand appliances they are in good working condition.

Case 4.11 Balancing gifts with HP

> When Belinda's (see Case 3.2) employer heard that Khayelitsha is electrified, he gave her a hot-plate, a two-bar electric heater, and a fridge. He gave her a fridge because he wanted to buy himself a bigger one. 'I have heard him saying he wants to change his electric stove and I know if he does then I will get the old one so I am waiting for it.' Belinda has also got a 37 cm colour TV which she bought on Hp in 1993, as well as an electric kettle, a frying pan and an electric iron.

4.4 Conclusion

Although this chapter has focused on appliance use it has been indicated that this cannot be separated from fuel use, as each influences the other. It has been argued that accessibility of fuels is a major influence on appliance use. People adopt different strategies either to save on fuels or to maximise appliance efficiency. The income of the household is an underlying factor in that people's use of appliances depends on whether they can afford to buy them - or at least afford to buy the fuels they require. Because of poverty, some people prefer not to use appliances which are perceived to consume too much fuel and, as indicated in the discussion on space heating, preference is given to appliances like paraffin heaters that can be used for multiple purposes at the same time, with minimum expenditure.

In focusing on appliance acquisition, it has been seen that second-hand buying is loaded with a variety of problems. Although it is an unreliable and inconvenient method, poor people do not always have a choice. The alternative method which is used by those with low but stable incomes, HP, is not accessible to many and is also more expensive. At the same time the role of savings club as used by some is important in that it provides a means to access new appliances either through gifts or cash buying. One can therefore conclude that these means are only coping strategies developed by the poor in the face of energy poverty and financial constraints.

Locating the use of energy within a social context

5.1 Introduction

Chapters 3 and 4 elucidated the sample's diverse uses of energy. It has been consistently shown that people's use of, or perceptions they have about, fuels and appliances are guided by a complex series of factors, such as accessibility, age, gender and income. Along with these determining factors, people's energy-use patterns are, to some degree, influenced by their social relations. Social relations are defined as various inter-personal and inter-household transactions that exist, and manifest differently according to situations. They include relationships between neighbours, kinship, and patron-client relations (usually between small retailers and households). These are sets of relationships that can be quickly mobilised to assist in meeting the domestic needs of households when and where needed. However, social relations are closely linked to, or inter-related with, people's economic situations, and it would be counter-productive to divorce the two.

The central argument of this chapter is that a holistic representation of people's energy-use patterns should be located within the contextual framework of their social relations as evidenced by the reciprocal networks they form over time. It is important to study such relationships, and the extent to which they have an impact on people's use of energy. As shall be shown, social networks are readily used by some households in energy-related activities, including borrowing, lending and sharing energy sources and appliances, and co-operation in fuel-related tasks such as collecting wood.

The following arguments inform this chapter, and they are supported by case studies drawn from households in the four sampled areas:

- Households' socio-economic predicaments (including un- or under-employment, impoverished living conditions) contribute to the formation of social networks that are used effectively for energy-related purposes.
- The four sampled areas are inhabited by people of low income, and there are minimal differences between types of settlement in terms of disposable income. However, there are marginal income differences between households in one given settlement. These differences determine most individual households' energy use. Poor households were seen to be sharing fuels using socially defined *reciprocal* relationships. However, households with stable and secure incomes tend to be less involved in a social web of reciprocity (cf. van der Vliet 1991).
- People's use of their social relationships cuts across settlement types: whether in an informal settlement in Khayelitsha or a backyard shack in Langa, poor households continue using social avenues as a resource. Households are impoverished, no matter where they are situated.
- Women were found to be the primary users of energy at household level, and are also energy resource managers. Since cooking is a socially defined role, more women than men were actively involved in relationships of sharing. Another important reason was the fact that female-headed households were generally found to be poorer.

It must be underscored that it remains a difficult task to examine one household's use of energy in isolation from other households that, to some degree, contribute to its patterns of energy consumption. This is particularly true when the households in question have a low income. Indeed, common to the four settlement types studied was that most householders had insufficient material resources to enable their households to be self-supporting units. In order to supplement their incomes, household dwellers were involved in an intricate and complex web of relationships with other households. People's use of social networks could be seen as both a coping strategy and a manifestation of poverty. The poorest households – with unstable and insecure incomes – relied more on social networks.

In analysing the arguments outlined above, the chapter is structured as follows:

- It firstly highlights the lack of qualitative studies to date dealing with social aspects of energy use.
- It shows the inadequacies of the conventional understanding of 'household' when applied to the sampled population and for policy analysis.
- It investigates, through the use of case studies, the nature of inter-household relationships and the extent to which these relationships are successfully used to serve energy needs. Two important sub-themes under this are:
  - the credit system between, especially, the spazas and households, which creates a relationship of patronage between those involved; and
  - the use of wider kinship and friendship networks to channel fuel-related activities.
- The last part of the chapter examines why inter-household sharing, specifically fuel sharing, did not occur in some households. Less participation in reciprocal relationships means that these households are breaking out of, and want to remain free of, demands of reciprocity that might undermine the households' chances of securing their material resources for themselves. These households tended to be financially better off, with comparatively stable incomes.

5.2 The dearth of literature on the importance of fuel sharing

There is a vacuum in the literature regarding the link between people's use of energy and their social relationships. Indeed, energy studies at household level seem not to recognise the importance of micro-contexts in circulating fuels between households. Ross' (1993) study of the squatters on a farm in Die Bos is a notable exception. In that study Ross traced the multitude of social relationships that develop around the use of fuels. She attests that such relationships are fluid and dynamic and constantly changing. She shows throughout that fuel-related activities are deeply embedded in inter-household relations and that it is important to locate energy activities within the users' social environment (see especially Ross 1993:91-116).

This chapter goes somewhat further than this - particularly in so far as it compares fuel/energy-sharing across settlement types, to show that fuel-sharing is not something used only by households in rural peripheries, but a practice that is found in most settlements.

5.3 The 'household' as unit and focus of study

The focus of this study has been `households' and ways in which they use fuels. As contemporary literature on households points out, however, it is insufficient to study individual households in isolation from others that may be interconnected with them (Spiegel 1990; Ross 1993; Spiegel et al 1995). The definition, or the understanding of the household, has changed substantially from an earlier conception of a unit which is self-supportive. No less appropriate is a definition that views the household as all people living together under the same roof and 'eating from the same pot' (see for example May et al. (1992: 4). Conceiving of the household in such ways is static and is not comprehensive enough to cover the complex aspects of what constitutes a domestic unit - specifically concerning extra-household relationships. Fuel-sharing, as shall be shown, questions the notion that a household is a self-supporting unit. It has been consistently shown by anthropologists in the southern African context that working people - especially the very poor - cannot rely on a single resource-base to provide for all their domestic needs (see for example, Spiegel 1992; Sharp 1987; Spiegel & Sharp 1988; Berry 1993).

Fuel-sharing between households tends to influence the organisation of households. This means that a household, because of its quest for survival, invariably establishes links with other households. Income or lack thereof, is arguably the single most important factor tying together different households. Boundaries around households become fluid, since they are, to a large extent, determined by the social relations present (cf. Spiegel et al. 1995: 15). Policy-makers should thus be aware that the conventional understanding of the household is limited.

5.4 Credit system: a relationship of patronage

One of the least researched areas in household energy policy is the relationships between spaza shops and households in circulating fuels. Because spazas are easily accessible, most households rely on them for their fuels and appliances purchases. Moreover, spazas are more

popular because they allow people to buy on credit - indeed, most respondents in informal Site B, Joe Slovo and Langa backyard shacks get their fuel from the spazas on credit. Owning a spaza is seen as one of the ways out of poverty, and there are many spazas in all areas competing for limited customers. One of the strategies that these spazas use to have a stable and relatively permanent client base is the granting of credit. Although this system has its advantages for a particular household, however, it obliges the household to continue buying at a particular shop, thus tending to establish and perpetuate a patronage relationship.

Case 5.1 below shows this very well. A householder might not buy at any other spaza - unless, of course, a required item is unavailable - without jeopardising the relationship with the spaza owner. This relationship (between spaza and the household) is crucial to the household: its very survival, in terms of meeting basic needs - that is, cooking and lighting - is largely dependent on this relationship. Most researched households fell in the same income category. Most depend on a highly unstable, inadequate and sometimes non-existent income - hence the need for credit at a spaza. The case example also illustrates a central theme of this chapter, by showing the extent to which social relationships between individuals and households are effectively used to channel energy-related activities. It also highlights that, in poor households, fuel and appliance use is socially defined, and such sharing should be located in people's daily interactions (cf. Ross 1993: 91). There are similar cases in other areas, where the use of relatives to meet fuel needs were widespread. Case 5.1 involves, particularly, two important issues:

- the credit system between, especially, spazas and households, which creates a system of patronage between those involved;
- wider kin and friend networks and relationships, which are used to channel energy/fuel-related activities.

Case 5.1 A myriad of social relationships in a Khayelitsha household

Natalie (69) lives with her 'last born' Nikiwe (32) and a child of the latter who, at the time of research, was five months old. They live in a two-roomed brick house which has a backyard shack made of corrugated iron (used as a bedroom for Nikiwe). The household uses mostly electricity for lighting, entertainment and refrigeration, and gas for cooking.

Natalie came to Cape Town from Lady Frere, Eastern Cape, in 1978, partly because of ill-health and partly because her husband had died. At first she lived in a shack in Old Crossroads with two of her adult children who were there before her. The household moved to the house in Khayelitsha in 1985, where she has been ever since. Her younger daughter came to Cape Town in 1989 to seek work.

In 1990 and 1991 two of her sons moved to their own houses, because 'the house was getting very small for all of us'. One currently lives in up-market Ilitha Park and the other in a two-roomed house in another section of Khayelitsha. At present Natalie is mostly dependent on a monthly pension of R410. She also does informal trading selling 'dolly-licks' (iced drinks), sweets, and home-made cakes to children in schools. Since her daughter is not employed, she assists in preparing these.

Natalie's household seems to be self-supporting, yet it is connected to others in the area. Natalie's pension and the money she gets from selling cannot support all the household's needs. She said: '[T]he money I get from pension is just not enough. . . . [I]t is sufficient only when the month is still new, but in the middle of the month we suffer.'

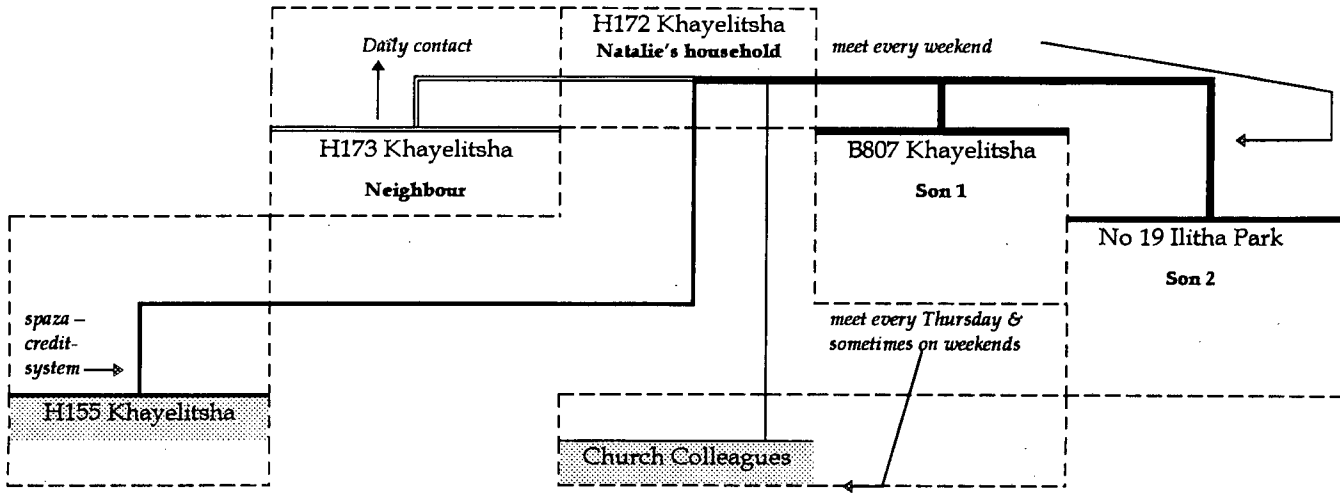


Figure 5.1 Households that are related to Natalie's

There is web of networks that ties Natalie's households with other households and individuals (see Figure 5.1). The degree of contact between people in this network is equally determined by social and physical proximity. This network is effectively used to channel fuel needs. The thick and bold line in the Figure shows affective and intimate bonds that Natalie has with her sons' households. Since both sons have higher incomes, they sometimes send Natalie money. Her teacher son who lives in Ilitha Park is responsible for paying the R130 per month for the refrigerator which Natalie bought on HP. Whenever Natalie is in a big financial need she approaches her sons because:

> They are my children, and I alone educated them to be what they are today. In addition, my sons would not expect me to repay the money I borrow from them. You see this fridge. This was bought by my other son when I said to him that I want it to sell drinks so that I have my money and not bother them all the time.

Indeed, none of the appliances currently in use in the house were bought by Natalie. Most were either left by her sons or, as in the case of the refrigerator, were bought by her sons. Natalie is only responsible for buying fuels for cooking and lighting.

The double lines in Figure 5.1 show Natalie's daily contacts with her neighbour and friend. She said of her:

> We are like relatives because we have been neighbours for 10 years. Others in the street might come and go but we have been here since 1985. We share *everything*. If I do not have soap to wash a bit of my clothes, she will lend me . . . and she does not expect me to return it. When she cooks something nice, like when she cooked *umfino* [wild plants mixed with mealies], she sends me a plate. She uses my fridge whenever she wants to store something. I borrowed her my [electric] iron because she only has these heavy irons. We are like family here; we share.

Down the road there is a big spaza where she buys her groceries. She chooses this shop because 'I am allowed to take items on a tick'. She has an account with the spaza, whereby she would make all her grocery purchases there and then pay at the end of the month. The spaza even sells liquefied petroleum gas (LPG), and Natalie buys or is given a 19 kg cylinder of LPG every month. In this way she never runs out of cooking fuel because whenever the LPG runs out she is sure to get a refill from the shop. When Natalie needs to buy stock from the supermarket for her small trade, she is helped by the owner of the shop who would transport her in his pick-up lorry. This system of patronage obliges Natalie to buy most of her needs from this spaza 'even though there might be cheaper shops nearby'.

Natalie's contacts are not limited to those described above. She also has contact with a group of women from the Anglican Church, of which she is a member. In Figure 5.1, it is shown by a thin line. The relationship she has with these women stretches beyond their shared church involvement. The network is also used to channel other activities, including energy. At the time of the interview, one woman from the group had stored her cakes and

drinks in Natalie's refrigerator in preparation for a child's birthday on that weekend. Natalie said of this relationship:

> [T]here are ten of us [women] in church. Although there are other women, the ten of us are very close, because we are in the same *iseti* [loosely translatable as 'savings club']. We assist each other because we are women who understand the burden that women-folk face. We borrow each other money and even use each other's stoves. The woman who is going to have a birthday of her child is going to bake scones in my oven tomorrow.

There were some instances in other settlements where the system of credit was used to good effect by some households as means of sharing fuels. It is no coincidence that the most shared fuels between households are those used for cooking - notably paraffin. As a result, is worth noting that since cooking is a gender-defined task, more women than men, as cases show, were actively involved in relationships of sharing. There were very few households in the sample where men cooked by themselves. In households where only single males lived, they tended to be independent and relied less on sharing fuels and/or appliances with other households.

Case 5.2 Servicing a selected number of customers

A shack next to Nomonde's is occupied by her sister and her three small children (see Case 3.6). The households are sometimes conceived of as one, because they lend and borrow household items such as cooking appliances and fuels. On most occasions, the two households share even food.

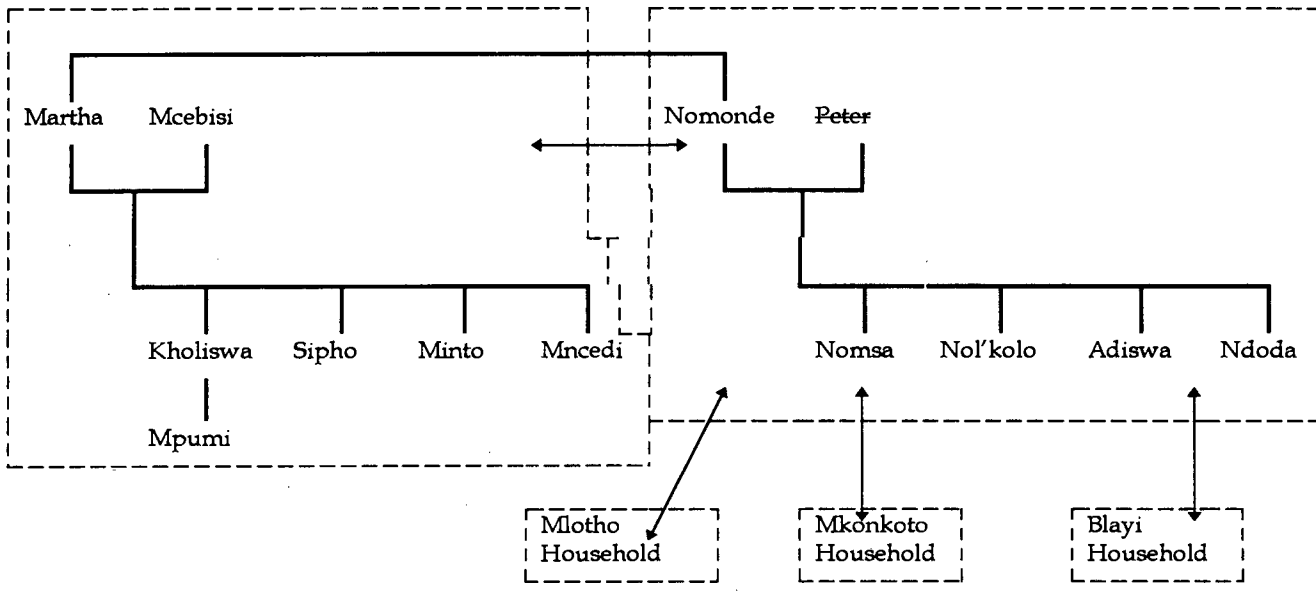


Figure 5.2 Nomonde's close network

To supplement the household income, Nomonde sells paraffin to the neighbours. She buys a 25 litre container costing R27.00 at a big spaza in Langa Hostels. She then sells a 750 ml bottle for R1.00. Although the paraffin business flourishes, Nomonde - as do most of small-time spaza shops - cannot calculate the exact profit because she does not keep written records,[1] uses some of the paraffin for domestic consumption, and gives credit to people she knows (see Figure 5.2). Her established customers consist of a selected few households, the reason being that there are many spazas and private homes, like hers, that sell paraffin.

