EVALUATION OF SOLAR COOKIT PROJECT IN KAKUMA REFUGEE CAMP

PROJECT OF SOLAR COOKERS INTERNATIONAL

FINAL REPORT

REPORT BY
CENTER FOR INDEPENDENT RESEARCH AND ENERGY FOR SUSTAINABLE DEVELOPMENT AFRICA

EDITED BY
JEREMIAH OWITI

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LIST OF ACRONYMS AND ABBREVIATIONS

AMS	All Metal Stove
CIR	Center for Independent Research
ESDA	Energy For Sustainable Development Africa
ESS	Energy Saving Stove
FGD	Focus Group Discussion
GTZ	German Development Cooperation Agency
IGA	Income Generation Activity
KCJ's	Kenya Ceramic Jikos"
LWF	Lutheran World Federation
OP	Original Project
PO	Project Officer
SCI	Solar Cookers International
SCP	Solar Cooking Project
SOCOCO	Solar Cookers Cooperative
SPSS	Statistical Package for Social Sciences
SWOT	Strengths, Weaknesses, Opportunities, Threats
TG	Target Group
TOR	Terms of Reference
UNHCR	United Nations High Commission for Refugees
WFP	World Food Programme

ACKNOWLEDGEMENTS

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Lastly, whereas we, the consultants team (Jeremiah Owiti, Bernard Osawa, Duncan Onduu and Linus K'Osambo), have received contributions and information from a myriad sources, we have ultimate responsibility for the contents of this report and accept the errors, statements, judgements, interpretations and conclusions drawn herein as our own.

EXECUTIVE SUMMARY

The evaluation of SCI's Solar Cooking project at Kakuma refugee camp was commissioned by SCI primarily to exhaustively review the entire solar cookers project from inception to the present, in anticipation of its phase out and eventual replacement by a refugee trainer operated cooperative. The evaluation is in line with SCI's procedures, much like other development agencies, which highlight the processes, impact and lessons learnt from development projects.

Key findings

Solar cooking devices, and in particular the Solar Cookit, have taken their place as important cooking options for refuges at Kakuma refugee camp.

- The Solar Cookit is now one of the cooking devices acknowledged, and used at the camp, alongside the more established cooking technologies such as the traditional three stone, the All Metal Stove, the improved (Maendeleo) Jiko, and the paraffin stove.
- Solar cooking uptake varies across space and social categories in Kakuma. The highest use is among the target group, the lowest among the vulnerable group. Kakuma 1 has the highest awareness and use rates for solar cooking.

Households that solar cook make considerable savings on firewood and or charcoal compared to those that do not solar cook and also make substantial monetary savings by the standards of the refugee camp.

- The savings in charcoal and firewood often come in handy during periods when firewood rations are delayed.
- The savings in fuel terms also mean that such households enhance their food security, as they do not have to barter food rations for firewood/charcoal, and neither do they go hungry for lack of fuel for cooking food.

Solar cooking is appropriate in the dry, sparsely vegetated, and mostly sunny Kakuma area.

- Rainy and windy days however make solar cooking cumbersome
- Solar cookits are vulnerable to termite attacks, which render them unusable
- Solar cookers are safe for households with small children
- Solar cookers cannot prepare food for large families
- Solar cooking saves especially women refugees the time spent on looking for firewood/charcoal to purchase
- Solar cooking is very useful for preparing foods like grains. It is however slower in making baked products and may not be used to prepare foods like Kisra
- Solar cooking encourages unaccompanied men folk in some communities, such as the Sudanese, to prepare their own food, a practice to which they attach negative stereotypes in the case of fire-based cooking devices.

The solar cooking project was initiated with project infrastructure put in place being sufficient for a smaller scale intervention than would eventually be appropriate for a much larger scale intervention after the refugee population increased nearly three-fold. This may have somewhat limited the potential impact it could have had on the refugee community.

- Communication between the head office, the regional office and the field office at the camp was regular, with the regional office acting as the liaison point and coordinating the provision of supplies and requisitions to the office.
- In view of the paucity of resources at the disposal of the project officer, the achievements such as reaching so many refugees with cookits, training an effective team of trainers and monitors, and getting some favourable rates of uptake and use among the refugees can only be commended.
- The project officer did not have unfettered access to an operations office, and spent most of the time in the field where the office available did not have adequate mobility and infrastructure to support project implementation in the field.
- The project relied on a Memorandum of Understanding with LWF covering hosting and basic facilitation but the facilities committed to the project were often unavailable to the solar cookers project officer. Considerable time and effort was therefore employed in getting very mundane tasks achieved
- The quality of cooperation with agencies working on associated programs was called to question by the less than satisfactory appreciation of these agencies, of the nature of activities conducted by SCI and key benefits accruing to refugees from the project.

On balance the project was highly relevant, performed moderately, and has good prospects for sustainability

- The abundance of dry sunny weather, the plunder of scarce of wood resources in the Kakuma environment and the inadequacy of firewood rations by the camp authorities means that the introduction of solar cokers in the camp was highly relevant. Solar cooker use could reduce dependence on wood based fuel, and in this way mitigate environmental degeneration, sensitise refugees to the benefits of environmental conservation, enable savings on fuel expenditure, and thereby enhance food security for households using solar cooking devices.
- More than 18% of the Kakuma camp population use solar cooking for at least 1-2 days in a week. Those using solar cookers for 3 days and more in a week are nearly 10%. Among the target group, 40% use solar cookers for between 1and 2 days in a week and 30% use solar cookers for 3 or more days in week. The Solar Cookit is the most widely used of the solar cooking devices.
- A notable proportion of the camp residents have reduced their use of charcoal and firewood. In Kakuma 1 for instance, 14% of the respondents used firewood for only 1-2 days in a week and some 9% did not use firewood at all in the week. Further analysis showed that most of those who used firewood sparingly were also using charcoal sparingly, therefore suggesting that this is the group that has become strongly sensitised to the need for environmental conservation.
- A viable exit strategy, based on a refugee trainer cooperative, is in place and is being made known to other development and relief agencies at the camp.
- Trainers and monitors used in the OP and TG phases of the project acquired the necessary skills for using and maintaining the Solar Cookits.

1.0 INTRODUCTION

1.1 Aims and objectives

The Centre for Independent Research (CIR) and Energy for Sustainable Development Africa (ESDA) jointly carried out this evaluation in the month of August 2003 at the behest of Solar Cookers International (SCI). The Centre for Independent Research (CIR) was lead agency.

The evaluation was to exhaustively review the entire solar cookers project from inception to the present, with the aim of understanding, among other things; the highpoints and challenges of implementing the project, including the relevance, performance and sustainability of the project; the advantages, especially in monetary terms, which have accrued to users of solar cooking technologies compared to others; the nature and extent of use of solar cooking technologies and factors influencing its uptake; the impact of solar cooking technologies on vulnerable demographic clusters (children, women-headed households etc); and the opportunity cost to households, of using fire wood and charcoal as primary cooking technologies.

1.1.1 Poverty, firewood consumption and the environment

Nearly one third of the world's population depends on wood and charcoal for cooking fuels, the large majority using these fuels primarily because they are poor. This number of people using resources that are not expanding at the rate in which they are exploited is a catastrophe waiting to happen. Thus the sustainable use of natural resources (including among other things, land, water bodies, the air, forests and precious minerals) has been a prominent feature of development discourse the world over for a long time now. This is not accidental, as the very survival of the human race depends on how it uses and exploits natural resources now, and protects them for the benefit of posterity.

The problem of the poor is compounded by the relatively high proportion of family expenditure on fuel for cooking food. By promoting solar cooking solutions, SCI hopes to simultaneously relieve the conflict between the needs of the poor and the global effort to conserve dwindling forest resources, and to ameliorate the misery and hopelessness faced by the poor, by releasing resources that can subsequently be spent on other crucial needs such as education, medicine, tools, seed and food.

1.2 Scope and Focus of the evaluation.

It was our understanding that SCI wished to have an objective review of the solar cookers project that would realize four key outputs:

- Provide a comparative perspective on different cooking technologies (mud-stove, solar cookers, maendeleo jiko and others) at Kakuma refugee camp, highlighting the relative prominence of one, or a combination of cooking technologies in daily household cooking, and the opportunity cost of this in specific reference to firewood use and savings.
- Provide a systematic analysis of the nexus between cooking technologies and per capita firewood consumption, as well as patterns of money and food allocation, using households that have taken up solar cooking as the control group.

- Provide a comprehensive report on the efficacy of the varied uses of solar power and highlights the impact of solar cooking on particular demographic clusters (children, unaccompanied males, women-headed households etc)
- Provide an informed basis for lesson learning from the solar cookers project, and in this way, make considered inferences covering issues such as the appropriateness of the project design, factors affecting implementation and management of the project, and ultimately, the relevance of the project to the needs and aspirations of the target group.

In realizing the first output, it was our understanding that SCI wished to receive an objective perspective on the solar cookers project when looked at in the context of the poverty situation, the general scarcity of firewood and the alternative cooking technologies available to the refugees at Kakuma. It was therefore also our understanding that in meeting this objective SCI sought an objective commentary on the value added that solar cooking has contributed in the generally difficult lives of the refugees. Therefore the evaluation paid keen attention to the savings in firewood use and ultimately household budget allocations to purchase of firewood occasioned by the use of solar cooking.

In realizing the second output, a comprehensive analysis of sources, origins, current prices and trends in pricing of firewood on the one hand, and per capita firewood consumption based on the main cooking technologies that households use on the other hand was done. A market survey was conducted to facilitate analysis on sources and pricing of firewood .The analysis of per capita firewood use made it possible to make inferences on savings made per capita on firewood consumption and the uses that are made of such savings. Such uses invariably included greater allocations to food budgets.

In realizing the third output, information was gleaned from the respondents on their own perspectives on the range of benefits accruing from use of solar energy, and also to built on findings and analysis in the second output by disaggregating data on the benefits and impact of solar cooking on demographic clusters mentioned.

The results of the evaluation along the three outputs outlined contributed to realization of the fourth output, which was the generation of lessons learnt from the solar cookers project, including the best practices in the management of a project of this nature, and considerations of its sustainability. In addition, we conducted a SWOT analysis of the solar cookers project, covering its design, implementation and management in view of the interests and normative concerns of key stakeholders, namely SCI, collaborators such as GTZ and LWF, UNHCR and the refugees themselves.

1.3 Target area site and situation

The kakuma refugee camp region lies in the heart of the arid lands of Turkana District in the North-western corner of Kenya. Turkana district is the largest district in Kenya, covering a total of 77,000 KM^2 and situated between longitudes 34^0 0' and 31^0 40' east and between latitudes 10^0 30' and 5^0 30' north. The district is a frontier district, bordering Ethiopia to the north east, Sudan to the north west, and Uganda to the west. It also borders Baringo and West Pokot districts to the south, Samburu district to the south east and Marsabit district to the east.

The district has a population of 485,627 (National census 1999), of which 104,625 reside in Kakuma division, which not only has the highest population density (29 persons/Km^2) of the 17 administrative divisions of Turkana district, but also hosts an estimated refugee population of 86,000 (as of Dec 2002). The Sudanese constitute about 60% of the total refugee camp population while the remaining proportion is represented by the Somalis, Ethiopians, Congolese, Burundi's, Eritrea's, Oromo and the Ugandans.

The soil is sandy with patches of black cotton soil. The natural vegetation is largely acacia of different sub-species, the larger ones found along riverbanks and on the hills surrounding the camp. The climate of Turkana district is mostly hot, and temperatures range between 24^0C and 38^0C. Most days are sunny, with mean temperatures of 30^0C and an annual mean daily insolation of 6.2 KWh/m^2. The rainfall pattern and distribution is erratic and unreliable in time and space, with an annual rainfall of less that 300mm. Due to the low rainfall and high temperatures there is a lot of evapotranspiration resulting into deposition of salt in the soil and capping on the surface. As a result, only about 30% of Turkana district's soil can be rated as moderately suitable for agricultural production. The area is also very windy, with estimated annual wind speeds of $4ms^{-1}$ and wind power densities of 100 Wm^{-2}.