1 A drum containing 25 litres of paraffin costs R27 from the spaza. It is then sold at a R1 a bottle. When sold in 750 ml, she would get R33 - a profit of R6.30.

Apart from paraffin the household also sells fruit and vegetables on a very small scale. The stock is bought at an Epping market for R50 or R60. As with the paraffin business, the profits cannot be determined.

Case 5.2 has shown that it is not only spazas that are involved in a system of patronage - private homes or households also take advantage of it. Again, this case study highlights the centrality of fuels in this social relationship. Nomonde sells paraffin - by far the most widely used fuel in Joe Slovo - to augment her household income.[2] However, the low economic status of most of her immediate neighbours prevents them from paying cash for paraffin in most purchases. Nomonde gives credit only to households she knows well. The nature of the settlement in Joe Slovo is such that people coming from the same place (either previous home or place of origin), tend to stay together. In this way, close residential patterns offer Nomonde a wide choice of households with which to interact. Some individuals and households staying closest to Nomonde's household form part of the network of sharing, and these also benefit by getting paraffin at Nomonde's on credit. The exchange of paraffin in this context provides a meaningful social interaction between Nomonde and others, one which is perceived as beneficial to all the households involved.

In some cases long distance between households and spaza does not constrain the establishment of a credit system. The case of Maxwell, a 'sangoma' (traditional healer), in Khayelitsha shows that, irrespective of physical distance, a relationship between spaza and customers is formed using other criteria.

Case 5.3 A brokered relationship

Maxwell (66) lives in a two-roomed Khayelitsha core house with his wife Noforms (55) and their six children and one grandchild, whose ages range from 26 to 10. Three of the couple's children are married and have their own households. One daughter, Nonkosi (who plays a central role in this case) is married and lives in a Site B shack about two kilometres away. No adult members of this household have full-time employment. Maxwell is a pensioner who receives R410 per month. He is also a *sangoma*, but he does not see this as an income-generating occupation - rather, he said, it is a calling. Hence he did not disclose how much money he makes out of it. Apart from his pension and an undisclosed amount from healing, the household has no other source of income. Most of the household's domestic economy thus centres on this erratic income.

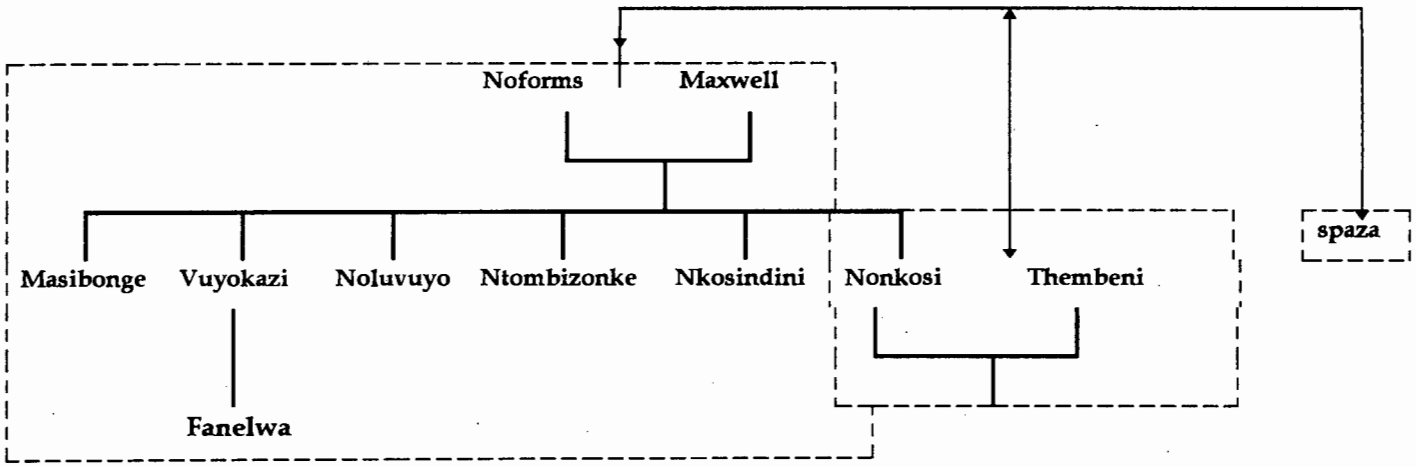


Figure 5.3 Maxwell's relations with spaza

[2] She is a divorcee (although this was never formalised) and she has a task of seeing to the welfare of four children. In addition, she has to look after the household of her widowed sister, Martha. At the time of research the latter had gone back to Tsolo to take care of personal business. Martha left behind her children and grandchild with no income. In her absence, the households have become collated.

It is against this background that Maxwell - through his wife - formed a relationship with the spaza owner. The relationship between Maxwell's household and the spaza in Site B was brokered by one of their daughters, Nonkosi. The latter is married to Thembeni who is a classificatory brother of the wife of the spaza owner[3] (Figure 5.3). Since Nonkosi's household takes goods on credit at the spaza, it was possible for her to arrange that her father's household be given credit. Included in the goods that Maxwell's household purchases are fuels and appliances for cooking.

Although Maxwell's household has been in Khayelitsha since 1985 (and electricity was installed in the late 1980s), the household still uses paraffin as the only cooking fuel. Since the household largely relies on Maxwell's pension, which comes at the beginning of each month, the household clearly could not afford to buy paraffin and other domestic items all the time. Noforms explained that

> We take almost everything in that shop, but we take paraffin the most. We have to cook every day and we have to heat the house with paraffin. At the end of the month we find that our debt in the shop is mostly made of paraffin. The second thing we take there is food.

The above case, although reiterating what was raised in cases 5.1 and 5.4, takes the argument further. It shows that the credit system that people have with spaza owners can be formed by households in different settlements. There were many spazas in the area of Khayelitsha where Maxwell's household is situated, yet the household chose to travel to and from Site B whenever there is a need to buy household goods. This example also shows that other criteria are used to form a relationship which can be later used for fuel-related activities. The spaza owner gives Maxwell's household credit because this household was referred to him by a relative. This points to another important component of relationships which are used to distribute fuels and appliance between and across households: the role that wider kin networks play.

5.5 Kin networks and fuel distribution

The international literature (see for instance Stack (1974) and Lomnitz (1977)) and South African literature (Ross 1993) has acknowledged that among the poor sectors of communities, 'family ties' serve a variety of needs. This has been noticed in all four settlement areas, where existing family ties are used to distribute and redistribute fuels. The general trend has been that the poorer the households were, the more they relied on relatives for their fuel needs.

Case 5.1 above has shown one common and underlying theme: that family support is mobilised to serve fuel needs. In that case, Natalie relied on her two sons to pay for the refrigerator and other appliances in her house. On one hand, because of his insecure and unstable income source, Mncedi of Joe Slovo (Case 5.4, below) continued to eat at, and borrow cooking fuels and appliances from, his parents' place (which is more than a kilometre away).

Case 5.4 Independent and yet dependent

Mncedi (27) came to Joe Slovo 'squatter' settlement in November 1994. Unlike most people in Joe Slovo, Mncedi moved from his home because he wanted to be independent of his parents. However he was far from being independent since he still depended on his home for cooked food and for fuels or money to buy fuels. His shack is divided into two separate rooms; he uses one, and the other belongs to his younger brother, who does not sleep there, but uses it as a shebeen. Mncedi lives alone in the shack, although his girlfriend sometimes spends a day or two there. At the time of research he was not in a full-time job, and depended on 'piece jobs' that he intermittently gets in Epping. This occupation is not at all secure. He referred to it thus:

> We are at the mercy of the unscrupulous employers who use our labour and pay very little for it. I was employed for three days to pack fruit and vegetables. After the contract time had elapsed, I was paid only R30 for 28 hours' work.

[3] A classificatory means a putative relative or relatives who are related to each other indirectly.

This represents a small example of the years he has suffered at the hands of this kind of employer. He cannot complain because, as he said, there is a long queue of people waiting to toil for that small amount of money.

To make ends meet, Mncedi has kept his ties with his family which lives in the core houses of Langa - situated about a kilometre from his shack in Joe Slovo. Since he lives alone, he does not cook very much. For instance, in one week he had cooked only once because work was hard to come by in Epping. A week went by without him finding a 'piece job'. On those days that he does not cook, he goes to his home in Langa for food. Moreover, the cooking appliances that he owns were given to him by his family.

Case 5.5 below crystallises the extent to which kin relations are called upon to fulfil energy-related needs. As in the case of residents of a farm settlement in Die Bos (Ross 1993), wood collection is a group effort. Beer-brewing is generally seen as lucrative, but the task involved is more than one individual can perform. In this case, Lumka's *molokazana*[4] was readily pulled in to help both in collecting wood and in brewing. The familiar principle applied as it does, to different degrees, to other poor households: kin networks were thought to be more effective than any other form of social relationships between people for the exchange of fuels and energy-related tasks. They were perceived to be more important than, for instance, relationships that are based on friendship and neighbourliness. There were cases though where neighbourliness - and, to a lesser extent, friendship - were called upon to serve as avenues to exchange fuels and appliances (see Case 5.1). However, in terms of frequency, the latter relationships were not as extensive as those between relatives. Perhaps, this can be attributed to two important reasons: the impermanence or insecurity of tenure for instance, some households in the backyard area of Langa and Joe Slovo, and the better economic status of other households (see below).

The following case study, taken from Site B shows the manner in which family support is mobilised for fuel needs.

Case 5.5 Co-operation in the collection of wood

Lumka (aged 52 years) lives with her six children (their ages range from 22 to 6). She is a widow, her husband having died in 1990. She had been a regular domestic worker from 1986 - the year she arrived in Cape Town - until August 1995. Things got bad for her when she lost her job. It is only her eldest daughter (22 years) who, at the time of research, was bringing in income from formal employment. The latter was 'doing chars' in a suburban homes in Bellville, and was paid R30 on each visit. To supplement Fezeka's minimal income, Lumka - like some other households in the area - started a business of selling home-made beer.

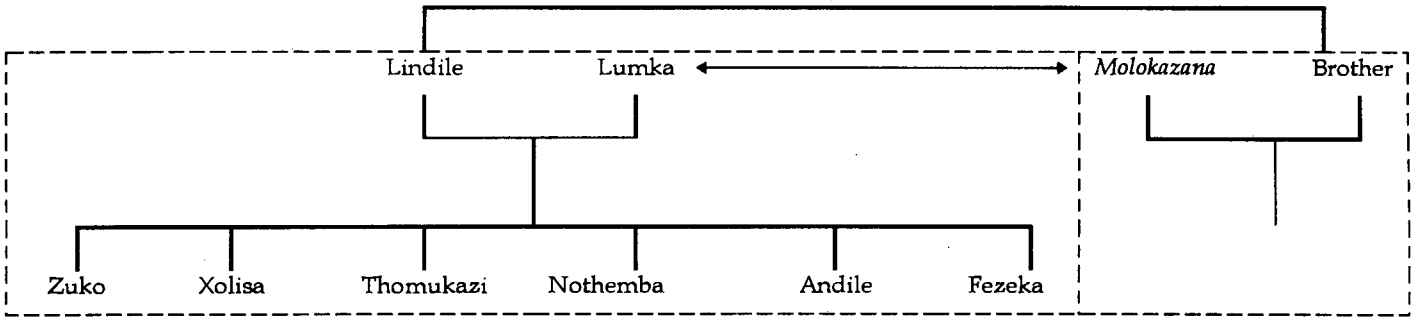


Figure 5.4 Co-operating households

Since collecting and making beer is an enormous task, Lumka is assisted by her *molokazana*. The latter does not stay in Lumka's household though. Her shack is about 100 metres distant. The 'bride' is obliged by the traditional or customary law to assist her mother-in-law in performing domestic duties. One of these traditional duties includes the collection of wood. The latter is still viewed as a traditional task that women have to perform. Together, they go to collect Port Jackson Willow wood from a forest about 5

[4] This means bride - the wife of her late husband's brother who lives in the settlement

kilometres away. They spend three hours travelling and collecting wood, from 6 a.m. to 9 a.m. They go early because they want to be among the first people to collect wood. They also want to go there when there are few cars on the freeway.

The two women again cooperate in the brewing of the beer - which takes about 12 hours. Because the *molokazana* is not working, she is able to get a fair amount of money from the sale of beer.

5.6 The independent households

It was noted earlier in the chapter that some households relied less on sharing of fuels and fuel related tasks than others. One of the often quoted reasons that these households do not share with others is that 'we do not want to share with other people because we do not know them sufficiently to borrow from, or lend to them'. There is more to it than the quest to be independent. To put this into perspective, some households in the sample came from settlements where the tenure is not stable as in the case of Joe Slovo and the backyard shacks in Langa. As a result, people are not in the same location or place of residence long enough to develop a sense of community. Although these households might interact with their neighbours on a day-to-day basis, that interaction may not be used to channel fuel activities between households. These households may only interact with their relatives in other settlements. Mncedi (Case 5.4) would rather borrow fuels and appliance from his family in Langa rather than from his neighbours in Joe Slovo:

> My brother, I cannot borrow from them [neighbours] because I do not know them enough that I can have a will to go to them and say, 'can you lend a bottle of paraffin, or a piece of candle'. I would rather go to my parents' house in Zone 13 at any time of the day because I know they are my parents. If the paraffin that I need is not there . . . then it is too bad, I will do without it.

Some households who are better off than others tended not to share their fuels and appliances. This is especially true of households who use 'modern' electric appliances. One prime example is the Cupido household in Khayelitsha. The couple have secure and stable incomes; combined they total more than R1 900 per month (which is the highest in the Khayelitsha sample). The household owns a variety of modern household appliances from a gas stove to a colour television. This is one of the few houses that does not use paraffin for any energy need. They use either gas or electric appliances. Mrs Cupido explained how, because of their secure living conditions, she was not sharing fuels or appliances with her neighbours:

> My husband and I are both working until late in the afternoon. Only our [four] children that are at home during the day. And they know that they cannot borrow [lend] a neighbour our appliances. Even when I am in one of my off-days, no one comes here to borrow anything because I do not borrow anything from anyone. If I need something . . . as I have just bought an electric kettle . . . I buy it. My husband does not like us to borrow from other people. You know the people of Khayelitsha like to gossip about people who borrow. It is better not have something than to borrow it. I cannot even borrow [lend] them my things because if they become damaged who is going to repair them...? It is me.'

Although she did not share with neighbours, she admitted sharing with their relatives who live in other parts of Khayelitsha and in other settlements. However, the crux of the matter is that in some cases the more a household has secure income, the more its household boundaries are rigidly drawn. The less the security (in terms of income and tenure) is, the more likely a household is to be dependent on other households. Therefore, fuel (and appliance) sharing is not a natural phenomenon, but should be seen as a manifestation of poverty.

5.7 Cooking fuels as social products: Conclusion

This chapter has shown that fuel sharing is still common in some households and less common in others. The case studies that are used here give weight to Ross' (1993: 117) arguments that sharing of fuels between households does 'not exist independent of the people initiating them', and that in these contexts 'fuel choices are irrevocably tied to systems of social relationships and interpersonal obligations'. Different social relationships, including the credit system between household and dealers and the wider kin network, are effectively used

to channel fuel related activities. It has been mentioned that women specifically are more involved in keeping these relationships alive. This is tied to the stereotypical view that 'cooking is a woman's domain'.

To avoid a romantic vision of sharing, it is important to look also at the other side of the coin: this chapter has shown that not all households were tied to each other through sharing of fuels. Sharing in this context is not defined by a romantic notion of *ubuntu* (humanity), rather it has to do more with poverty. Sharing and credit systems are conscious and calculated decisions by poor people in their quest for survival.

CHAPTER SIX

Dwelling construction, thermal performance and fuel consumption

6.1 Introduction

The central concern of this chapter is to demonstrate that, because the dwellings in all four settlements are constructed of different materials, this has an impact on their respective thermal performances and, therefore, on the households' energy consumption. Efficient thermal performance is achieved through an investment in energy-efficient building materials. This is believed to reduce the cost of energy for space-heating in many households (see Eberhard & van Horen 1995, especially 174-180). Households with very poorly constructed dwellings were seen to spend much on fuels. Although it was difficult for householders to quantify the amount of fuel they used for heating, it was observed that a sizeable amount of fuel was used. This takes into consideration that the bulk of the research was done in winter. At this time most people were using paraffin for heating, and it was possible to record, in one month, the actual expenditure on this type of fuel.