1.4 Energy and environment

Energy supply to Kakuma refugee camp is principally through firewood, charcoal, Kerosene, and diesel. Charcoal and firewood are the major sources of energy for cooking, while use of kerosene is largely used for lighting.

One of many problems encountered by the camp administration over the years has been the supply of cooking energy to meet the needs of the refugees. Because of the fragility of the local ecosystem, the establishment of the camp was bound to cause unfavourable environmental side effects, as well as conflict between the local community and refugees over scarce resources, including domestic energy

To mitigate deforestation in the immediate area in the early years of camp establishment (1992-94), the camp administration utilized charcoal bought from Turkana and, later, other districts. Refugees were supplied with portable "Kenya Ceramic Jikos" (KCJ's) to efficiently use the charcoal. Even though this strategy avoided a short-to-medium term fuel crisis and forestalled firewood cutting, which would otherwise have occurred in the area, the supply of charcoal was discontinued and replaced with firewood in 1995 after a review.

The largest portion of the refugee community in Kakuma currently access energy for cooking primarily in the form of firewood rations provided by GTZ since the last two years (previously LWF provided firewood), and by purchasing firewood and charcoal from market centres within the refugee camp. Plant residues, used building materials and wood shavings from wood workshops are used to supplement firewood and charcoal.

1.5 Socio-Cultural aspects and Community development activities

The population of the refugees in Kakuma is estimated at 86,000 people. The Sudanese constitute about 60% of the total camp population while the remaining proportion is represented by the Somalis, Ethiopians, Congolese, Burundians, Eritreans, Oromo, Rwandans and Ugandans. The settlement patterns are in such a way that there is some form of clustering in residence by country of origin and even sub tribe as was established during the evaluation. This, we learnt, is to facilitate ease of cohesion and maintenance of a "home" environment, although Kakuma 1 Zone 5 is an exception to this general rule, being inhabited

by refugees from a cross section of countries and the population is less clustered around country of origin, unlike the other settlement areas as shown hereunder.

Table1: Kakuma camp population representation

Location	Representation	
Kakuma 1	Zone 1	Didingas, Dinkas, Latuko, Ugandans, Lopit, Bare, Madi, Acholi, Sudanese
	Zone 2	Dinkas
	Zone 3	Dinkas
	Zone 4	Dinkas
	Zone 5	Somalis, Sudanese Nuer, Ethiopians, Congolese, Burundis, Eritreans, Oromos, Rwandese,
	Zone 6	Dinkas
Kaluma 2	Somalis-Barawa, Bajuni, Bantu Phase 1: Barawa, Bajuni Bantu Phase 2: Sudanese mixed, barawa Phase 3 : Barawa Bajuni Bantu	
Kakuma 3	Community: Sudanese Dinkas Protection area: Mixed Reception: Mixed	
Kakuma 4	Somali Bantus	

Source: Field Survey, 2003

Within the camp, marriages are largely between the same tribe and few cases of intermarriage are reported if any. Among the Sudanese for example, marriage is regarded as a very important occasion with very elaborate activities undertaken. Indeed, as a sign of what is coming, they hoist a flag at the future homestead of the couple to be, to inform all and sundry of the impending marriage. FGD's among the unaccompanied Sudanese youth testified to the fact that even having a girl friend is not an easy thing as their culture discourages pre-marital sex.

The youth have ample facilities that are used for recreation and for nurturing talents. The games played are mainly football[1] and basketball, which are played in almost every zone. During the evaluation period, no girls were encountered engaging in any recreational or sporting activity. There are also commercial video shows, largely in Kakuma 1 and 2.

Community development within the camp is being undertaken by both the United Nations agencies and international relief and development organizations. The co-ordinating agency

[1] Discussions with the youth revealed that the majority of them are more conversant with the European football championships with youth donning t-shirts having labels of the Europeans stars. This is on the premise that the majority are out of touch with the sporting activities that happen in Kenya, which some even consider as "another country".

on the part of the UN is the United Nations High Commission for Refugees (UNHCR). The main implementing partners within the community were identified as:

- Lutheran World Federation (LWF): Lead agency and camp manager, is involved in education, water and sanitation, community services, which are also done in liaison with Don Bosco and Jesuit Refugee Services. The SCI solar cookit project is hosted by LWF.
- World Food Programme (WFP): Focuses on provision of the food rations to the community, sometimes done through LWF. These are principally to enhance school attendance. WFP is also involved in income generation activities in the camp.
- German Development Co-operation (GTZ): Basically involved in environmental management and conservation activities. These are done through the planting of trees and the provision of energy saving stoves.
- International Rescue Committee (IRC): Health issues; preventive and curative.
- World Vision: Provision of shelter.
- National Council of Churches of Kenya (NCCK): Operates through organizations such as IRC and focuses on reproductive health issues.

By and large, it was noted during the evaluation that the level of community consultation and involvement depended on the nature of the development initiative in question. While some involved the communities extensively, others did not because the nature of the service didn't necessitate it. A case in point is the construction of the houses where World Vision provides the construction material but normally enlist the services of the beneficiary community members in the construction of the same. The same was also the case with initiatives on water and sanitation. Such measures are often part of the process towards building in counterpart contribution and tapping of both skilled and unskilled labour.

The involvement of the refugees in the implementation of development initiatives ranged from awareness creation and sensitization, training and capacity building, information sharing and dissemination and also the creation of structures that would enhance sustainability, much like the Solar Cookers Cooperative.

The camp also has the community elders' structures that are not only seen as entry point in social change process interventions, but also the locus opinion shaping in the camp. The structures are largely heterogeneous across the different Kakuma's as decision-making and development perception is heavily influenced by the different cultures. As it is characteristic with many other domestic responsibilities, the women still play a key role in collecting firewood rations and going to purchase the same in Kakuma. From the public survey, anecdotal evidence of the overwhelming participation of women in sourcing domestic fuel was confirmed, hence echoing the patriarchal nature of the refugee communities.

In respect to membership in community groupings, information obtained from the public survey indicates that nearly half did not belong to any community group, while for those who did, the greatest proportion belonged, in descending order, to a local social grouping, community cooperative groups, and women's development grouping. The generally low participation in cooperatives may provide useful insights in the conception and planning for the Solar Cookers proposed Cooperative. Trapped in a condition many consider transient, having been dislocated from their roots, it is little wonder that most refugees have little more than a passing interest in associational life, including joining cooperatives.

1.6 The solar cooking project

In line with its mission ***to assist communities use the power of the sun to cook food and pasteurise water for the benefit of people and environments***, Solar Cookers International (EA) implemented the Solar Cooking Project (SCP) in Kakuma Refugee Camp, Kenya. The project started in 1995 in Kakuma 1 as a pilot. The project has an "off-shoot" which is referred as the Target Project (TG), with the entry initiative referred to as the Original Project (OP).

According to the 2001-2003 project document for both projects (TG) and (OP), the following are itemized:

Target Group

Overall Goal:

To implement a targeted approach for enhancing solar cooking and water pasteurization in a refugee setting.

Specific Objectives:

1. To stimulate highest possible usage of Solar Cookers amongst Target Group (TG).
2. To enhance the growth of skills amongst beneficiaries (TG) in order to facilitate broader application.
3. To document benefits and lessons learnt.
4. To implement a phase out strategy that would enhance project sustainability.

We examine the extent to which some of these specific objectives are achieved in the section on project performance

Project Output

1. Increased use of the CooKit and water pasteurization.
2. Increased knowledge and application of the solar cooking technology.
3. Documentation-monthly reports, mid-term review, annual reports, evaluation.
4. " A model project on Solar Cookers dissemination".

These should be translated thus;

Increased use of CooKit for: ▪ Cooking ▪ Water Pasteurization	▪ 30% of TG will use Solar Cooker in the first 3 months ▪ 50% of the TG will Solar Cook in the first Six months ▪ 75% of TG will Solar Cook on most sunny days

Original Project (OP)

Overall Goal: To establish Solar Cooking as a widespread practice within the camp, that produces significant improvement in people's lives.

Specific Objectives:

1. Achieve a high usage rate of Solar Cookers by the end of the fiscal year 2003.
2. To reduce the amount and extent of firewood use by families.
3. To reduce the amount of money or other resources spent to purchase firewood.
4. To achieve a phase out transition that would provide continued access to Solar Cooking supplies and training after departure of SCI.

Systematic Objectives

1. To demonstrate a significant reduction in the use of Fuel-wood in the Kakuma refugee camp.
2. To integrate solar cooking with other cooking technologies and energy saving techniques in order to promote energy saving
3. To train and monitor volunteers who use Solar Cookers to pasteurise water using the WAPI.

Project outcomes

- 70% usage of CooKits in Kakuma by the end of Fiscal yr 2003.
- Amount of firewood use reduced by 25% for families who Solar Cook as compared to those who don't.
- Amount of money spent on resources battered to purchase wood reduced by 25% for families who Solar Cook as compared to those who do not.
- 50% reduction of firewood use by Solar Cooks in Kakuma 1.
- 66% of families who Solar Cook also use other energy saving practices.
- Access to training and Solar Cooking supplies after SCI phases out.
- 75% of volunteer families who solar cook also pasteurize river water using solar cooker.

Solar Cooker Project activities

The project was designed not only to provide information about the CooKits but also opportunities for the client community (refugees) learn practical ways of using the CooKits. These activities, although sequential in nature, often take place simultaneously.

Table 2: Project activities

ACTIVITY	PURPOSE
User training workshops	▪ Often used to sensitise the community on solar CooKits in a bid to make them choose and adopt the use of the technology
Home-visit[2]	▪ It helps solve the problems the users face while in the field ▪ It facilitates collection of information on various savings made by the solar cooking, kinds of food cooked and cultural issues that support or hinder Solar cooking
Group Demonstration	▪ Used for explaining the solar cooking technology to the public and often includes issues such as care and maintenance of equipment, setting and possible repairs ▪ Providing costs, sourcing points and types of cookers existing ▪ They may train the public on basics of solar cooking such as water pasteurization. The process of training may include public demonstration ▪ This also provides a listening forum for the Solar Cookers International personnel to get ideas from the community on issues relating to solar cooking
Transect walk	▪ The main purpose is to find out the rate of solar cooking and also count the number of CooKits being used during sunny periods
Refresher Training	▪ These are provided to those who have already received the training in the use of the CooKits and it is a means for updating their skills in the use of the technology and providing them with new information
Maintenance	▪ The black pot with black lid is painted from time to time to ensure that they are black and that it continues to absorb sunlight and store heat[3] ▪ The reflector is also supposed to be kept in such a way that it is not interfered with by externalities like termites etc ▪ SCI issued plastic bag replacements where they had been worn out or lost. Eventually these were sold at a nominal cost to enhance ease of access by users
Staff Meeting	▪ These are key as they act as planning and review sessions by SCI staff, Supervisors, Trainers and the Monitors

[2] When the Monitors conduct home visits, they often probe on the use of the CooKits by asking questions such as; when did you last use the CooKits, did you keep the CooKits well, the condition of the plastic bag. Other than the questions, they are also engaged in observation and look at things such as evidence of CooKit usage, storage of CooKit, the condition of the pot, and the status of the plastic bag.

[3] A pot repainting is usually done on demand on Saturdays while users are consequently trained on maintenance and they are instructed not to use sand or steel wire for washing the outer parts of the pots.

2.0 METHODOLOGY AND APPROACHES FOR THE EVALUATION:

The work was executed broadly along the lines suggested in the TOR. Both primary and secondary data gathering methods were used as explained hereunder.

2.1 Methods and instruments

2.1.1 Desk review

All relevant secondary material were reviewed, which included among other documents, strategic and operational plans, financial and progress reports, evaluation reports, and other relevant documents held by the SCI.