All the sampled settlements are located on the Cape Flats. This means that all experience the coldest weather and very windy conditions for most of the year. The bad weather often damages the buildings. This is especially true in the informal settlements which tend to be waterlogged in winter.

There are even large differences as to the heating requirements between formal and informal households, and between households within a defined settlement. The temperature readings in Joe Slovo show that, even within one particular settlement, differences in thermal performance were marked. To a large extent, thermal performance was influenced by a combination of two factors:

- The poverty of the households, seen in terms of their income, constrained people from buying, or investing in, thermally efficient materials to build their dwellings.
- The physical location of the settlements (that they are all located in the Cape Flats), and types of settlement determine the type of materials used to construct the dwellings and hence their thermal efficiency. The actual construction of each area and the physical location of the dwellings are critical in the analysis of the thermal performance of each.

The latter point needs elaboration. There are various issues linked to thermal performance which are symptomatic of a particular type of settlement. These issues are as follows:

- The standard two-roomed Khayelitsha core houses are constructed with very cheap building materials. Since they are not insulated properly, people have to invest large sums of money in insulating them. When the houses were delivered, they were without ceilings, and the floors were of cement. Considering that the occupants are mostly poor, few householders have attempted to install thermally efficient features such as ceilings.
- The Site B site-and-service settlement, like the Khayelitsha core houses, is situated in an area which is notorious for heavy winds for most parts of the year. In addition, the settlement, although serviced, is still built with corrugated metal sheets and timber. As in Khayelitsha, the householders in Site B have not invested in bricks and other proper building materials. This is directly related to the precarious economic status of the inhabitants.
- The insecurity of tenure in Langa backyards is arguably the most important constraint having a direct influence on the thermal efficiency of the dwellings. Apart from the impoverished conditions of most shack dwellers, that they are at the mercy of their landlords severely restricts on the type of building materials they use to construct their dwellings. The most frequently given reason for people who live in these dwellings not investing in good building material was, as one informant put it:

  > Even if I can afford to [buy proper building materials], I cannot do it. The reason is that we can be thrown out at any time by owner of the site. I want to put cement on

the floor because to stop water from entering this house, but I cannot because cement is an investment.... It is very expensive. What happens to it when I move out?

- This chapter demonstrates that the most often used building material in the backyards is timber. It is thought to be cheaper and is easily dismantled when the need arises.
- There is a combination of all the above issues in Joe Slovo 'squatter' settlement. Squalid living conditions, poverty, and insecurity of tenure prohibited people from constructing thermally efficient structures. The area is not officially designated for residential purposes. As a result, no services are provided, specifically electricity, roads and water. Therefore, when the settlement is waterlogged, for instance, there is no help from the local authority.

This chapter demonstrates that people in poorly insulated dwellings tended to spend more on fuel than those that were well insulated; and that poor insulation of dwellings was not a conscious decision by household owners, but hinged on, or was constrained by, their poverty and their bad living conditions.

The above settlement-specific issues highlight the need not to divorce household energy needs from other related socio-economic issues such as housing and health. There is a need for integrated planning or an approach that will take into account the interrelationship between the structure of people's dwellings and their energy needs. What this means in practice is that for energy policy to achieve maximum social equity, it should be integrated with other policies such as housing, labour and health.

In order to contextualise the research findings, this chapter first gives a descriptive and comparative analysis of the dwellings in the four sampled areas. Secondly, it analyses temperature readings taken in one week in three households in Joe Slovo. Besides statistical analysis, it picks up underlying and cross-cutting themes relating to thermal performance and fuel usage, in order to show that the construction of the dwellings correlates to the thermal performance and the amount if fuel used by households.

6.2 Dwelling construction: a comparative analysis

6.2.1 The building materials

Most dwellings in the informal settlements were built of either corrugated iron sheets (23) or wood planks (15) (see Figure 6.1). In the formal settlement in Khayelitsha, all were built of bricks (or, as residents refer to them, 'blocks'). However, most dwellings in other settlements were built of a combination of corrugated iron sheets ('zinc'), mostly in varying states of corrosion, and wood. In Site B, Joe Slovo informal settlement, and in Langa backyards, most shacks in the sample were in a bad state of repair. Some had holes in them, and were sources of concern in wet and windy weather. In wet winter conditions (in Joe Slovo in particular), rain comes through these openings and causes damage to goods within, as well as making the dwellings very cold and damp. In Joe Slovo, many dwellings had to be re-erected – using the same building materials – because they were waterlogged. When it is hot, however, the 'zinc' is said to get too hot.

A sizeable number of dwellings (13) used only plywood sheets or wood planks for walls; this was the case mostly in Langa backyard shacks (5) and Joe Slovo (7). In the backyard shacks, the use of timber for construction is related to the temporary and insecure nature of their tenure. Timber shacks (called 'bungalows') have an important advantage; thus they can be easily dismantled when the occupants move to another area or site. Occupants of backyard shacks know that they can be evicted with little notice – or none at all; owning a 'bungalow' makes it easy to move off the site quickly and easily. Owing to poverty, some people in Joe Slovo have made use of the scrap-wood that is dropped off in Langa. In Site B, most shacks were made solely of corrugated iron sheets. In part this could demonstrate that the residents of this informal settlement have a greater sense of permanence than those living in either Joe Slovo or Langa.

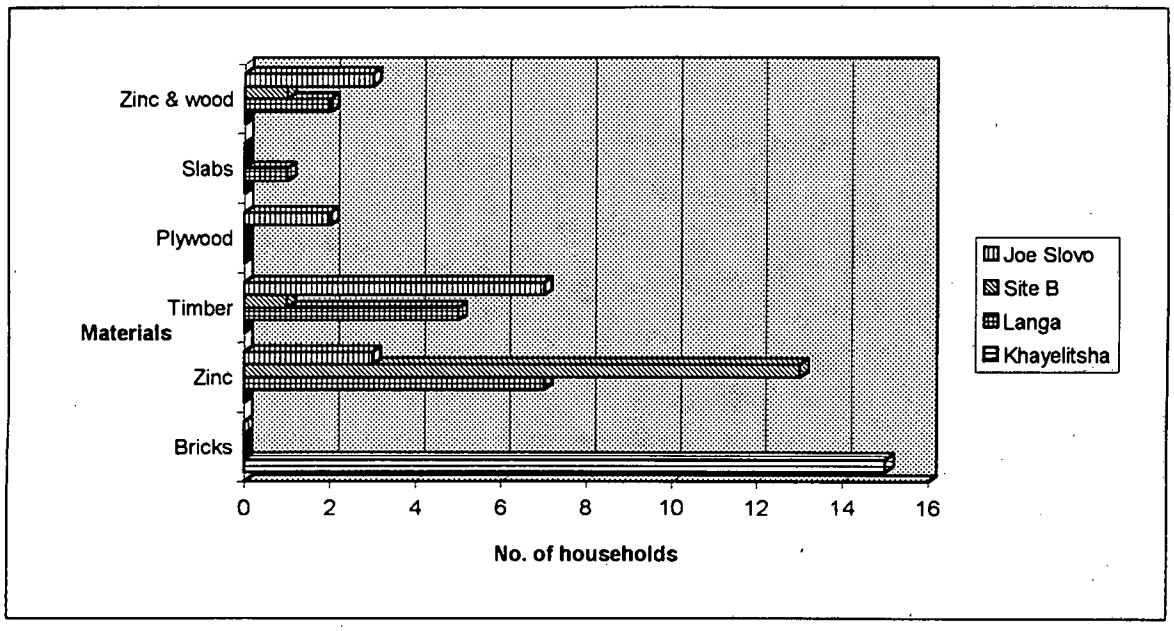


Figure 6.1: Materials used for dwelling walls

6.2.2 *Roofing materials*

The dwellings' roofs in all settlements (except for the formal area of Khayelitsha, where they are generally of corrugated asbestos) were made of corrugated iron sheets (Figure 6.2).

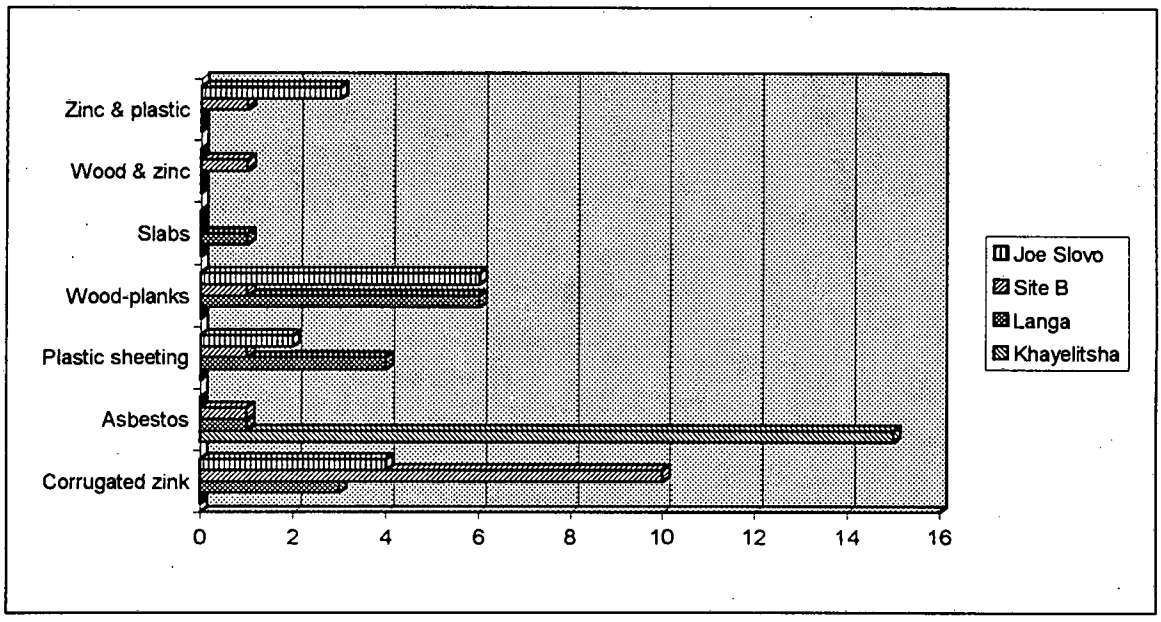


Figure 6.2 Materials used for roofing

The state of these corrugated iron sheets left much to be desired. In the three settlements in which 'zincs' were used, they were mostly old and badly rusted. It was evident that in some dwellings, especially in Site B, fire-damaged 'zinc' were used; this required covering the 'zinc' with either canvas or plastic sheeting.

In Joe Slovo settlement, by far the poorest of the settlements sampled, corrugated iron was used rather sparingly. Where used, it was in combination with other materials to cover the sheets - mostly wood planks and plastic. This goes some way to explaining the sorrowful predicament of the inhabitants of Joe Slovo in wet winter months. The walls and roofs of their shacks are in bad condition. Coupled with this is the type of soil on which the shacks are built:

unlike the sandy Site B and Khayelitsha soil, the soil in Joe Slovo tends to retain water for a long time (see section 6.2.3 on flooring).

Because the Khayelitsha houses were built by the council, their roofs are made of corrugated asbestos. There were houses, however, (but not in the sample) where the asbestos had been replaced with corrugated iron.

6.2.3 *Flooring materials*

The flooring of the dwellings in the four settlements was congruent with the type of structures of the buildings. Figure 6.3 gives details of the types of flooring found.

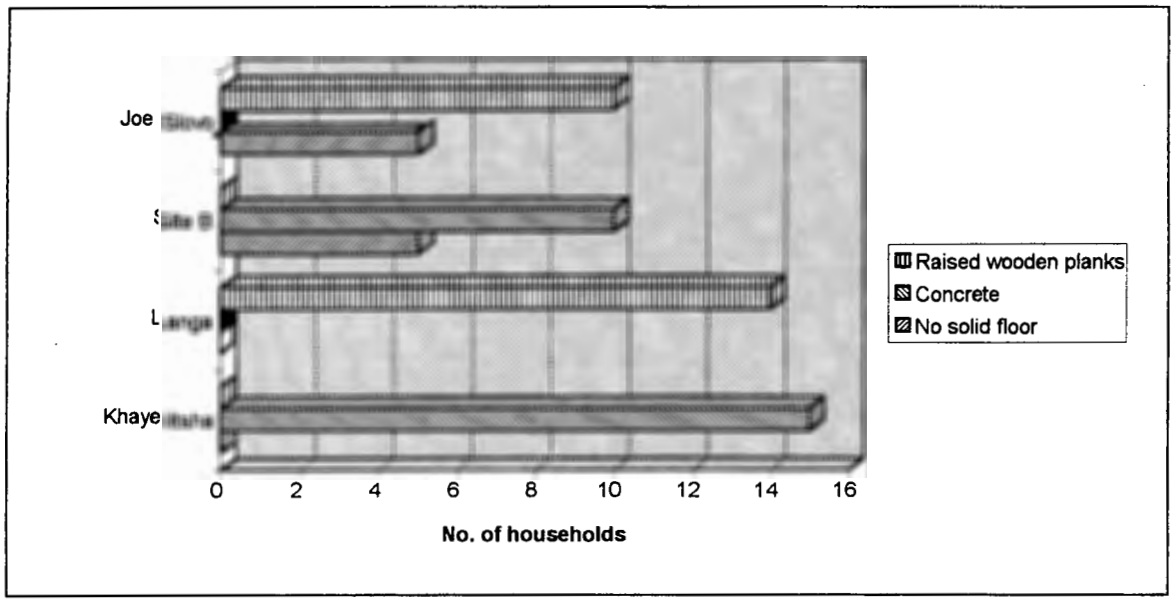


Figure 6.3: Types of floors

All the Khayelitsha core houses are floored with concrete. This also applied in Site B shack area where a majority of the houses (10) in the sample were cemented. Some householders had pieces of rugs on the floor to keep their dwellings warm since cement is cold especially in winter. Only five shacks had no solid floor in the Site B.

There were no dwellings in either Langa backyard and Joe Slovo shacks, however, that were concreted. The majority of dwellings' floors in the combined sample of Langa and Joe Slovo – 24 against 30 – were made of elevated wood planks. There are basically three reasons that the planks were raised off the ground:

- They protect against wet weather. It was noted earlier that the soil in Joe Slovo settlement and Langa retains water for a long time, so people had made the floors in such a way that water would not come up through it. This highlights people's awareness of building according to the environment in which they live.
- Wood floors are perceived to generate, or retain, heat better than other types of flooring. This is illustrated by Gilibatha who stays in a backyard shack in Langa. He said:

  > Cement floors are very cold in winter, and cool in summer. Wood floors are warm if you compare them to cement. I do not need a carpet on the floor and my children are sleeping on the floor and they do not get ill. Imagine if they were sleeping on a cement floor.

- Cement is seen as an investment since it involves large sums of money. As a result of their insecure and unstable tenure, the residents of Joe Slovo and occupants of Langa backyards could not cement their shack floors. In the latter case, this is built on a fear that they might be evicted at anytime, and hence cementing their shacks is seen as 'a waste of money'. In the case of Joe Slovo, apart from the lack of finance capital – since cementing requires a large capital outlay – people here are still waiting for proper housing facilities. Earlier in

1995 they were promised site-and-service-land in Phillipi, but this latter was aborted after it sparked political controversies.

Of the sample of 60 households, only ten dwellings had floors which were not solid. Even in these cases, the flattened soil was covered with materials such as carpets and plastic sheeting; one household in Joe Slovo used pieces of bricks collected in the dumping ground nearby.

6.2.4 Insulation

There appear to be parallels between the dwellings' insulation, location of the dwelling and the income of the occupants. Figure 6.4 shows materials used for insulating ceiling and walls in the four sampled settlements.

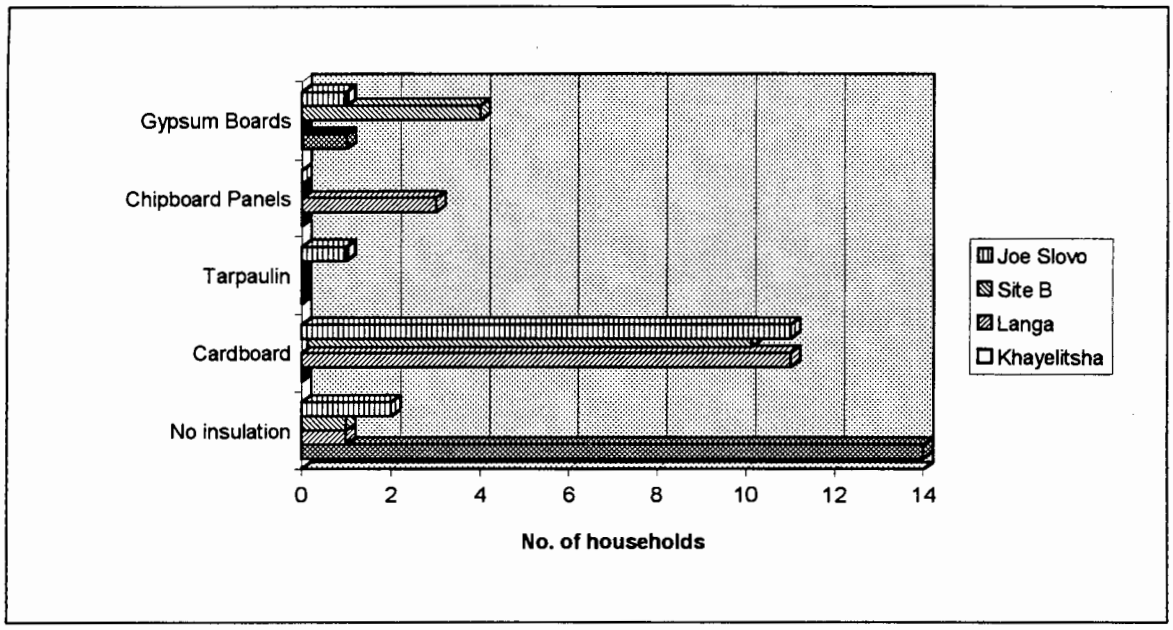


Figure 6.4 Insulation of dwellings

Partly because of the cool Cape Town winter, most people in the sample have seen fit to insulate their houses. (Insulation is usually motivated by a wish to make dwellings look beautiful than a conscious strategy against excessive cold climate and summer heat). The types of insulation differed according to what householders could afford and what materials were available. Cardboard boxes were the most widely used, especially in informal settlements. Indeed, 32 households - more than half of the sample - used this type of insulation. What makes cardboard popular is that it is cheap and readily available. Some householders (in Joe Slovo and Site B) collected their cardboard boxes in the dumping grounds.