2.1.2 Key informant interviews

Interviews were carried out with persons strategically placed to possess vital perspectives on the solar cookers project in Kakuma. Some key informants included relevant personnel at SCI, and LWF, the major collaborating institution, as well as GTZ and UNHCR personnel. Interviews with each critical set of key informants was conducted with the help of interview schedules that were developed

2.1.3 Focus group discussions

Participants were mixed groups or from same category but different zones comprising, among others, community leaders, solar cooks, non-solar cooks, women, target group members, and unaccompanied youth.

2.1.4 Household and firewood measurement survey

A survey covering the general refugee population at Kakuma was conducted. The survey chiefly employed a questionnaire and a firewood measurement form. Once administered and analysed, these two instruments allowed for descriptive statistics representative of the study population on selected themes.

2.1.5 Market survey

A market survey was specifically done for the purposes of generating information on the sources, the origins, current costs and trends in the pricing of firewood. We sought to understand the framework for sourcing, supply, distribution, and point of sale of firewood and the factors that have contributed to the efficiency, or the converse, of this framework.

2.2 Sampling

2.2.1 Sampling design

The sample design used for the general evaluation was decided upon a critical look at the camp demographics, which meant that a neat stratification could not be achieved, and also the nature of implementation of the Solar Cookit project, which had concentrated in Kakuma 1. Thus a combination of stratified, purposive, random and probability proportional to population size (PPPS) sampling techniques were employed. PPPS was used to arrive at the first level of stratification along administrative zones (Kakuma 1-4). Purposive sampling was used to get set numbers of vulnerable, target group members and unaccompanied youth as sub-samples (n=30). In respondent selection for the broader sample, we employed a 4-stage design that was household based, and employing random methods of selection at every stage. The sample design had four important stages, namely: Stratify and randomly select primary sampling units; randomly select starting points; randomly select households; and randomly select individual respondents.

2.2.2 Sample frame

The sample frame was the household listings available from camp authorities. The listings contained the names of refugees in a manner generally consistent with clusters such as country of origin, year of arrival at camp and group number, lingual and cultural sub-groups, the spatial/geographical set of the camp and the administrative units into which the camp is divided (Kakuma 1-4 and the zones and phases within them).

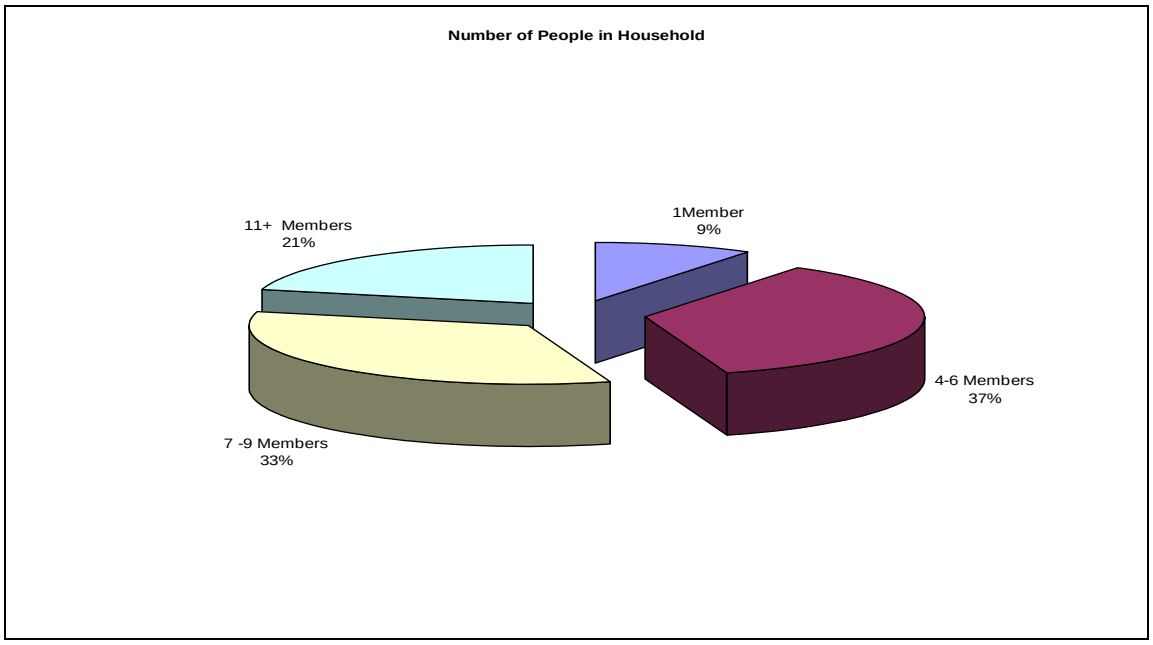
2.2.3 Sample Size

Sample size is a function of the degree of homogeneity/heterogeneity of the population, desired precision, type of sampling design, sub-strata sizes acceptable at analysis, availability of resources and logistics. Kakuma Refugee Camp is a highly heterogeneous area with refugees drawn from different neighbouring countries (Uganda, Ethiopia, Sudan and Somalia). Based on the current refugee population (about 86,000) a sample of 310 respondents was worked out drawn from Kakuma I, II III and IV for the general survey. Given this sample size, and the rigorous sampling techniques used in choosing respondents, the margin of error for the general survey is approximately +/- 2%.

The sample size for the fuel measurement study was 33 households with fuel measurements being conducted over a period of 7 days at a frequency of three times daily. The sample group comprised six unaccompanied youths, ten solar cooker target group members, ten vulnerable and seven normal[4] households. Composition by gender of those interviewed was 75.8 % female and 24.2 % male. 70% of the households were female headed while males headed 30%. Figure 1 below shows the breakdown of households for the fuel measurement survey by size.

[4] Normal in this case refers to a household that has a mother, father and child(ren)

Figure 1: Breakdown of Households by Size.



2.3 Data Analysis and Interpretation

Data obtained from the field was analysed along the evaluation objectives and other desired themes identified by SCI. Quantitative data (from the questionnaires) was coded and analysed using SPSS. Qualitative data, on the other was analysed along the major research themes. The evaluation team agreed on the judgments and inferences to be drawn from analysis through consultations.

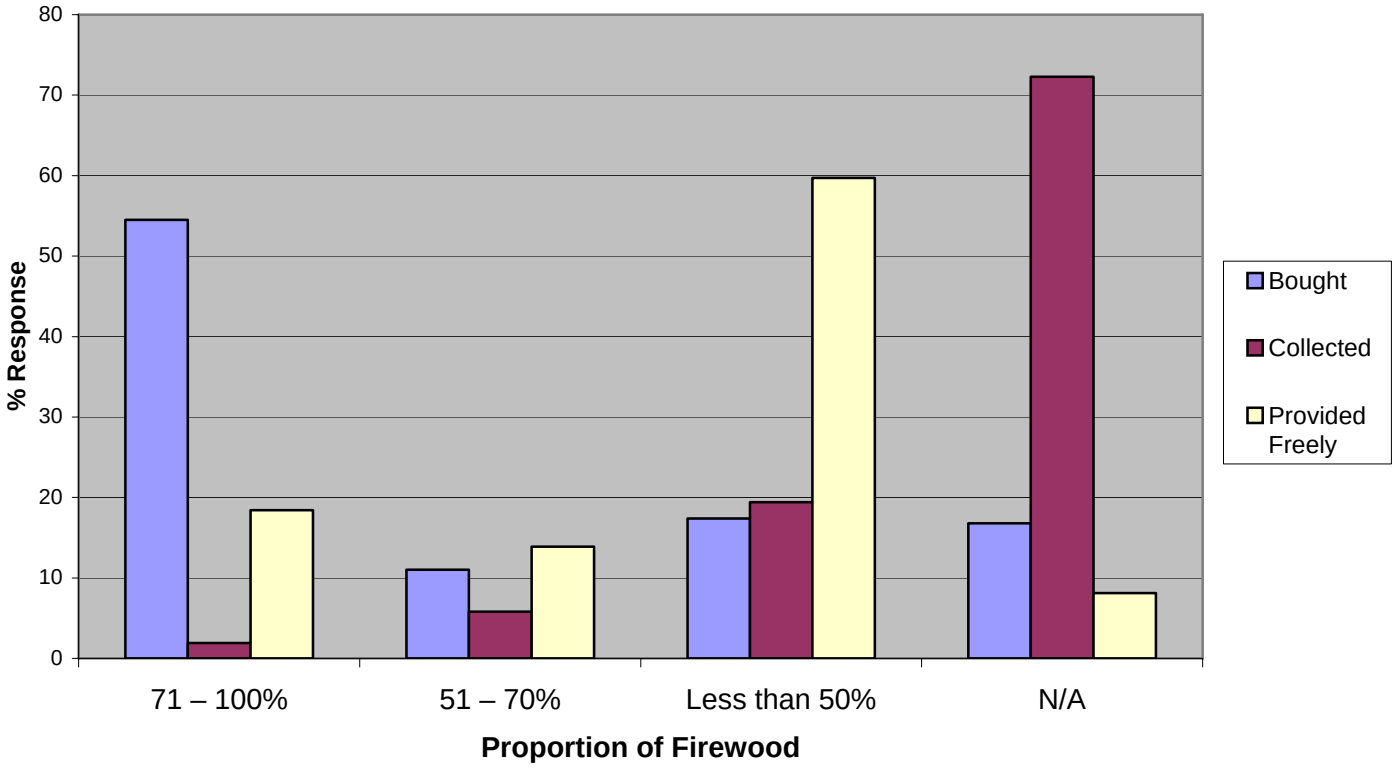
3.0 STUDY FINDINGS

In this section we highlight the results of the general household survey, the firewood measurement survey and the market survey. We have used data from each component of the study to complement and qualify findings from one another.

3.1 Energy sourcing, pricing and utilization

Normally, firewood rations are supplied to refugees within the camp. During the survey, refugees indicated that they had not received wood rations for three months. Ration sizes are 3.5 kg per person per 15 days. No charcoal is distributed. Figure 2 below shows that the refuges increasingly buy their own firewood. Indeed, 55% of the respondents said they bought more than 70% of their firewood requirements, compared to 11% who bought 51-70% of the firewood they used and 17% who bought less than 50% of their firewood requirements. Another 17% did not buy firewood. In contrast, only 18% of the respondents said they were provided freely with 71-100% of their firewood requirements, 14% said they were provided freely with 51-70% of their firewood requirements, and, not surprisingly therefore, 60% of the respondents said the firewood provided freely to them made up for less than 50% of the firewood they used.

Figure 2: Proportion of Firewood Acquired from Various Sources



There is minimal variation on the pricing of firewood and charcoal between market centres within the camp. While charcoal pricing seems to stay constant irrespective of supply and the weather, firewood prices vary, though minimally, by up to Ksh. 5-10 for small to large bundles depending on the demand and weather. I.e. Prices go up when there is short supply and rainfall. This can be attributed to the fact that charcoal has a longer history in the camp, with more stable pricing and constant availability for those who can afford it. In contrast firewood supply through rations is erratic hence price instability when demand outstrips supply.