Few dwellings (only ten) were without any form of insulation. A majority of the dwellings that were not insulated were found in the formal area of Khayelitsha. Here, the houses did not have ceilings, and some were not even fitted with carpets. Some of the households without insulation had no apparent stable source of income.

6.3 Construction materials and house temperature

The means of dwelling construction in the sampled areas impacted on how the dwellings performed thermally. It was impossible at this stage of research to actually measure and compare thermal performance of the four areas. Such temperature reading would, undoubtedly, provide substantial 'hard' evidence to support observation that a relationship exists between dwellings' construction and thermal performance[1].

[1] In the next phases, temperatures will be measured in all settlements' households.

6.3.1 *Measuring house temperature in Joe Slovo*

The temperatures that were recorded in Joe Slovo during the week of 6-12 September show relationships between the extent of insulation and thermal performance of those dwellings (see Figure 6.5). Three shacks that differed in terms of construction, insulation, position and size were selected. In each shack, two thermometers were placed, one outside and another inside. The thermometers were placed on the south side of the shacks, always in the shade. Informants played an active role in recording temperatures throughout the week. Close monitoring of the recordings was done, however, to ensure that accurate temperatures were recorded, and to see that the process was actually taking place. Each household was given a sheet of paper for the records. The temperatures were recorded at 4 p.m. daily. The week in which temperatures were recorded followed weeks of heavy rainfall in the Cape Peninsula region, and the aftermath of downpours was still visible in some shacks in Joe Slovo (including one of the three selected for temperature recording). However, by Peninsula standards, the weather at the time of recordings, was warm. Throughout the week, the outside temperatures in Joe Slovo were between 8^0 and 10^0 Celsius (minimum) and between 23^0 and 25^0 Celsius (maximum).

The shacks selected had the characteristics listed below.

Shack 1: Ngwatyu

The size of this shack is 6 metres^2, and it is the smallest of the three. The walls are made of timber and the roof is covered with corrugated iron sheets which, compared with other shacks in the neighbourhood, were in good condition. A thick canvas was put over the corrugated iron for extra protection.

The shack is partially insulated. At the time of temperature reading, it was without a ceiling. The floor underneath the linoleum is bare, with neither cement nor timber. However, there had been attempts to insulate the walls with cardboard and wall-paper was used to cover them. There were no windows, although there was ample ventilation because during the day the door is always kept open.

The shack was densely filled with the furniture and appliances. Because of the lack of space inside the house, cooking was mostly done on the floor. As a result, the steam from the simmering pots and the warmth from the appliances added to the heat of the shack. For heating the dwelling, a primus stove is used since they cannot use a brazier because of the small size of the shack. This shack is occupied by six people.

Shack 2: Didi

This is one of the well-built shacks in the area. It is a big two-roomed L-shaped shack of about 15 metres^2. The outside walls are made of solid and painted metal sheets. The floor is made of timber which is elevated to about 30 cm off the ground. There are two windows. The roof is of corrugated iron and thick canvas. The inside of the shack is insulated: painted cardboard pieces cover the insides of both walls and roof. The elevated wood floor is covered with linoleum and pieces of carpet.

This household consists of four members. During week days, the dwelling is used as a crèche. A primus stove is used for space heating. However, on very cold days, wood brazier is also used.

Shack 3: Mlota

This is the poorest of the three shacks. There is not much difference between the inner and outer wall surfaces, nor is there a difference in terms of materials between its roof and walls. Comparatively, the shack is big (about 12 metres^2). It is made of an assortment of timber, plastic and corrugated iron pieces that had seen better times. The walls have holes, and little attempt has been made to seal them. The floor of the house was bare soil; indeed, at the time of temperature readings, it was recovering from the rains of the past weeks and was still damp.

This household consists of three children and one adult female (the owner of the dwelling). At the time of research, partly because the owner was in former Transkei, and partly because the shack was said to be very cold, the three children spent some of the nights on their neighbour's shack who is also a relative.

	Wed 6		Thurs. 7		Fri. 8		Sat 9		Sun 10		Mon. 11		Tues. 12	
Households	Min	Max.	Min	Max	Min	Max	Min	Max.	Min	Max.	Min	Max.	Min	Max.
Ngwatyu	10	28	11	24	9	28	10	29	11	29	10	27	10	29
Didi	8	27	15	24	8	27	9	28	10	29	8	27	10	28
Mlota	4	23	7	23	6	22	5	23	6	22	5	22	6	23

Table 6.1 Inside temperatures (6-12 September 1995)

	Wed 6		Thurs. 7		Fri. 8		Sat 9		Sun 10		Mon. 11		Tues. 12	
Households	Min	Max.	Min	Max.	Min	Max.	Min	Max.	Min	Max.	Min	Max.	Min	Max.
Ngwatyu	8	23	9	18	8	22	9	24	8	18	10	22	9	25
Didi	9	22	9	19	7	21	8	24	9	18	10	23	9	25
Mlota	9	23	8	19	8	22	9	23	9	19	9	23	8	25

Table 6.2 Outside temperatures (6-12 September 1995)

6.3.2 Discussion

In all the selected shacks, there was little difference in temperature on the outside. The recorded temperatures were more or less the same as the general temperatures recorded in the Cape Peninsula. Maximum temperatures ranged from 18^0 to 24^0 Celsius, while the minimum ranged between 8^0 and 9^0 Celsius. However, there were marked differences as far as the shacks' inside temperatures were concerned, as Figures 6.5, 6.6 and 6.7 show. These differences stem mostly from the different construction attributes of the shacks.

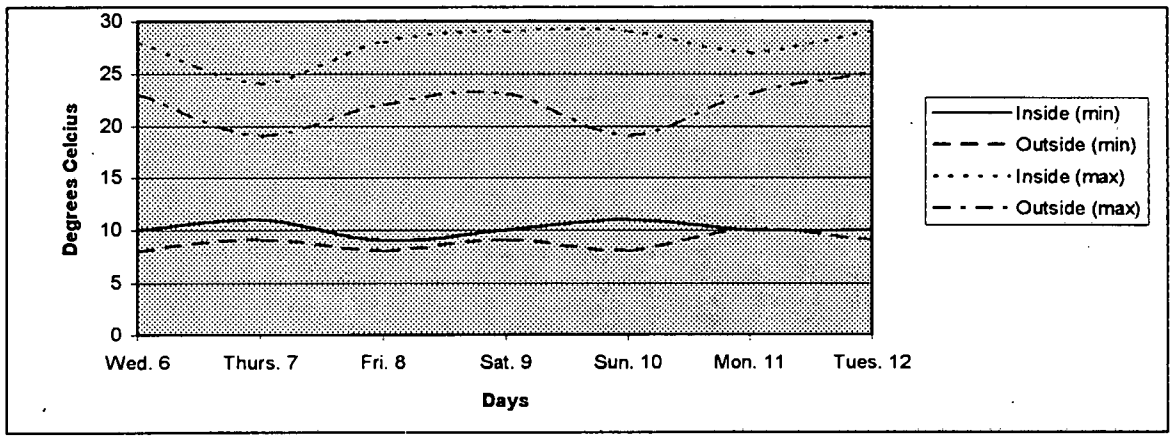


Figure 6.6 Ngwatyu's September temperature reading

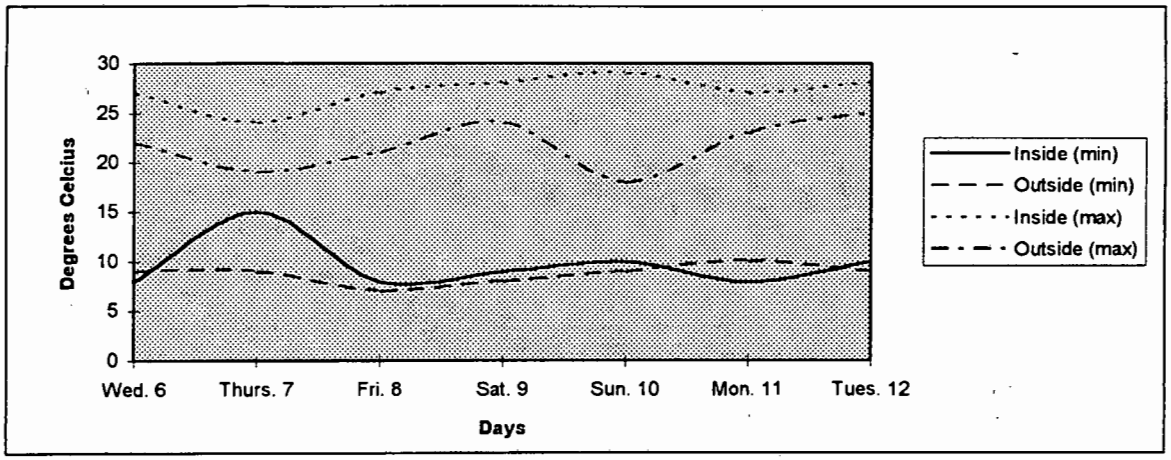


Figure 6.7 Didi's September temperatures

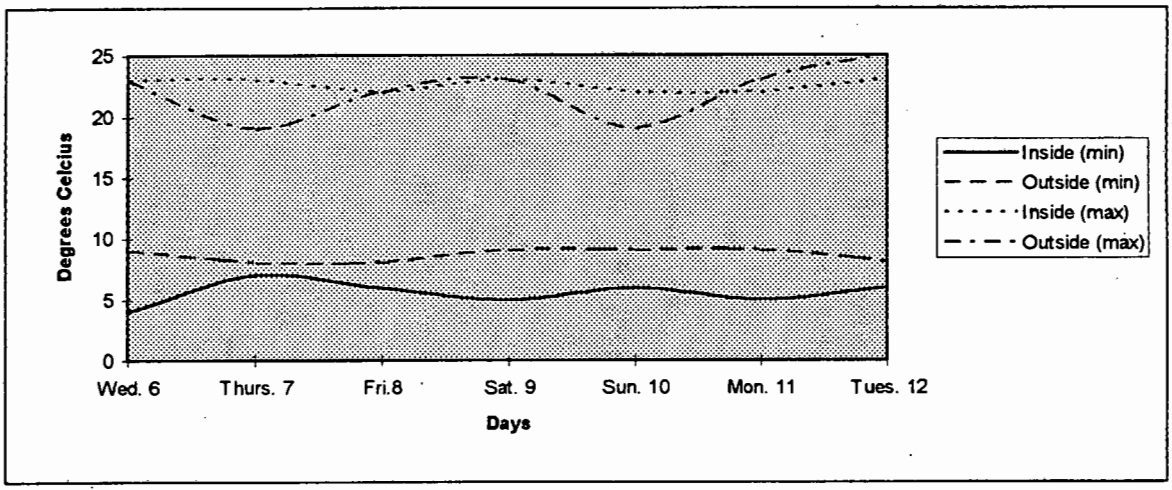


Figure 6.8 Mlota's temperature readings

The findings from temperature records in Joe Slovo can be summarised as follows:

Constant minimum inside temperatures
While the maximum temperatures fluctuated, the minimum temperatures in all the household tended to remain constant. The exception being in Didi household where the minimum temperature on Thursday 7 September was 15^0 Celsius (see Table 6.1). On that day the temperature was high because they had been heating the house with a brazier.

Size of the shack and thermal performance
The size of the shack clearly influenced its thermal performance. The smaller the shack, the warmer it becomes. Although shack 2 was the best of the three in terms of structure, shack 1 was the warmest. On the other hand shack 1 was the smallest of them all, and there were as many as seven people who occupied this shack - meaning that heat was maintained for a longer time.

Cooking and thermal performance
Cooking inside the house also influenced the thermal state of the shacks. This particularly applied in shack 1. Because of the lack of space, cooking was done in the centre of the floor. The meal that was repeatedly cooked here was samp which would take up to three hours to prepare. Therefore the steam from the pots, and the heat generated by the cooking appliances contributed to the relatively high temperature of the house. In contrast, the temperatures in shack 3 - by far the poorest in the settlement - were the lowest. Owing to its bad state of repair, there was not much cooking done in this shack: most of it was done at a neighbour's shack (see Chapter 5).

Building materials and thermal performance

One important observation was that in shack 3 the inside minimum and maximum temperatures tended to be lower than the outside's. This was partly caused by the heavy rainfalls of the weeks before. The shack was not insulated in any form; and the walls and roof had huge opening, and at the time of recording, the inside floor was still wet. This prompted the occupants to vacate the shack and lodge temporarily in the neighbour's shack. Even during the day the inside maximum temperatures were consistently lower than those outside. By the conclusion of the research the shack's owner was considering destroying it and rebuilding it with other, better, materials once she had saved enough money..

In contrast, other shacks' room temperatures were relatively much higher than the outside's, as a result of the type of insulation present in the shacks.

Cost of heating and thermal performance

One of the most important observations was the relationship between the amount of fuel consumed by the household and the state of the dwelling. It should be noted that households in the informal settlement of Joe Slovo rely more on paraffin than any other fuel. There are basically four inter-linked reasons that residents rely on this fuel for space-heating:

1. The settlement is very far from places where wood can be collected. Wood is the only other cheap fuel, yet is inaccessible to the people of Joe Slovo.
2. In addition, open fires (like the use of candles) are discouraged by the civic committee in the settlement for fear of fires.
3. The general economic status of residents of Joe Slovo leaves much to be desired. Most people, especially of the sampled households, were either unemployed or underemployed. This restricted their choice of fuel.
4. The settlement is not officially recognised, and is situated on land which is not designated for residential purposes. Therefore, no attempt, to date, has been made to develop this area, and it is without electricity.

Figure 6.9 shows the paraffin expenditure for August 1995. Although paraffin is used for other end-uses, it was observed that a sizeable amount of paraffin was also used for space-heating.

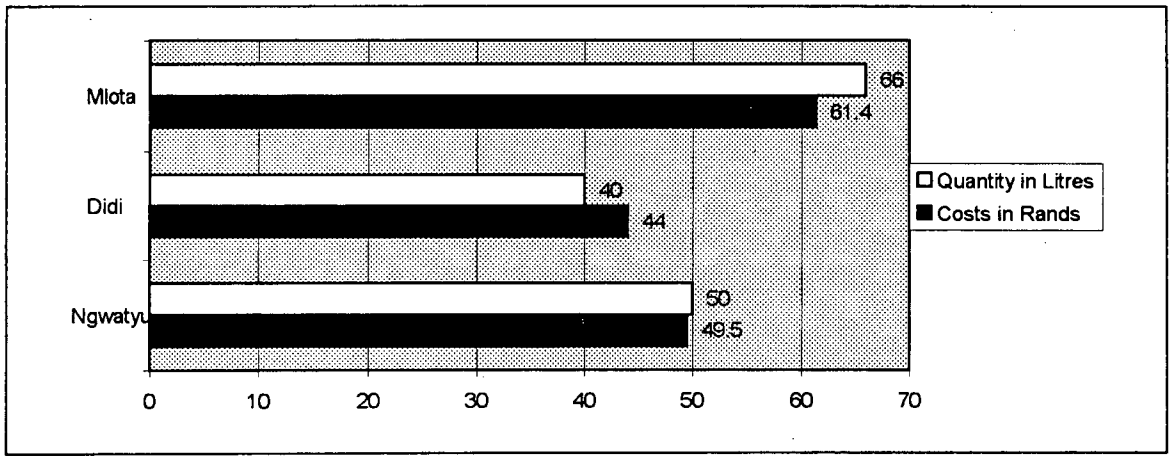


Figure: 6.9 September expenditure on paraffin of the three surveyed households[2]

It is clear from Figure 6.9 that the three dwellings' paraffin expenditures are different. As might be expected from the description of their dwellings, two households (Ngwatyu and Mlota) spend a lot on paraffin. The Didi household, although using paraffin for cooking, also uses gas. Like other households, it also uses paraffin for heating the dwelling. However, the costs outlined above are more complex than immediately apparent, the complexities deriving from the different ways these households pay for paraffin. For instance, since the Didi

[2] All these households buy their paraffin from a big 'spaza' shop in Langa hostels which sells paraffin for R5.20 (5 litres) and R1.20 (1 litre).

household has a stable source of income, it is able to budget for paraffin, and buy it in bulk. Owing to their insecure income, the other households are not able to budget for their paraffin, and therefore pay more per litre.

6.4 Thermal performance and fuel consumption

Although the informants in all the sampled areas could not clearly explain the link between the thermal performance of their dwellings and fuel consumption of their households, varying efforts have been made at insulating their dwellings. Insulating dwellings is largely because of winters that are generally cold, wet and windy. It has been mentioned elsewhere in this chapter that in Joe Slovo and Langa backyard shacks, most shacks' floors are elevated because these areas tend to be waterlogged in rainy seasons. In addition to this, more people are turning to timber for the construction of their dwellings. Apart from timber shacks being cheaper, and easy to put up and dismantle, they are said to be warmer in winter and cooler in summer than shacks made of corrugated iron sheets, which are said to be cold in winter and very hot in summer.

Although people did not make an automatic link between the thermal performance of their dwellings and the amount of fuel consumed, especially to heat the house, the link was evident in the amount of money or time that they used to buy or collect fuels, as shown below.

6.4.1 Space-heating

The amount of fuel the householders use in heating their houses provides a useful point of entry into the subject. The case below shows the way that the fuel used for space-heating is tied to the thermal performance of the shack and hence its construction. It shows a situation where, when the shack is poorly insulated, much more fuel is used in making it warm. This should be seen in the context of a cold winter climate in the Khayelitsha area. The heat from the primus stove that was used to heat the shack was not adequate. Woodfuel was seen as a solution.

Case 6.1 Heating the house with a brazier

Nolwandle of Site B lives in a three-roomed shack. The shack is very big (about 42 metres^2). The walls are made of a combination of plywood and corrugated iron. The roof is of corrugated iron, with canvas to cover holes. There is no ceiling. The inside wall is covered with pieces of cardboard and paper is stuffed in where there are holes. The floor has cement but there is no carpet of any kind. Despite attempts at insulating the shack it remained cold.

She had used a primus stove to heat the house but,

> 'It was just a waste of money and time because this house would not be warm. If it was warm, it will be for a short while. Another thing is that I use the primus for cooking. The house was not warmed by this primus stove because it is big.'

Since it was the middle of winter, she changed to woodfuel for heating her shack. She, and other women in the neighbourhood, collect wood at a forest that is about eight kilometres distant. She travels every day at 7 a.m. returning at noon. When she comes back, her father-in-law - who is unemployed - assists her in chopping up the wood.

Since the house is big and because Site B is cold, especially in the evenings, the household makes a point of lighting the fire every evening. The fire is made outside the house, and will be put in the house only when it has ceased smoking. The fire is allowed to burn through the night even if everyone is asleep. They are aware of the dangers that this poses but they cannot do otherwise because of the cold.

In contrast, dwellings that were well insulated were able to retain heat for a long time, and therefore less energy was used in heating them. The case of Nolusindiso Jam-jam, a nurse living in Khayelitsha shows that, with proper insulation, the thermal performance of the house is improved, and thereby less fuel is consumed in space-heating.

Case 6.2 Proper insulation, less fuel consumption

Nolusindiso is a single mother of two children aged 14 and 10 years. By profession, she is a nurse at a local clinic. She lives in a standard two-roomed house (excluding the bathroom). It is now well insulated: the roof has been fitted with a painted ceiling;

the walls are now plastered with 'cretestone' and painted; the kitchen floor and the passageway are beautifully tiled; the bedroom floor is fitted with a wall-to-wall carpet. Unlike other houses in the Khayelitsha sample (where there is an overloading of the readyboard with electric cords), the electric cords are concealed by the ceiling, and there are switches in every room for the electric lights. The plugs are fitted on the walls, with the wiring concealed behind the 'cretestone' plaster.

Since her house retains warmth she does not heat very often. When she does heat the house she uses an electric fan heater. When she is compelled to use it, she would switch it on and only for a few hours because 'my house is able to get warm quickly and electricity is very expensive'. Before she installed proper insulation and acquired an electric heater, she used a primus stove for heating: she would heat the house for about three hours in any given day - usually from 6 p.m. to 9 p.m.. She believes that the primus stove would consume a 750 ml bottle of paraffin in each day she used the it for heating the house. She said:

> 'It is very cold here in Khayelitsha. So I decided that the best thing for me is to insulate the house so that I do not spend much money to buy paraffin for heating. Each day I used R1.20 worth of paraffin, but now I reckon that I use less because I have this electric heater and my house is able to retain heat for a very long time.'

Nolusindiso is one of the few householders who saw the connection between the dwelling's thermal performance and the amount of fuel consumed in trying to heat the house. It was possible for Nolusindiso to invest in thermally efficient materials because her tenure is secure. However, other householders in informal areas cannot invest in efficient materials - even if they can afford them - because of their insecurity of tenure.

6.5 Conclusion

It has been shown that there is direct link between the dwellings' physical structure and fuel consumption. Very few people actually see this direct link, but have, nevertheless insulated their dwellings. As a direct response to the climate, residents, especially those living in Khayelitsha area, are obliged to make their dwellings warmer. It has been consistently shown that the different household's insulation contributes to the differing thermal performances of the dwellings.

An important key to improved thermal performance has been shown to depend on two closely linked supporting factors:

- *Individual income of households* — The types of insulation found in respective dwellings can, perhaps, be used as a barometer to measure the households' economic status. There is an indication that in cold weather, poor households spend much of the fuel budget on space-heating. This is, perhaps caused the poorly insulated dwellings they occupy.
- *Type of settlement* — This is a factor of equal importance. The constraints imposed by the physical and tenure environment in which people live was seen to have a direct correlation to the thermal performance of their dwellings. The lack of proper housing in the informal settlements of Site B and Joe Slovo and in Langa backyards, for instance, contributes to the lack of suitable thermal efficiency in dwellings in those areas. The general insecurity of life in such places, especially in Joe Slovo and in backyards, plays a part in preventing most people from investing in building materials that are thermally efficient.

It should be underscored that the research findings presented here do not come from a representative sample. However, the data presented has picked up some trends relating to thermal performance which will be pursued in the next phases of the research. Nevertheless there are policy implications relating to thermal performance that can be gleaned from these preliminary findings. For instance, for efficient use of household energy, it is important that new energy policy take into consideration the kind of structures in which people live. The most clear-cut policy option is the supply of thermally efficient housing units. The latter may, indeed, reduce the large amount of money, or time that poor householders spend on buying

or collecting fuels for space heating[3]. What this shows is that it is equally important for energy policy to address not only the energy poverty or needs of the previously disadvantaged communities: it should be realised that efficient and workable energy policies should be integrated, and go hand-in-hand, with matters such as delivery of proper housing.

Finally, in addition to integrated planning, as shown above, the energy needs of poor people have been neglected. These people who live in thermally inefficient dwellings spend more on energy than those in better insulated dwellings. Although the widely used fuel – that is, paraffin – is easily accessible, it is also expensive (especially where households are forced to burn excessive amounts of it to keep their dwellings warm).

[3] In addition to the inefficient use of energy, these dwellings constitute a health hazard, since they are unsafe and can burn easily. Also damp surroundings have health implications (see Chapter 7).

Safety and health issues relating to energy use

> At exactly 4.30 p.m. (November 22, December 1995) a huge fire, fanned by a strong south-easterly wind, broke out in Joe Slovo settlement. About 150 shacks were gutted, and about 700 people were left homeless. The incident was reported in the *Sunday Independent*, and one of the victims - a woman - was reported as saying, 'My Christmas clothes and the money I had were all destroyed in the fire. I do not know what to do'. The fire was caused by a primus stove when two quarrelling couples accidentally knocked it over. It was unclear where the victims of fire were going to be sheltered, but a Red Cross fieldworker said that 'the majority [of the victims] were accommodated by friends and neighbours. But it is not going to be easy with so many people homeless'. This was the second fire to erupt in this area within a month.

7.1 Introduction

The discussion on fuel and appliances that poor people use will not be complete without mentioning the safety and health aspects associated with their use. Ross (1993: 143-160) provides a telling account of how people squatting on a farm in Die Bos are invariably faced with the spectre of dangers and illness as a result of the fuels and appliances they use. These dangers ranged from poisonous gases that certain types of wood are thought to release, to fires that are primarily caused by paraffin and wood. This is a dread that economically marginalised people face, a fear built on experience of fires. An informant from a Langa backyard shack made this point succinctly:

> Even if you can be more careful with paraffin other people in this yard may not. Therefore if they are not careful and there is fire, all the *hokkies* [shacks] here are going to be burnt down ... and all your efforts and carefulness will amount to nothing. We are not the same, some of us are drinking and others are not. The reality is that you cannot escape fire.

This sentiment was shared by other people, especially those living in informal dwellings. It is known amongst them that their dwellings - made of flammable materials - are susceptible to fire. It is not only people's property that is lost, nor only injuries that are sustained, but fire has dire implications as far as social relations are concerned. Recriminations against people responsible for fire sometimes result in the displacement of families and individuals (see Case 7.2 below).

The epigraph to this chapter sets the central theme, which is that fuels and appliances, or the way that people use these, and the kinds of dwellings that people live in, constitute a danger for loss of property, injury and severing social relations. This chapter draws on various themes discussed in previous chapters. Owing to most households' erratic incomes, their limited access to suitable fuels and appliances and the poorly built structures they occupy, fuels and appliances that are dangerous are constantly used. Previous chapters have underscored that the most used source of energy - for cooking, lighting and space heating - is paraffin, and the commonly used appliances are flame and primus stoves, for domestic tasks such as cooking and heating (see especially Chapter 3). Paraffin and these appliances are renowned for causing injury, such as burning (property or personal) and poisoning. A retrospective analysis undertaken on 194 patients admitted to the Burns Unit in Woodstock Hospital, Cape Town between January 1990 and June 1992 found that 33 patients sustained burns as a result of working with primus stoves (Hudson et al. 1994: 251). What is notable is that these patients were all black men and women, with an average age of 32.5 years (range 14-68 years).

However, previous medical research has found that more children than adults suffer from paraffin related burns, mainly from residential fires. Fires that involve energy sources such as wood or paraffin - like the one in Joe Slovo cited in the epigraph- account for 75% of childhood serious injuries occurring in, mostly, informal settlements, and are responsible for 21% of child deaths (De Wet et al. 1977: 399). The medical fraternity is agreed that burns - resulting from domestic energy sources (mainly paraffin) - are one of the top causes of injury and mortality in the under-14 age group (Kibel 1990: 403). This tragic state of affairs is

what prompted a national paraffin safety workshop, the 'Paraffin Safety Indaba' held in Cape Town on 7 August 1995, to devise a national strategy to combat the dangers of paraffin use.

It is against this background that this chapter examines the dangers, potential or otherwise, of sources of energy (Chapter 3), appliances (Chapter 4) and the types of dwellings (Chapter 6) of the sampled households. During the research - May to November 1995 - there were no major cases of either fuel-related burns or poisonings in all the sampled households. Anecdotal evidence from most respondents shows that these calamities had happened in the recent past, however, and the absence of any 'concrete' or substantive evidence in the sampled households must not be interpreted as if they no longer happen. Most of the respondents had known victims of fires and poisoning caused by the kind of energy sources they use. Accordingly, the chapter describes contexts or potential hazardous situations, where burns could occur and fires erupt. Since prevention is said to be better than cure, it is these contexts that energy policy should immediately address. Important causes of fires and poisoning are the kinds of domestic units in which people live and their management of energy sources and appliances.

7.2 The spectre of fire

The danger that is most feared by people living in informal settlements is fire. Most fires are caused by sources of energy, especially paraffin and candles, and faulty appliances. The use of candles is so often quoted as the most dangerous that many poor households have stopped using candles altogether. In an informal unplanned settlement in Joe Slovo, the local civic committee has even prohibited residents from using candles in their shacks. It is said that in the first months (1994) of people's occupation of land in Joe Slovo, fires caused by candles erupted repeatedly, increasing the sufferings of the already marginalised community. However, the rate of fires in the recently electrified informal Site B has subsided because most people here are not using candles or paraffin lamps for illumination (see Chapter 4). Nevertheless, because most of them are still using paraffin for cooking, the residents still fear fire. As mentioned, this chapter makes use of anecdotal evidence of fires; Case 7.1 gives one Site B respondent's story.

Case 7.1 A fire caused by a supernatural power?

At 1.30 a.m. on 20 February 1989, Rose's shack burnt to the ground (of Case 4.10). All her years of investment in furniture and appliances came to nought. On this early morning, they were awoken by the cry of a child who was choking because of fumes. They woke up, panicked and ran away, leaving all their belongings behind. The fire was at an advanced stage and efforts by neighbours and, later, the fire brigades were not to no avail. Her shack, and ten others, were burnt to the ground. Months before the fire she had invested most of her savings in building her shack and buying new furniture to go with it. She told of a new bedroom suite which she had just finished paying off at Morkels furniture store (it cost her R4 000), a kitchen unit which she was still paying off, and 'all my expensive clothes and jewellery which I had accumulated over the years. These were my serious losses I received because of that fire'.

The fire also brought negative reactions from neighbours who were directly affected by the fire. They blamed her for it to the point of wanting to make her pay for their losses. It was the intervention of the street committee that evaded what could have become a nasty confrontation. The fire brought her immense psychological trauma because of the thought that her years of sweating and toiling had gone down the drain in one moment:

> I will never recover what I lost then. The most puzzling thing is that I never precisely knew the cause of the fire. I do not think that the fire was caused by anyone in the household, or by paraffin or candles because, as far as I can remember, none of them were burning then. I also do not think it was malice because I do not have enemies around here. Maybe the fire was caused by the supernatural powers. Perhaps, some [bad] people do not like my work [healing] in the community, and so they try everything in their power to discourage me from the work that my ancestors have commanded me to perform. I was bewitched.

As the result of the fire, she had to start afresh - with the help of relatives and the Red Cross Society (which contributed food and blankets). The costs of rebuilding her shack

were high: corrugated iron cost her about R450, and the grand total of expenses towards reconstructing her shack reached about R2 000 including the payment of labour.

Although Rose attributed the cause of the fire to supernatural powers, the reality is that, the fire was perhaps caused by a burning candle or an appliance left burning. When probed about the possible causes of the fire, she admitted that she went to bed early, and other people in the household were still watching television. By that time, electricity was not yet installed in Site B, and fires occurred repeatedly. Apart from her material losses, the most important aspect was that relations with her neighbours were disastrously affected. She was fortunate that the timely intervention of the civic association avoided what could have turned out to be a bloody confrontation. Some people held responsible for fire, however, are not as fortunate. The story of Nocwaka Simayile of Joe Slovo is a case in point.

Case 7.2 The social costs of fires

Nocwaka arrived in Cape Town in June 1994 from rural Centani, Eastern Cape. She lived with the daughter of her brother-in-law in a hostel room in Langa. Since the small room was shared with the other six couples, she built a shack between the hostels. However, one evening in December 1994 a candle caused a fire which destroyed her shack and others. She recalled that:

> The fire was caused by a candle which I left burning while I went to one of the hostel rooms to chat with my friends. After some time I was there, I heard people screaming outside... I realised that my *house* was on fire. We tried to extinguish the fire, but unfortunately six shacks including mine were totally burned down.

She was blamed by the residents for causing the fire. Her neighbours had lost valuable property and their savings. She remembers that:

> I was called by the [hostel's] block committee after the fire was extinguished. They said I have caused so much trouble to the people whose houses were burned. The said I must pack my things and go. At first I did not know where to go... I was in Cape Town just for few months. I was desperate but I managed to come and stay in this place [Joe Slovo]. I did not come here by choice, I was desperate.

Indeed she was given an ultimatum of either paying for the losses or moving out of the area. Since she was not able to pay, she opted for the latter. She then applied to the chairperson of WECUSA (a civic body in Joe Slovo) and was allocated a site. There have been stories by other informants of people responsible for causing fire being chased out of the settlements, or being made to repay the costs that the fire caused.

It is important to particularise the potential causes of fires in the informal settlements and backyard shacks. These causes are tied to fuels, appliances and the structure of the dwellings. It is important here to tease out the potential causes related to the kind of dwellings in which people live, and people's handling of fuels and appliances.

7.3 The settlement type and construction of the dwelling contribute to fires

Respondents living in the formal houses in Khayelitsha did not relate stories of burning in their houses as did respondents from other settlements. These houses are made of bricks, which reduce the risks of fires. However, most informants still use hydrocarbon energy sources, especially paraffin, for cooking. The previous chapter described the ways that dwellings in each area were constructed, noting that both informal settlements and the backyard shacks are built of highly flammable materials such as timber, cardboard, plastic and paper. Apart from the construction of the shacks, most are small and there is not enough space to store fuels and appliances safely inside them. All these characteristics encourage fires.

Case 7.3 The near catastrophe in one of the Langa backyards shacks

Gilibatha's shack caught fire in December 1993. His wife was preparing a Sunday meal on the makeshift timber table. She recalled that:

> I filled my primus stove with paraffin. Since my *raaskop* [a kind of primus stove] was smoking, I was advised by my friends that I should pour small drops of illuminating spirit (methylated spirit) *into* the primus stove and so that it mixes with paraffin. This, they said, would stop the stove from smoking. Probably, I poured more spirit than

was required. When I lighted the stove the spirit with paraffin caught fire. The house was half-burned, but there were no serious damages because the fire was put out while it was still beginning.

However, the roof, which was of a combination of timber and plastic, was burnt; so were other household goods closest to the fire, including a hi-fi system, the table and groceries stored beneath it, and pots that were on it. Fortunately the fire was contained, and did not spread to the other four rooms – which were occupied by other households. As a result of the fire, the household does not use a primus stove as often as before. Further, they have bought two 7 kg gas canisters for cooking. Recounting the incident, Gilibatha said:

> The fire happened while all of us were here in the house. If my wife was here alone, maybe she would not have managed to put out the fire alone. There might have been serious damages. It is better if only our house was going to be burned, but as you see this shack is attached to [3] others. Tell me what could have happened if they were all burned? What could have been said by *masitande* [landlord] had all the shacks, and possibly the house, burned down?

Gilibatha's household's near catastrophe brings into focus not only the lack of space inside the shack (where household items are stored near each other), but the lack of space between shacks. If one shack catches fire, others are invariably affected. The space in which Gilibatha's shack and the other three are located is so small that there is absolutely no space between the shacks. Overcrowding of shacks in a small piece of land contributes to the spreading of fire (see Cases 7.1 & 7.2). The lack of space between shacks was also relevant in Joe Slovo (see epigraph) where 700 people were displaced as a result of fire which spread from one shack.