Figure 3: Currency Spent on Household Fuel Per Week

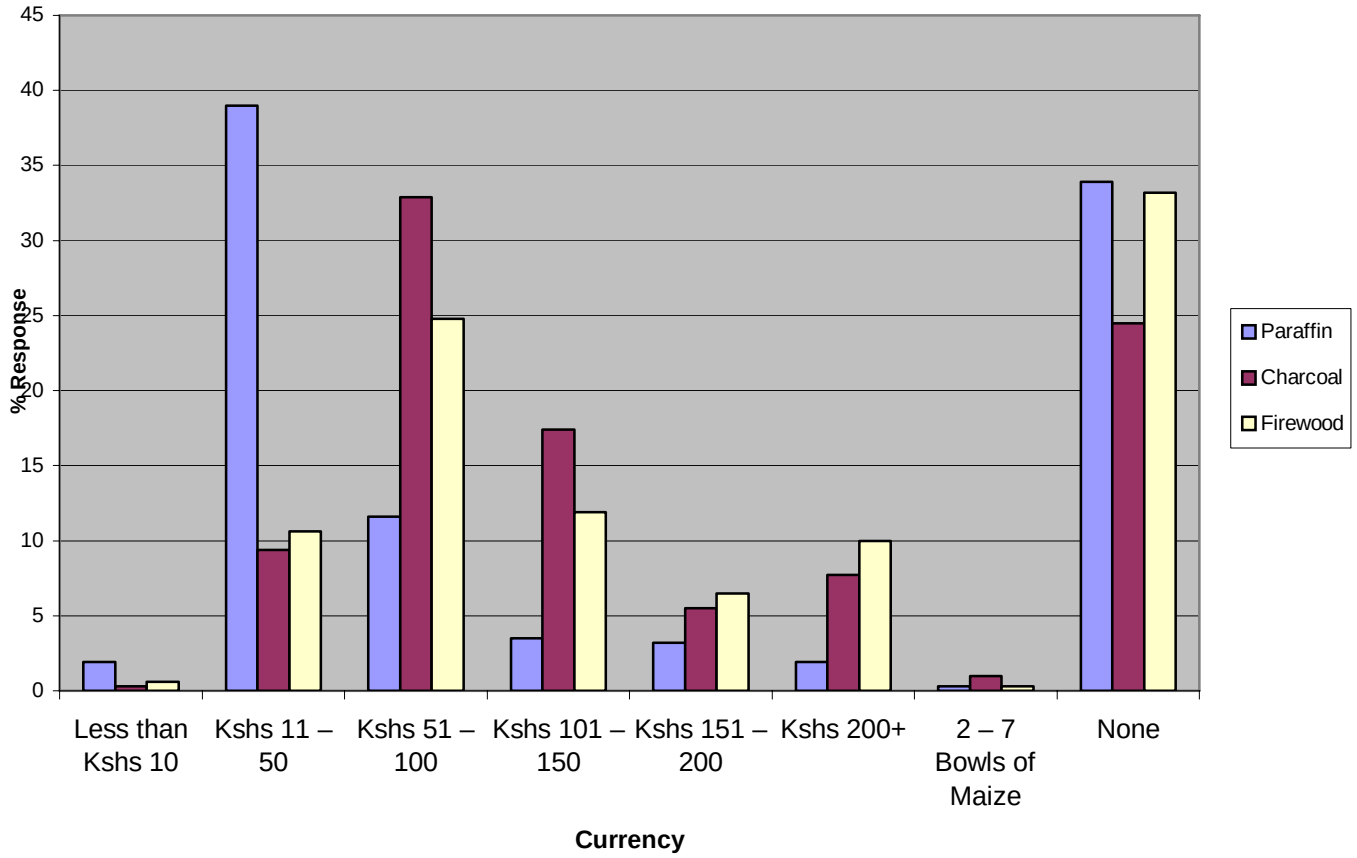


Figure 3 above shows the currency spent on household fuel per week. Only paraffin is bought primarily in cash. Purchase of firewood and charcoal on the other hand is in cash or by barter for grains, especially maize. Local Turkana vendors prefer to barter firewood and charcoal for grains (especially maize). Grain prices fall when food rations are distributed hence firewood vendors prefer to barter and do roaring business during such periods. Table 3 below shows the pricing for firewood and charcoal for the various market centres within the camp. For firewood, three sizes of bundles are available, typically weighing between 3 – 24 kg depending on the type of wood and market centres or zone where sold. Charcoal is also widely sold in the markets but in one standard unit, the basin.

Table3: Prices and weights of firewood and charcoal sold within Kakuma camp

Fuel Type	Weight (Kg)	Price (Ksh.)	Price (Kgs. Of Maize)
Firewood (Large)	20-24	120 - 180	10-12
Firewood (medium)	10-13	50 - 80	5-7
Firewood (Small)	3-5	10	1.5
Charcoal (basin)	10-13	70	5 -7

Average unit prices are Ksh. 5.6 /kg of firewood and Ksh. 6.2 /kg of charcoal. From surveys conducted within the camp firewood and charcoal were observed to be marginally cheaper when purchased from hawkers than from the market centres.