Overcrowding of shacks was observed in informal unplanned settlements, especially in Joe Slovo, and in the backyards in Langa. In the latter, the desire by the landlords to maximise profit meant that people are allocated shacks large enough for only a bed and few belongings. For instance, in the Langa sample there was an average of four shacks per site, with each site in Langa being about 40 m^2.

7.4 The safety of fuels and appliances, and human behaviour

Perhaps the main source of fire can be attributed to people's handling or managing of their fuels and appliances. These were observed to be risky. The fire which nearly destroyed Gilibatha's household (Case 7.3) is a case in point. The example of Pamela, a totally blind woman who lives alone in a backyard shack in Langa illustrates this further. She was observed by a researcher while she was preparing a meal for herself on a weekday afternoon.

Case 7.4 The visually impaired and the use of paraffin

Pamela is totally blind as a result of an accident which happened many years ago, but she went to a school for the visually handicapped so that she can do her things by herself. She does all her domestic chores herself. She sells bed-linen to supplement her disability grant in order to support her three children who stay with her mother in the core houses in Khayelitsha. For cooking, she uses a primus paraffin stove placed on top of a cupboard. She claims that she does not need assistance to light it. On this particular day she was alone in the shack. She was cooking offal. She ran out of paraffin while cooking. Because she did not have money she sent someone to sell some material for her so that she could buy more paraffin. Seeing the problem, the researcher, who was present at the time, bought her 750 ml of paraffin from a nearby supermarket – partly so that Pamela could finish her cooking and partly to observe how she sets about lighting the stove.

When the paraffin was available she, unaided, poured a small amount of illuminating spirit *into* the primus stove 'to prevent smoke'. She seemed to be struggling to make the stove burn. Seeing the difficulty she was in, the researcher assisted her. She said she normally makes the primus burn herself but this day she could not concentrate because something was disturbing her – referring to her boyfriend who had she had asked to sell materials for her. The boyfriend had come without money nor the materials, and Pamela believed that he had used the money to buy liquor.

> While the fire stove was burning, a flame came appeared the stove's head. When the researcher pointed out this problem to Pamela she seemed unperturbed and she casually said, 'It will not cause any problem ... maybe the head of the primus which is not tight enough'. But the danger was that the primus stove could burst or the flame could set fire to the plastic cloth on the table. And she might not see it happening.

Although Pamela has been trained to take care of herself, the fact that she is visually impaired and handles potentially dangerous fuels makes her run a risk of burning her shack and possibly other nine shacks on the site. Further, she could not understand the potential danger that a faulty primus stove might cause. There was a day early in the year in which she almost caused fire. She recounted that:

> I fear using candles. Before I used the [paraffin] lamps I was using candles to light the house. On that day, the candle fell on the table and the table was covered with papers which were burnt. I heard a sound which went like *nqa-nqa-nqa*. I came closer to feel what was going on. When I was near I could feel the wax of the candle and realised, because it was getting hotter, that the house was on fire. I took quickly the bucket of water which I always have it full inside the house, and poured it over the fire. I was able to put out the fire before it could do any damage to the property. Only the table and chair and other minor materials were burned. Since then I never used candles.

It is not only Pamela who uses paraffin in a risky manner. Although informants seemed to be aware of the dangers of fire - and some take precautions when using fuels and appliances - their actual actions convey a different message. In some households, for instance, small children are entrusted with the task of cooking. Invariably these children have to use dangerous fuels and appliances with little or no adult supervision. The case below taken from one household in Joe Slovo illustrates this.

Case 7.5 Children cooking without adult supervision

> Because Nomonde is not present in her shack for the better part of the day, the children cook for themselves (see Cases 3.6 & 5.2). One day when the shack was visited, Nomsa, the eldest child was said to have visited her friends in Langa hostels (about 500 metres away). In the two shacks that constitutes this household there were only children present, the oldest of whom was 10 years old. In one shack, Nolukholo (10) was lighting a primus stove with no supervision at all. Asked whether she is not scared of lighting the stove, she said: 'I fear lighting the paraffin stove but my aunt [Nomsa] said that I must light the stove, and put on the samp pot for supper'.

In another shack (which belongs to Nomonde's sister), Nompumelelo (8) was cooking *umphokoqo* (crumbling maize meal) for lunch. She is the oldest child of this household and was entrusted with the responsibility of taking care of her two younger siblings. She said: 'I can cook any meal because my mother had taught me while I was *very young*. I can cook everything, I can cook samp, porridge and meat. I can light the primus by myself.'

If one considers the reported rate of fires in this settlement, these children who perform adult household chores unsupervised run both the risks of being poisoned by paraffin or of setting the whole settlement ablaze.

Some specific instances which have policy implications and where the use of fuels or appliances was seen to be dangerous are listed below.

7.4.1 Danger of wood brazier

Case 6.1, which is discussed in Chapter 6, is one of the example of households that use a wood-brazier to heat the dwelling. In this household the brazier is normally left burning the whole night. This probably is the most dangerous way of using firewood. The shack that this household occupied was poorly insulated and the corrugated metal roof had holes in it. Besides that, the dwelling is situated in Site B where winds, especially in winter, are strong. The household members were aware of the danger such use of wood entailed, but a cold shack was said to be more harmful to health: the disadvantage of fire erupting is, according to them, outweighed by the advantage of having the house warm throughout the night.

7.4.2 Unsafe storage of paraffin and stoves, and poisoning of children

Some householders place a primus stove on top of a wood table which is sometimes covered with a highly flammable cloth. Because of lack of space, paraffin containers are usually kept

under the table. On most occasions, cool-drink bottles without caps are used to store paraffin. Most of these households contain small children. Despite claims that children are trained to distinguish paraffin from other liquids, this constitutes a problem if current statistics on child poisoning by paraffin are anything to go by. Because of the fear of paraffin poisoning, some householders are taking stringent precautions in storing their paraffin where small children cannot reach it. Mrs Mkonkoto of Joe Slovo said:

> As you see my house is very small and therefore I do not have enough room to store paraffin. Paraffin is dangerous especially for children... I do not store paraffin in bottles because I do not have a safe place where I can put those paraffin bottles. I store my paraffin in a 5 litre *gallon* and close it with a cap. I then put it at the head of my bed, where I can see it all the time. My children have never laid their hands on the paraffin. I do not even allow my children to light the stove. But I send them to buy paraffin.

However there are anecdotes of some informants who mentioned their children being poisoned by paraffin. Kate of Joe Slovo recalled an incident which happened in 1994 when her grandchild drank paraffin as a result of careless storage:

> I have a fresh memory of a child who was poisoned by paraffin. Now I store my paraffin in a place where these children would not reach. A year ago, one of my grandchildren [aged 6] drank paraffin because she thought it was a drink. The paraffin was in a bottle of 'Ship Sherry'. Fortunately, we found out very soon. We gave child much milk [to make her vomit out the paraffin].[1] We rushed her to the nearest day hospital here in Langa. There they took her to Red Cross children's hospital. Fortunately she lived. Ever since that occasion, it is the responsibility of every adult of this house to make sure that paraffin is stored in a safe place and that children's movements in the house are monitored.

7.4.3 Crowding the readyboard

In electrified households, such as in Khayelitsha, Site B and some backyard shacks in Langa, there is no proper wiring. As a result, there is a tendency to overload the readyboard with wires going to different destinations. This dangerous practice can contribute to electrocutions and fires. The informants who overcrowded their readyboard were aware of what this might cause but were constrained from wiring the houses properly because they cannot afford it. One informant in Khayelitsha said:

> We know that this is a very unsafe way of using electricity. We do not have enough money to hire an electrician to put electric switches. The cheapest one that we find is going to charge us R800 to do the two rooms and a toilet. This excludes electric materials, which we were going to buy ourselves. Since we do not have money, we are still using electricity this way.

7.5 Conclusion

Based mostly on anecdotal evidence, this chapter has described instances where people's use and management of fuels and appliances were hazardous. This was done to draw the parallels between the use of some sources of energy, notably paraffin, and dangers that people are faced with as a result. Fires in the informal settlements are most feared, and they are the result of the energy poverty experienced by the urban poor. People do not voluntarily choose paraffin, but are forced to consider this type of fuel because it is cheaper and more accessible than other fuels. The same is true with the types of appliances they use.

What is more important was the fact that there were no reported fires in the electrified settlements. In the informal settlement in Site B, the informants say that fires have been reduced since the area was electrified. Most examples drawn in this chapter come from informal non-electrified settlements and the backyards because it is in these areas that paraffin is used the most. An additional factor which is important for energy policy is the type of structures in which people use it. The unplanned, random shacks in Joe Slovo and in Langa backyards are highly susceptible to fire. In these settlements, the crowded dwellings make it difficult to contain fire once it erupts. It is important not only to address the energy

[1] There is a widely held belief that a child poisoned by paraffin should drink much milk in order to vomit, thereby neutralising the poison.

poverty of these people but also to address the shortage of proper houses, because the latter has a direct relevance to energy use and risks involved.

CHAPTER EIGHT

Conclusions and their implications for energy policy

8.1 Introduction

The past few years have witnessed a flurry of policy formulation activity in the country, particularly concerning the redressing of the imbalances of the apartheid era. The energy sector has been no exception in this regard, and the latter months of 1995 saw the culmination of a process of identification of policy issues and options in the sector, leading to the Energy Policy Summit held in November. The next step in the process is the writing of the Energy White Paper, which will in turn lead to the necessary legislation being drafted and enacted. A particularly important part of the new energy policy deals with improving the access of poor urban and rural households to adequate supplies of convenient energy sources.

Policy in the South African energy sector is shifting in its emphasis away from the energy security concerns of the apartheid government to more universal goals of social equity, economic efficiency and environmental sustainability. Meeting basic needs is a central objective of the RDP; it is for this reason that households have been placed so high on the energy policy agenda. Energy is required to meet a wide range of household needs and services such as cooking, water heating and space heating, lighting, entertainment through the use of radio, hi-fi and TV, the provision of services such as water, health care and education, informal home-based productive activities, and in rural areas for associated small-scale agricultural production.

Energy is not a basic need in itself; however, its end-uses and the services it provides often meet basic needs, without which life can not be sustained. To illustrate this, it is not enough to say that the basic food needs of a household are met *without* ensuring that they have the necessary energy to cook the food. Similarly, it may not be possible to meet a household's basic water needs without using energy to pump the necessary water. It is therefore apparent that sustainable *energy security* for poor households is a vital element in the reduction of poverty, and the fostering of *livelihood security* for these households.

Current patterns of energy consumption by South African households mirror the inequality which has characterised the country's social, political and economic order, the differentiation being defined largely along racial lines. The vast majority of the black population do not have electricity in their homes nor have access to it, whilst almost all whites, even many on remote rural farms, are connected to the national grid. Unelectrified households rely instead on fuelwood, coal, paraffin, gas, candles and batteries for cooking, heating and lighting, and are denied the convenience and flexibility of electrical appliances such as kettles, irons, refrigerators and the multitude of other time-saving devices found in high-consumption homes.

8.2 Policy implications of the research findings

Looking at the important findings from the research documented in this report, it is clear that many of them underline the energy issues that have already been identified as facing poor urban households. However, there are certain findings that reveal issues that have not been given sufficient attention to date. It is particularly apparent that patterns of energy use in poor households have deep socio-economic roots and implications, and are not as simple as energy planners would like them to be. It is therefore imperative that policy options be demand-driven, flexible and broad enough to give household decision-makers and energy-users, primarily women, sufficient space within which to operate.

8.2.1 Women and sharing of household energy resources

The principal end-*users* and managers of household energy and indeed household budgets are generally women. Yet we know very little about how they make decisions on expenditure, particularly when survival is an issue. Furthermore, little is known about women's perceptions of energy and the use of energy appliances. In short, household management and

survival strategies in poor households are complex, and deserve serious consideration when formulating household energy policy.

Sharing of energy and appliances has been found to be deeply embedded in people's social relations. Existing relationships are utilised to channel energy-related activities and resources. This sharing between households has an impact on the actual constitution of the household: because of sharing of resources, especially fuels, the boundaries of households become fluid. The cases presented in this report show that sharing of energy related activities in some household leads to the disappearance of boundaries. However, inter-household sharing should not only be understood in terms of the notion of *ubuntu* (humanity), but should also be seen as a result of poverty. Thus the context within which sharing occurs is equally important to consider. Most of the sampled households have erratic incomes which cannot sustain or meet all their energy needs. In this context, sharing of resources provide households with adaptive strategies, and resourcefulness and resilience under the conditions of perpetual poverty and instability they face.

8.2.2 Spazas and credit

Related to the notion of sharing is the relationship often found between spaza shops and households which is based on a socially defined credit system. Although the relationship could be viewed as exploitative because spaza prices are generally higher, this relationship is in many instances symbiotic. Credit is seldom if ever extended to households not known to the spaza owner, and very often based on kinship relations.

The spazas provide credit to households at critical times, which is particularly important given the nature of cash flows of many households. Therefore, even though spazas may be expensive, people continue to rely on them especially for energy-related needs because of the credit they give. Thus, for a holistic understanding of the prevalence of spazas it is important to go beyond classical economic explanations. It is important to understand the 'credit system' relationship and the type of resources that are frequently exchanged. Understanding of this kind of relationship has direct policy implications. As a result of precarious economic conditions of most of the sampled households, relationships that they have with spazas are crucial for their survival, and it is important that policies should take cognisance of these relationships. Any action that would undermine it would not only be counter-productive but would have negative impacts on the existence of most households.

8.2.3 Children and household energy use

Most of the energy policy issues relating to children have focused on health and safety aspects particularly concerning paraffin, but have not addressed the issues of children using energy in the household. In the study it has been found that children play an important role in both energy use and in performing energy-related activities. Thus it is important that they be considered by policy-makers particularly if there educational campaigns are run around energy use. Particularly in female-headed households it has been found that children play an active role in domestic activities like cooking and fuel purchase, sometimes with no adult supervision.

8.2.4 Thermal efficiency of dwellings

One of the most important factors determining energy use in poor households is the thermally inefficient dwellings they occupy. The research has confirmed what has previously been observed of the link between thermally inefficient dwellings and energy consumption. The consensus is that poor people continue to spend proportionately more on energy for heating their dwellings. This is particularly relevant in the Cape Peninsula which is very cold in winter and windy most of the year. This is one of the areas that integrated energy planning should address. There is a need for a policy which will not only address the energy poverty of low-income households but also the acute housing shortage in these communities, with thermally efficient dwellings.

8.2.5 Electrification of backyard shacks and informal areas

At present there is no clear policy concerning the electrification of backyard shacks and informal unplanned areas. Regarding backyard shacks, access to electricity can be obtained through the landlord – often, however, at extortionate prices. There is therefore a need to look at electrification of dwellings as opposed to sites in areas where there are backyard shacks.

Concerning informal unplanned settlements, the poverty of people generally found in these settlements forces them to use fuels that are unsafe particularly given the settlements' overcrowded nature. The fires which can result from the use of these fuels have both social and economic costs, since people lose their belongings and as the fire may spread from one shack to another this has the potential to damage people's social relationships. Some people have been forced to leave shack settlements as a result of the damage caused to other people's property caused by fires. This again points towards the need for the integration of energy policy with housing and the delivery of services in general.

8.2.6 Electricity costs

Electricity is the most desirable energy carrier in urban areas. However it is often too expensive for people to afford the benefits it offers. In the study it has been found that this energy source is under-utilised in those low income households that have access to it. Besides the costs of the electricity itself there are other costs involved. Firstly, electrical appliances are expensive so people can seldom afford to buy more than the most basic appliances. Although they have the option to buy them on HP, the criteria for determining creditworthiness excludes most people, quite apart from the fact that the interest charges make it expensive. In addition there is the cost of wiring the house which is often overlooked. It is important in that people are forced to use only the readyboard that is located in one room and there are two problems related to this. First, the possibility of overloading, with many appliances being attached by adaptors; secondly, the extension cords running to different destinations. In addition, the inconvenience of always having to go to the readyboard to switch off appliances is also a problem.

8.3 Conclusion

It must be remembered that this is but the first phase of three being carried out under this research programme. In the subsequent two phases a number of other aspects will also be investigated, and the sample will be broadened in an attempt to be representative.

This type of research highlights the importance of involving energy end-users in the formulation of policy, as it is impossible for planners and policy-makers to be aware of the day-to-day realities of poor households and social complexity of the communities in which they are situated. It also helps to build an awareness in households of energy issues, and can serve to create channels of communication between policy makers and end-users.

Finally, research that concentrates on the qualitative nature of energy use is also important to monitor the impacts of energy policies as they are implemented, as it allows for relatively quick response to policy makers, thus enabling them to make adjustments if necessary.

BIBLIOGRAPHY

Berry, S. 1993. No condition is permanent. Madison: University of Wisconsin Press.

Black Sash 1984. 'The road to Khayelitsha - and Beyond' (pamphlet)

Cooper, D. et al 1990. 'A study of the effects of urbanisation on the health of women in Khayelitsha, Cape Town: rationale and methods'. Department of Community Health, University of Cape Town.

De Wet, B. 1977. 'Die oorsake van bradwonde in kinders.' South African Medical Journal Vol. 52: 969-972.

DMEA 1995. South African energy and discussion document. Pretoria.

Eberhard, A. 1990. 'Energy consumption patterns and supply problems in underdeveloped areas in South Africa.' Development Southern Africa Vol. 7. No 3 August 1990.

Eberhard, A. and van Horen, C. 1994. 'New imperatives for the energy policy in South Africa.' Energy for Development Research Centre Publication: University of Cape Town.

Eberhard, A and van Horen, C. 1995. Poverty and power: energy and the South African state. Cape Town: UCT Press.

Hudson, D.A. et al 1994. 'Primus stove burns in Cape Town: a costly but preventable injury'. Burns Vol. 20 No. 3: 251-252.

Kibel, S. M et al 1990. 'Injury related mortality in South African children, 1981-1985.' South African Medical Journal, Vol. 78: 398-403.

Makan, A. 1995. 'Power for women and men: towards a gendered approach to domestic energy policy and planning in South Africa'. Third World Planning Review Vol. 17 No. 2 May 1995: 183-198.

May, J. et al. 1992. 'An in-depth evaluation of fuel use by rural women. The ingwavuma district - KwaZulu'. Report prepared for the DMEA. National Energy Council.

Ross, F. 1993. 'Assessment of the impact of fuel-use of an informal settlement.' Report prepared for the DMEA. University of Cape Town.

Sharp, J. 1987. 'Relocation, labour migration and the domestic predicament: Qwaqwa in the 1980s.' In Migrants, Workers, and the Social Order (ed.) J Eades. London: Tavistock

Spiegel, AD. 1982. 'Spinning off the developmental cycle.' Social Dynamics 8(2) 30-45

Spiegel, AD. & Sharp, J. 1988. 'Relocation in Qwaqwa, betterment in Matatiele: resources and responses.' In The Societies of Southern Africa in the 19th and 20th centuries Vol. 14 Collected Seminar Papers No 37. University of London, Institute of Commonwealth Studies.

Spiegel, AD., Watson, V. & Wilkinson, P. 1995. 'Domestic fluidity and movement patterns among Cape Town's African population: some implications for housing policy.' Paper presented at the African Studies Seminar, University of Cape Town

Stack, C. 1974. All our kin: Strategies for survival in a black community. New York: Harper and Row.

Van der Vliet, V. 1984. 'Staying single: a strategy against poverty?' Second Canergie Inquiry into Poverty and Development in Southern Africa: Paper No. 116.

APPENDIX A
SOCIAL AND ECONOMIC DETERMINANTS OF URBAN DOMESTIC ENERGY USE
AUGUST 1995

1. Questionnaire Number (DO NOT FILL IN)	
2. Name of Respondent	
3. Number of Shack/Address of formal house	

4. [Interviewer: Study area:]

Mzimhlophe formal houses	1
Mzimhlophe backyard shacks	2
Powa Park planned shack settlement	3
Mandelaville unplanned shack settlement shack	4
Duncan Village formal houses	5
Duncan Village backyard shacks	6
Duncan Village planned shack settlement	7
Duncan Village unplanned shack settlement	8
Khayelitsha formal houses	9
Langa backyard shacks	10
Khayelitsha Site B planned shack settlement	11
Joe Slovo unplanned shack settlement	12
Chesterville formal houses	13
Chesterville backyard shacks	14
East Wiggins planned shack settlement	15
Old Dunbar unplanned shack settlement	16

5. [Interviewer: Type of study area:]

A formal house	1
A back-yard shack or room	2
A shack in a planned informal settlement	3
A shack in an unplanned informal settlement	4

6. [Interviewer: is the respondent's dwelling:]

A formal township house	1
A back-yard shack or room	2
A shack in a 'free-standing' informal settlement	3

7. [Interviewer: What type of electricity supply does the dwelling have?]

No Electricity Supply At All	1
Credit Meter System	2
Pre-Payment Card System	3
Pre-Payment Code System	4
Other (Specify):	

8. Which of the following appliances and fuels do you use for COOKING FOOD?

(Circle more than one option if necessary)

An open wood fire	1
A wood-burning stove	2
A coal-burning stove	3
A wood-burning brazier	4
A coal-burning brazier	5
A paraffin stove (wick)	6
A primus paraffin stove (pump)	7
A gas stove (hob only)	8
A gas stove (hob and oven)	9
An electric hot-plate (hob only)	10
An electric stove (hob and oven)	11
A microwave oven	12
An electric stove AND a microwave oven	13
An electric frying pan	14
Other (Specify):	

9. Which of the following appliances and fuels do you use for RE-HEATING FOOD?

(Circle more than one option if necessary)

An open wood fire	1
A wood-burning stove	2
A coal-burning stove	3
A wood-burning brazier	4
A coal-burning brazier	5
A paraffin stove (wick)	6
A primus paraffin stove (pump)	7
A gas stove (hob only)	8
A gas stove (hob and oven)	9
An electric hot-plate (hob only)	10
An electric stove (hob and oven)	11
A microwave oven	12
An electric stove AND a microwave oven	13
An electric frying pan	14
NOT APPLICABLE: never re-heat food	15
Other (Specify):	

10. Which of the following appliances and fuels do you use for HEATING THE HOUSE?

(Circle more than one option if necessary)

An open wood fire	1
A wood-burning stove	2
A coal-burning stove	3
A wood-burning brazier	4
A coal-burning brazier	5
A paraffin heater	6
A paraffin STOVE	7
A gas heater	8
An electric bar heater	9
An electric asbestos heater	10
An electric oil-filled heater	11
An electric fan heater	12
NOT APPLICABLE: Do not heat the house	13
Other (Specify):	

11. Which of the following appliances and fuels do you use to BOIL WATER FOR TEA (etc)?

(Circle more than one option if necessary)

An open wood fire	1
A wood-burning stove	2
A coal-burning stove	3
A wood-burning brazier	4
A coal-burning brazier	5
A paraffin stove (wick)	6
A primus paraffin stove (pump)	7
A paraffin HEATER	8
A gas stove (hob only)	9
A gas stove (hob and oven)	10
An electric hot-plate (hob only)	11
An electric stove (hob and oven)	12
An electric kettle	13
An electric geyser	14
A gas-fired water heater	15
NOT APPLICABLE: Do not boil water for making beverages	16
Other (Specify):	

12. Which of the following appliances and fuels do you use for LIGHTING?

(Circle more than one option if necessary)

Candles	1
Paraffin lamp/s	2
Gas lamp/s	3
Electric light bulb/s (Credit Meter System)	4
Electric light bulb/s (Pre-Payment Card System)	5
Light bulb/s powered by a car battery	6
Other (Specify):	

3. Which of the following appliances and fuels do you use to HEAT WATER FOR WASHING CLOTHES?

(Circle more than one option if necessary)

An open wood fire	1
A wood-burning stove	2
A coal-burning stove	3
A wood-burning brazier	
A coal-burning brazier	4
A paraffin stove (wick)	5
A primus paraffin stove (pump)	6
A gas stove (hob only)	7
A gas stove (hob and oven)	8
An electric hot-plate (hob only)	9
An electric stove (hob and oven)	10
An electric kettle	11
An electric geyser	12
A gas-fired water heater	13
A geyser which is attached to a coal/wood stove	14
NOT APPLICABLE: Do not heat water for washing clothes	15
Other (Specify):	

14. Which of the following appliances and fuels do you use to HEAT WATER FOR WASHING UP DISHES?

(Circle more than one option if necessary)

An open wood fire	1
A wood-burning stove	2
A coal-burning stove	3
A wood-burning brazier	4
A coal-burning brazier	5
A paraffin stove (wick)	6
A primus paraffin stove (pump)	7
A gas stove (hob only)	8
A gas stove (hob and oven)	9
An electric hot-plate (hob only)	10
An electric stove (hob and oven)	11
An electric kettle	12
An electric geyser	13
A gas-fired water heater	14
A geyser which is attached to a coal/wood stove	15
NOT APPLICABLE: Do not heat water for washing up dishes	16
Other (Specify):	

18. What electrical power source do you rely on to run your Television/Video Cassette Recorder?

(Circle more than one option if necessary)

Dry Cell Battery	1
Car Battery	2
Generator	3
Mains Electricity (Credit Meter System)	4
Mains Electricity (Pre-Payment Card System)	5
NOT APPLICABLE: Do not use any of the above appliances	6
Other (Specify):	

19. What electrical power source do you rely on to run your Radio/HiFi?

(Circle more than one option if necessary)

Dry Cell Battery	1
Car Battery	2
Generator	3
Mains Electricity (Credit Meter System)	4
Mains Electricity (Pre-Payment Card System)	5
NOT APPLICABLE: Do not use any of the above appliances	6
Other (Specify):	

20. How do you wash most of your clothes?

By hand	1
Your own electric washing machine	2
Your neighbours' or relatives' washing machine	3
A laundrette	4
Other (Specify):	

21. Do you own an electric vacuum cleaner?

Yes	1
No	2

22. What appliances do you have in your home, but DO NOT use?

(Interviewer: circle more than one if necessary)

A vacuum cleaner	1	A washing machine	11
An electric hot-plate	2	A television	12
An electric stove	3	An electric sewing machine	13
A microwave oven	4	A battery-powered radio or cassette player	14
An electric kettle	5	A gas stove	15
An electric bar heater	6	A gas light	16
An electric panel heater	7	A gas heater	17
An electric fan heater	8	A paraffin heater	18
An electric refrigerator	9		
An electric iron	10		
Other (Specify):			

23. What are the reasons WHY you do not use them?

The appliance is faulty or broken and needs repairs	1
The appliance consumes too much (mains) electricity	2
The car battery is too expensive to re-charge	3
The dry-cell batteries are too expensive	4
There is no source of electricity to the house/shack	5
It was a gift/cast-off from my employer	6
Other (Specify):	

24. Is your house installed with

an electric geyser?	1
a geyser attached to your coal stove?	2
a gas geyser?	3
NOT APPLICABLE: No geyser installed	4

25. How often do you buy CANDLES?

Never	1
Once a day	2
Once every two days	3
Once every three days	4
Once a week	5
Once a fortnight	6
Once a month	7
Other (Specify):	

26. Where do you buy candles?

Nearby Spaza Shop	1
From a Supermarket in a white area	2
From a General Store in an African township	3
Hawker	4
NOT APPLICABLE: Do not buy candles	5
Other (Specify):	

27. How many candles do you buy at a time?

NOT APPLICABLE: Do not buy candles	0

28. What does each candle cost? [Interviewer: calculate the cost per candle if respondent buys candles in packets of six]

R :	
NOT APPLICABLE: Do not buy candles	0

29. How often have you bought or collected FUEL WOOD this winter?

Once a day	1
Once every two days	2
Once every three days	3
Once a week	4
Once a fortnight	5
Once a month	6
NOT APPLICABLE: Do not use fuel wood	7
Other (Specify):	

30. Where do you get wood?

From a nearby Spaza Shop	1
From a Supermarket in a white area	2
From a General Store in an African township	3
From a Hawker	4
From a Coal Yard	5
From a Coal Truck	6
Collect it from a nearby Woodland	7
Collect discarded boxes etc.	8
NOT APPLICABLE: Do not use fuel wood	9
Other (Specify):	

31. How many bundles of wood do you buy at a time?

NOT APPLICABLE: Do not use fuel wood	0

32. What does each bundle of wood cost (Rands and Cents)?

R :	
NOT APPLICABLE: Do not use fuel wood	0

33. [Interviewer: Measure and record the weight (in kilograms) of a wood bundle]

NOT APPLICABLE: Do not use fuel wood	0

34. How often have you bought or collected COAL this winter?

Never	1
Once a day	2
Once every two days	3
Once every three days	4
Once a week	5
Once a fortnight	6
Once a month	7
Other (Specify):	

35. Where do you get Coal?

From a nearby Spaza Shop	1
From a Supermarket in a white area	2
From a General Store in an African township	3
From a Hawker	4
From a Coal Yard	5
From a Coal Truck	6
Scavenging	7
NOT APPLICABLE: Do not use coal	8
Other (Specify):	

36. How many containers of coal do you buy at a time?

NOT APPLICABLE: Do not use coal	0

37. What size container do you buy your coal in?

[Interviewer: establish the weight in kilograms of a coal-filled container/bag]

NOT APPLICABLE: Do not use coal	0

38. What does each container/bag of coal cost (Rands and Cents)?

R :	
NOT APPLICABLE: Do not use coal	0

39. How often have you bought PARAFFIN this winter?

Once a day	1
Once every two days	2
Once every three days	3
Once a week	4
Once a fortnight	5
Once a month	6
NOT APPLICABLE: Do not buy paraffin	7
Other (Specify):	

40. Where do you buy Paraffin?

From a nearby Spaza Shop	1
From a Supermarket in a white area	2
From a General Store in an African township	3
From a Hawker	4
From a Paraffin Depot	5
From a Filling Station/Garage	6
From a Private Home	7
NOT APPLICABLE: Do not buy paraffin	8
Other (Specify):	

41. What size and type of container do you MOSTLY buy your paraffin in?

200ml Glass Bottle ('nip' of Whiskey/Brandy etc)	1
375ml Glass Bottle ('half-jack' of Whiskey/Brandy etc)	2
500ml Glass Bottle (Coke/Fanta etc)	3
500ml Plastic Bottle (Coke/Fanta etc)	4
750ml Glass Bottle (Brandy/Whiskey bottle)	5
1 litre Glass Bottle (Coke/Fanta/Spar-Letta bottle)	6
2 litre Plastic Bottle (Coke/Fanta bottle)	7
2 litre Plastic 'Jug' (bottle with moulded handle, such as milk bottles)	8
5 litre Plastic 'Jug' (bottle with moulded handle, usually fruit juice)	9
10 litre Plastic Drum	10
NOT APPLICABLE: Do not buy paraffin	11
Other (Specify):	

42. How many containers of paraffin do you buy at every purchase?

NOT APPLICABLE: Do not buy paraffin	0

43. What does each container of paraffin cost? (Rands and Cents)

R :	
NOT APPLICABLE: Do not buy paraffin	0

44. How frequently do you re-fill your GAS cylinder?

Never	1
Once a week	2
Once every two weeks	3
Once every three weeks	4
Once a month	5
Other (Specify):	

45. Where do you get your GAS cylinder re-filled?

From a nearby Spaza Shop	1
From a Supermarket in a white area	2
From a General Store in an African township	3
From a Hawker	4
From a Gas Depot	5
From a Filling Station/Garage	6
From a Private Home	7
From a Hardware Store	8
NOT APPLICABLE: Do not have a gas cylinder	9
Other (Specify):	

46. What size GAS cylinder do you have?

[Interviewer: establish the weight in kilograms of the gas cylinder]

NOT APPLICABLE: Do not have a gas cylinder	0

47. How many cylinders of gas do you re-fill at every purchase?

NOT APPLICABLE: Do not buy gas	0

48. What does each cylinder of gas cost? (Rands and Cents)

R :	
NOT APPLICABLE: Do not buy gas	0

49. How many car batteries do you have in use at one time?

50. How frequently do you re-charge a CAR BATTERY?

Never	1
Once a day	2
Once every two days	3
Once every three days	4
Once a week	5
Once every two weeks	6
Once a month	7
Other (Specify):	

51. Where do you get your CAR BATTERY recharged?

At a Filling Station/Garage	1
At a Battery Centre	2
At a Private Home	3
NOT APPLICABLE: Do not have a car battery	4
Other (Specify):	

52. What does it cost to re-charge a battery? (Rands and Cents)

R :	
NOT APPLICABLE: Do not have a car battery	0

53. How many dry-cell batteries do you have in use at one time?

54. How often do you buy new DRY-CELL BATTERIES?

Never	1
Once a day	2
Once every two days	3
Once every three days	4
Once a week	5
Once every two weeks	6
Once every three weeks	7
Once a month	8
Once every five weeks	9
Once every six weeks	10
Other (Specify):	

55. **Where do you buy DRY-CELL BATTERIES?**

From a nearby Spaza Shop	1
From a Supermarket in a white area	2
From a General Store in an African township	3
From a Hawker	4
NOT APPLICABLE: Do not buy dry-cell batteries	5
Other (Specify):	

56. How many dry-cell batteries do you buy at every purchase?

NOT APPLICABLE: Do not buy dry-cell batteries	0

57. What does each dry-cell battery cost? [Interviewer: calculate the cost per battery if respondent buys batteries in packets]

NOT APPLICABLE: Do not buy dry-cell batteries	0

58. What was your electricy bill last month (Rands and Cents)? [Interviewer: ask to see the actual invoice]

NOT APPLICABLE: No electricity supply	0

59. How many times a DAY do you boil water for tea/coffee?

60. Roughly, how many people do you make tea for at a time?

61. How many times a WEEK do you cook samp (stamp mielies)?

62. How many times a WEEK do you cook mielie meal?

63. How many times a WEEK do you cook beans?

64. How many times a WEEK do you cook vegetables?

65. How many times a WEEK do you stew chicken or red meat?

66. Does the 'wife' or 'husband' do most of the cooking for the household?

The 'husband'	1
The 'wife'	2
Husband and wife share the cooking equally	3
NOT APPLICABLE: single Female-headed household	4
NOT APPLICABLE: single Male-headed household	5
Other (Specify):	

67. Does the 'wife' or 'husband' decides which ENTERTAINMENT appliances should be bought?

The 'husband'	1
The 'wife'	2
Husband and wife decide democratically	3
NOT APPLICABLE: single Female-headed household	4
NOT APPLICABLE: single Male-headed household	5
Other (Specify):	

68. Does the 'wife' or 'husband' decides which COOKING appliances should be bought?

The 'husband'	1
The 'wife'	2
Husband and wife decide democratically	3
NOT APPLICABLE: single Female-headed household	4
NOT APPLICABLE: single Male-headed household	5
Other (Specify):	

69. Does your 'spouse' live here with you?

Yes	1
No	2
Not Married	3

70. If NO, why does your 'spouse' not live here with you?

NOT APPLICABLE (Not Married)	1
NOT APPLICABLE (Does live with Spouse)	2
his/her workplace is too far away	3
she cares for my rural homestead	4
Other (Specify):	

71. Are any children of yours (under 18) living elsewhere?

Yes	1
No	2
Does not have any children	3

72. If YES, why do your children not live here with you?

NOT APPLICABLE (Does not have any children under 18)	1
NOT APPLICABLE (Does live with children)	2
no schools nearby	3
there is no-one to look after them here	4
Other (Specify):	

73. Do you have another home elsewhere?

Yes	1
No	2

74. Is it in [DO NOT READ OUT: Interviewer to probe question]

an urban township?	1
a rural area in a 'homeland'?	2
a white-owned farm?	3
a white-owned peri-urban plot?	4
NOT APPLICABLE: Respondent has only one home	5

75. Does your 'spouse'

live at your other home?	1
live here with you permanently	2
NOT APPLICABLE: Respondent is single/divorced/widowed	3
Other (Specify):	

76. Do you intend to bring your 'spouse' to live here with you?

Yes	1
No	2
NOT APPLICABLE: Respondent is single/divorced/widowed/'spouse' already lives here	3

77. Do you have any children (under 18) living at your other home?

Yes	1
No	2
NOT APPLICABLE: Respondent does not have children under 18	3

78. [Interviewer: If the respondent has a spouse at his/her other home, establish if she/he has another partner who lives with her/him here]

Yes he does	1
No he does not	2

Provide the details of all the individuals in the respondent's household as specified in the table

		Member 1	Member 2	Member 3	Member 4	Member 5
Name						
Relationship to Key Decision-Maker		Key Decision-Maker				
Marital Status						
Sex	Male = 1 Female = 2	79.				
Age	(in YEARS)	80.				
School Qualification	None = 0 Pre-School = A Grade 1= B Grade 2 = C Std 1 = 1 Std 2 = 2 Std 3 = 3 Std 4 = 4 Std 5 = 5 Std 6 = 6 Std 7 = 7 Std 8 = 8 Std 9 = 9 Std 10 = 10 NTC 1 = 11 NTC 2 = 12 NTC 3 = 13	81.				
Post-Matric or Post NTC 3 Qualification	None = 0 NTC 4 = 1 NTC 5 = 2 NTC 6 = 3 T 1 = 4 T 2 = 5 T 3 = 6 Commercial Diploma = 7 Nursing Diploma = 8 Teaching Diploma = 9 Bachelor Degree = 10 Post-Graduate Degree = 11	82.				
Employment Status	Employed Full-Time = 1 Employed Part-Time = 2 Self-employed/Informal = 3 Unemployed = 4 Student/Scholar = 5 Child = 6 Disabled = 7 Retired = 8 Not attending school = 9	83.				
What is (or was) your/his/her Job? IF UNEMPLOYED, Ask for last job		84.				
Where is your/his/her place of work? OR Where does he/she attend school? (Write down the name of the 'suburb' or township)		85.				
Exact Monthly Income (Take home pay)		86.				

* = immediate family members who are not living in this household

		Member 6	Member 7	Member 8	Member 9	Member 10
Name						
Relationship to Key Decision-Maker						
Marital Status						
Sex	Male = 1 Female = 2					
Age	(in YEARS)					
School Qualification	None = 0 Pre-School = A Grade 1= B Grade 2 = C Std 1 = 1 Std 2 = 2 Std 3 = 3 Std 4 = 4 Std 5 = 5 Std 6 = 6 Std 7 = 7 Std 8 = 8 Std 9 = 9 Std 10 = 10 NTC 1 = 11 NTC 2 = 12 NTC 3 = 13					
Post-Matric or Post NTC 3 Qualification	None = 0 NTC 4 = 1 NTC 5 = 2 NTC 6 = 3 T 1 = 4 T 2 = 5 T 3 = 6 Commercial Diploma = 7 Nursing Diploma = 8 Teaching Diploma = 9 Bachelor Degree = 10 Post-Graduate Degree = 11					
Employment Status	Employed Full-Time = 1 Employed Part-Time = 2 Self-employed/Informal = 3 Unemployed = 4 Student/Scholar = 5 Child = 6 Disabled = 7 Retired = 8 Not attending school = 9					
What is (or was) your/his/her Job? IF UNEMPLOYED, Ask for last job						
Where is your/his/her place of work? OR Where does he/she attend school? (Write down the name of the 'suburb' or township)						
Exact Monthly Income (Before Deductions)						

* = immediate family members who are not living in this household

87. What is the name of the place where you were born? (and name of nearest town)

88. Is your birthplace

an urban township?	1
a rural area in a 'homeland'?	2
a white-owned farm?	3
a white-owned peri-urban plot?	4

89. After you left your birthplace, did you move to

live in a town or city?	1
live on a white-owned farm?	2
live on a peri-urban plot?	3
live in a dense settlement in a 'homeland'?	4
NOT APPLICABLE: Respondent did not leave place of birth	5
Other (Specify):	

90. In what year did you leave your birthplace? (Write down the YEAR only)

Year respondent left birthplace	
Born here	0000

91. When you first moved to live in a town, did you

move in with relatives or friends in a formal house?	1
share a formal house with another family?	2
rent your own formal house?	3
rent a brick room in the backyard of a house?	4
rent a shack in the backyard of a house?	5
live in a shack in a shack settlement?	6
live in a domestic servant's room in a white or Indian area?	7
stay in a hostel?	8
stay in a room at the factory where you worked?	9
stay in a hut on a construction site where you worked?	10
NOT APPLICABLE: Respondent was born in an urban area	11
Other (Specify):	

92. What is the name of the first town that you moved to live in?

Born in a town	0

93. In what year did you first move to live in a town? (Write down the YEAR only)

Year respondent first lived in a town	
Born in a town	0000

94. Before you lived in this dwelling, did you

live with your parents in a formal house in an urban area?	1
rent your own house in an urban area?	2
share a house with another family in an urban area?	3
live in a formal backyard room in an urban area?	4
live in a backyard shack in an urban area?	5
live in a shack in a shack settlement in an urban area?	6
live in a domestic servant's room in a white or Indian area?	7
stay in a hostel?	8
stay in a room at the factory where you worked?	9
stay in a hut on a construction site where you worked?	10
live on a white-owned farm?	11
live on a peri-urban plot?	12
live in a rural district in the 'homeland's?	13
NOT APPLICABLE: Born in this place	14
Other (Specify):	

95. What is the name of the place that you lived in before you moved to this settlement?

96. Did you leave your previous accommodation because

you married recently and you did not want to continue living in your parents' home?	1
you married recently and you wanted your own place?	2
you were just tired of sharing a house with another family?	3
you were tired of the problems of renting a shack in someone's backyard?	4
you were evicted by the owner?	5
you could no longer afford to pay the rent?	6
your family was not allowed to live with you there?	7
you were retrenched or fired from your job?	8
your wages were too low?	10
you were treated badly by your employer?	11
you went on pension?	12
there were no jobs there?	13
NOT APPLICABLE: Did not leave place of birth	14
Other (Specify)	

97. When did you move to live in this settlement?

NOT APPLICABLE: Born here	0000

98. The MOST IMPORTANT reason why you chose to live in this particular settlement is because

you wanted to live closer to work?	1
you wanted to live on a good transport route?	2
you could not find any alternative?	3
NOT APPLICABLE: Born here	4
Other (Specify):	

99. When you are too old to carry on working, do you intend to

return to live at your other home?	1
OR continue living in town/away from other home?	2
Uncertain/Don't know	3
NOT APPLICABLE: respondent has only ONE home	4

100. What type of transport do you use to travel to work?

Bus	1
Train	2
Taxi	3
Both Bus and Train	4
Both Bus and Taxi	5
Both Taxi and Train	6
Train, Bus and Taxi	7
Private Motor Car	8
Lift Club	9
Motorcycle	10
Bicycle	11
Walk	12
NOT APPLICABLE	13
Other (Specify):	

101. [Interviewer: Establish the total floor area of the dwelling (in square metres): (Multiply the length by the width)

m^2

102. [Interviewer: What are the walls of the dwelling MOSTLY made from?]

Blocks	1
Bricks	2
Zinc/Corrugated Iron Sheets	3
Solid Wood Planks	4
Plywood Sheets	5
Wattle and Daub	6
Plastic Sheeting	7
Other (Specify):	

103. [Interviewer: What is the roof of the dwelling made from?]

Zinc/Corrugated Iron Sheets	1
Cement or Clay Tiles	2
Corrugated Asbestos Sheets	3
Plastic Sheeting	4
Tarpaulins	5
Other (Specify):	

104. [Interviewer: What is the ceiling of the dwelling MOSTLY made from?]

No Ceiling	1
Plastic Sheet	2
Cardboard	3
Gypsum Ceiling Board	4
Canvas Sheet/Tarpaulin	5
Other (Specify):	

105. [Interviewer: What is the floor of the dwelling made from?]

No Solid Flooring	1
Concrete	2
Raised Wooden Floor	3
Other (Specify):	

106. [Interviewer: Is the house/shack fitted with a carpet or linoleum?]

Yes	1
No	2

107. [Interviewer: What are the walls of dwelling insulated with on the interior?]

No Insulation	1
Cardboard	2
Newspaper	3
Tarpaulin	4
Chipboard Panels	5
Other (Specify):	

VARIABLES FOR POST-CODING ONLY: (DO NOT FILL IN)

108. How many earners are there in this household? ☐

109. How many unemployed members are there in this household? ☐

110. Stage in the life-cycle

	Unmarried youngsters (younger than 25) without children	1
	Young married/living together couples without children	2
	Young parent/s with first child of pre-school age	3
	Parent/s with first child of school-going age	4
	Parent/s with first child of student/working age (but still living at home)	5
	Household head retired	6
Other (Specify):		

111. Household structure

	Nuclear family (Parents and their own children)	1
	Nuclear family plus parent/s of household head or spouse	2
	Nuclear family plus unmarried relative/s or friend/s	3
	One person living alone	4
	More than one unmarried person living together	5
	Single-parent (mother) household	6
	Single-parent (father) household	7
Other (Specify):		

112. Urban/Rural committment

	Migrant male with wife and children at other home	1
	Migrant male with wife here and children at other home	2
	Migrant male with some children here and rest/wife at other home	3
	Migrant female with children at other home	4
	Rural born, but without rural homestead	5
Other (Specify):		

113. Energy Consumption Type

	Paraffin Only	1
	Paraffin for cooking and Coal for space-heating and cooking	2
	Electricity for cooking and Coal for space-heating and cooking	3
	Electricity Only	4
Other (Specify):		

APPENDIX B

FUEL LOG

DATE:
HOUSEHOLD NAME:
SETTLEMENT/STUDY AREA:

Activity	Type of Foods Cooked (or Water Boiled/Heated)	Appliance Used	Time Appliance in Use	Quantity of Fuel Used
A) Preparing Breakfast	1)	1)	1)	1)
	2)	2)	2)	2)
	3)	3)	3)	3)
B) Preparing Lunch	1)	1)	1)	1)
	2)	2)	2)	2)
	3)	3)	3)	3)
C) Preparing Supper	1)	1)	1)	1)
	2)	2)	2)	2)
	3)	3)	3)	3)
D) Preparing Morning Tea				
E) Preparing Afternoon Tea				

Activity	Quantity of Water (Boiled/Heated)	Appliance Used	Time Appliance in Use	Quantity of Fuel Used
F) Washing Dishes				
G) Washing Clothes				
H) Bathing				
I) Ironing				

Activity	Size of Room/s Heated	Appliance Used	Time Appliance in Use	Quantity of Fuel Used
J) Space Heating	1)	1)	1)	1)
	2)	2)	2)	2)
	3)	3)	3)	3)

Activity	Appliance Used	Time Appliance in Use	Quantity of Fuel Used
K) Radio/HiFi			
L) TV			
M) Refrigeration			
N) Lighting			
O) Multi-End Uses for the same appliance	1)	1)	1)
	2)	2)	2)
	3)	3)	3)
	4)	4)	4)

APPENDIX C

FUEL QUANTITY AND COST SHEET

DATE:

HOUSEHOLD NAME:

SETTLEMENT/STUDY AREA:

Fuel Type	Type of Container	Capacity (litres) or Weight (kg)	How Many Containers are Bought at a Time?	How Frequently is Fuel Purchased?	Cost of Fuel Per Container	Quantity of Fuel per Week	Cost of Fuel per Week
Coal							
Paraffin							
Wood							

Fuel Type	Number of Candles Bought at a time	How Frequently are Candles Purchased?	Quantity of Candles per Week	Cost of Candles per Week
Candles				

Fuel Type	Type of Battery	How Many Batteries are Bought at a Time?	How Frequently are Batteries Purchased?	Quantity of Batteries per Week	Cost of Batteries per Week
Dry Cell Batteries					
Car Battery					

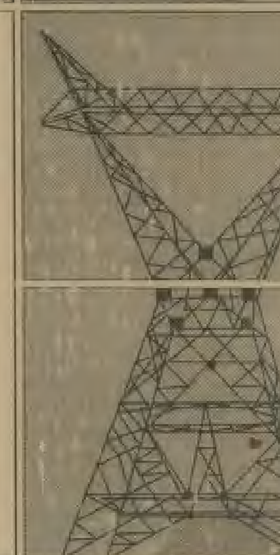
Fuel Type	Capacity of Cylinder: Weight (kg)	How Many Cylinders are Bought at a Time	How Frequently is LPG Purchased	Cost of LPG Per Cylinder	Quantity of LPG per Week	Cost of LPG per Week
LP Gas						

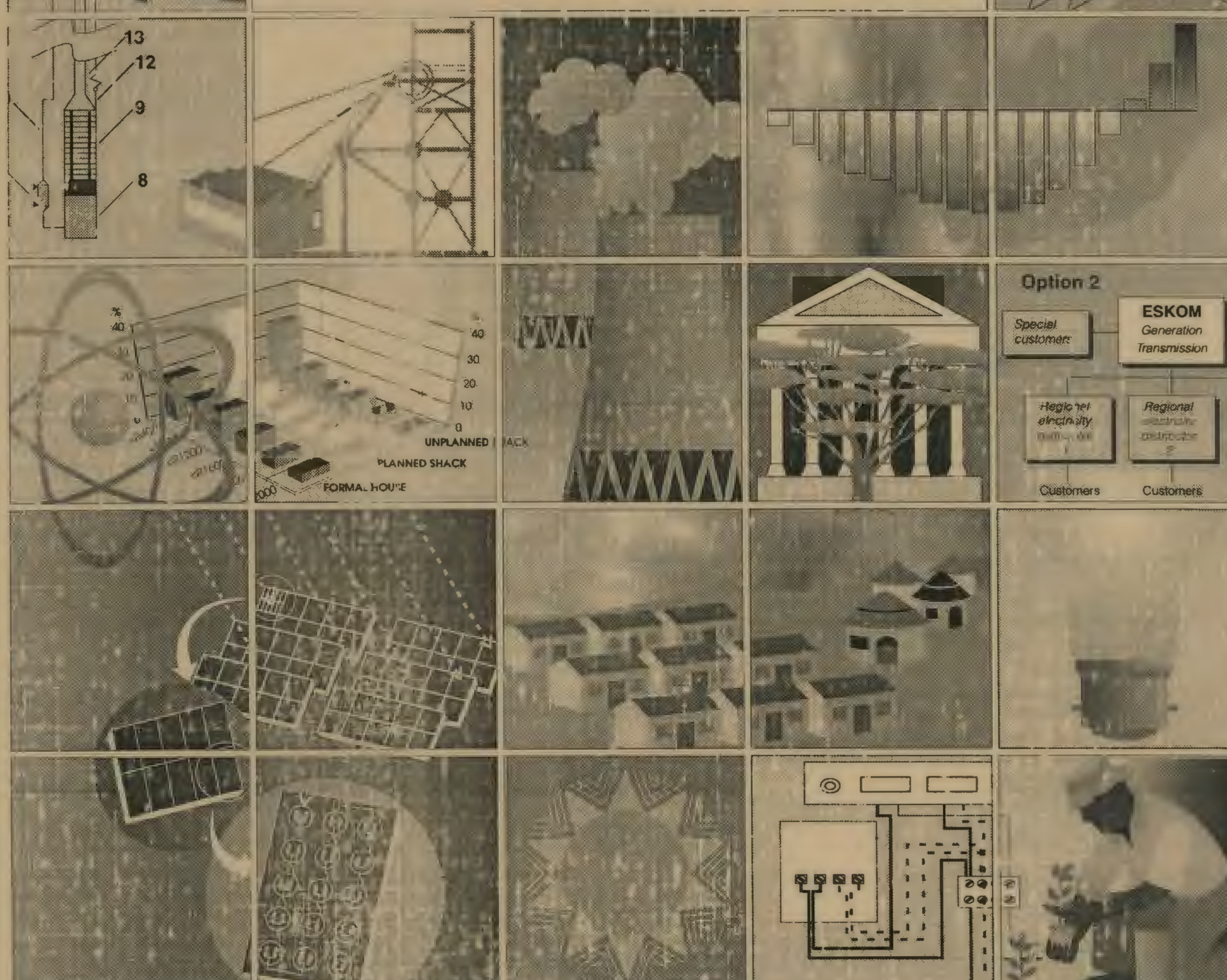
Fuel Type	Unit Cost of Electricity	Number of Unitys per Month	Cost of Electricity per Month
Electricity			

Other Sources of Energy: Provide details on type, quantity and cost below

Social determinants of energy use in low-income metropolitan households in the Western Cape

ANTHONY MEHLWANA
NOMAWETHU QASE





EDRC REPORT SERIES

ENERGY & DEVELOPMENT RESEARCH CENTRE
University of Cape Town