Figure 4: Weekly Frequency of Usage of Various Fuels

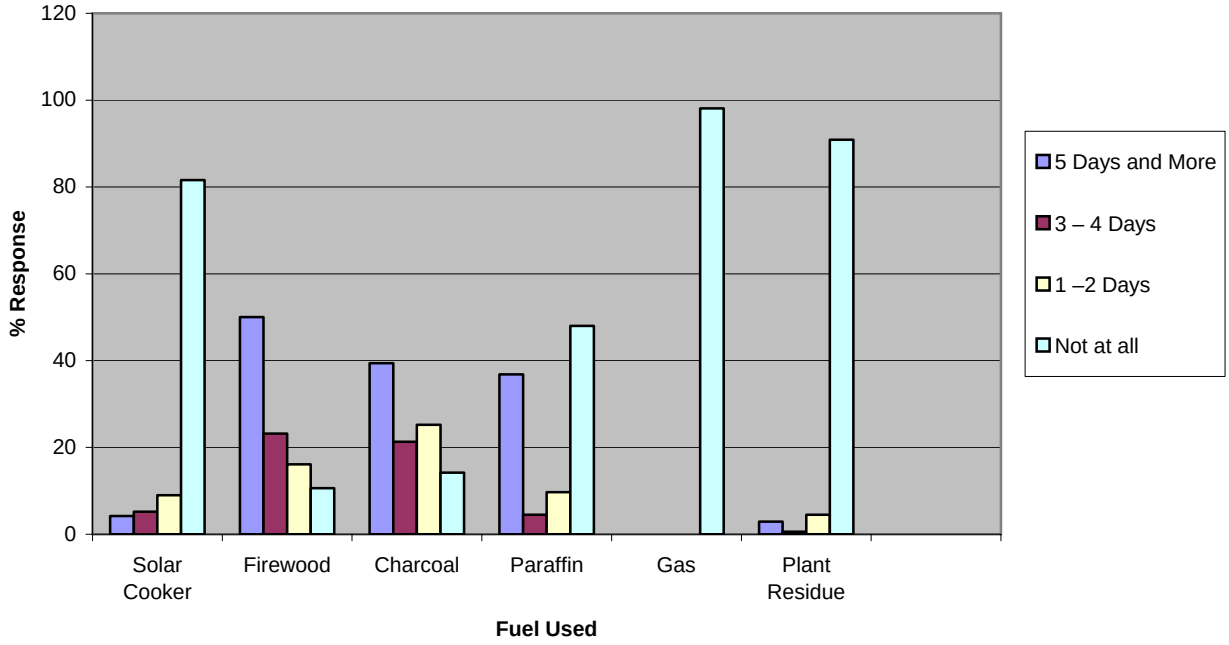
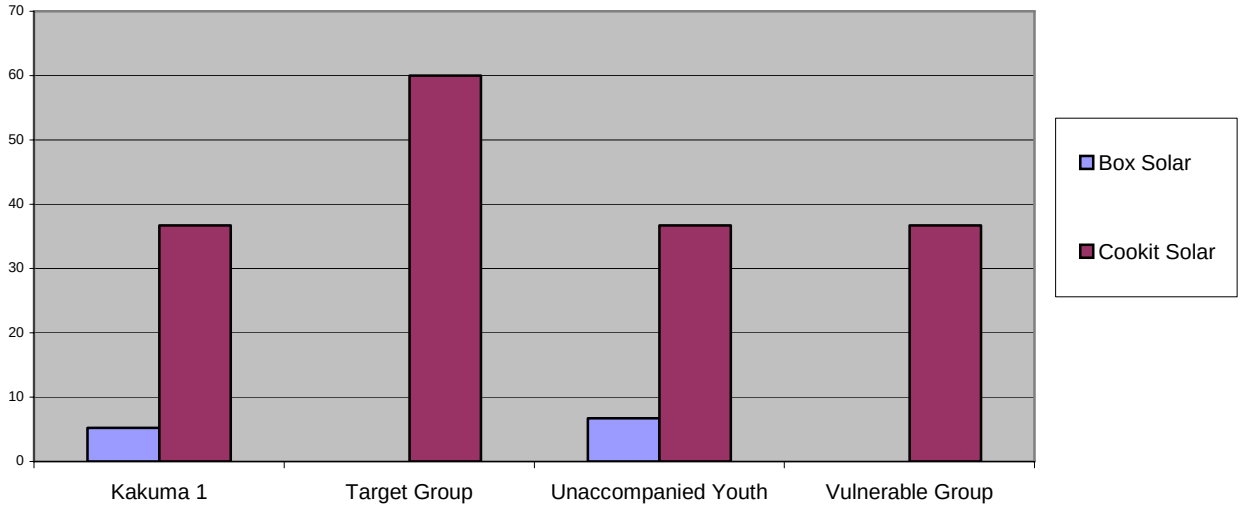


Figure 4 shows the frequency of use of different fuels at the camp based on the general household survey. It can be seen from this figure that the use of solar cookers is much lower compared to firewood and charcoal. Of the general households we investigated, the proportion using solar cookers for at least once in a week stood at 18.4%, while those who said they use solar cookers for three days and more in a week are 9.4%. Among target group, utilisation of solar cookers is 40% for between one and two days in a week and 30% for three and more days in a week (see fig. 16). These figures may be lower than the 55% utilisation in the target group reported by SCI in its monthly reports, but they nonetheless suggest that solar cooking is now one of the key sources of domestic cooking energy in the camp. In addition to the Solar Cookit, other solar cooking devices are used in Kakuma as shown in figure 5 below. Self evidently, the Solar Cookit is the most widely used of the solar cooking devices, and widest use is among the target group. The Box cooker is predominant among the unaccompanied youth, this being the group that had been used to promote it.

Figure 5: Types of Solar Cookers Used in Kakuma



The extent of use of charcoal and firewood within the camp varies with zones, which could be attributed to the energy use preferences of the communities that live in the zones. While firewood and charcoal use is common in all areas, Zone 5 was found to predominantly use charcoal in households. Firewood use in this zone is mainly in commercial establishments. Relative to the rest of the camp communities living in zone 5 generally have better income (especially from remittances and the numerous businesses), and hence can afford charcoal, which is less bulky than firewood and considered easier to use.

3.2 Usage of Cooking Devices

Consequent to the energy supply options available within the camp, the major cooking devices within the camp are traditional three stone fires, energy saving stoves (KCJ and some Kuni Mbili stoves), All Metal Stove (AMS) and solar cookers. The All Metal Stove (AMS) is the single most predominant cooking technology for Kakuma II and III while in Kakuma I, an assortment of cooking devices are used in different proportions.

3.2.1 Breakdown of usage of different cooking devices

Table 4 shows the combination of cooking devices found in households interviewed. No households were found to use only one type of cooking device

Table 4: combinations of cooking devices used in households

Cooking Device	Percent Use
All Metal Stove (AMS)	21%
Paraffin stove	6%
T3S and All Metal Stove (AMS)	45%
T3S, All Metal Stove (AMS) and solar cooker	3%
ESS and All Metal Stove (AMS)	3%
T3S,ESS,All Metal Stove (AMS), Paraffin stove and Solar Cooker	6%
T3S, and Solar Cooker	9%
T3S,paraffin stove and solar cooker	3%
T3S, All Metal Stove (AMS) and paraffin stove	3%
Total	**100%**

As can be seen from table 4 above, the single largest combination of cooking devices found in the households is the traditional three stone fires and All Metal Stove (AMS). The largest single device used is the All Metal Stove (AMS). The largest combination of cooking devices that involves solar cookers is the traditional three stone, All Metal Stove (AMS) and solar cooker.

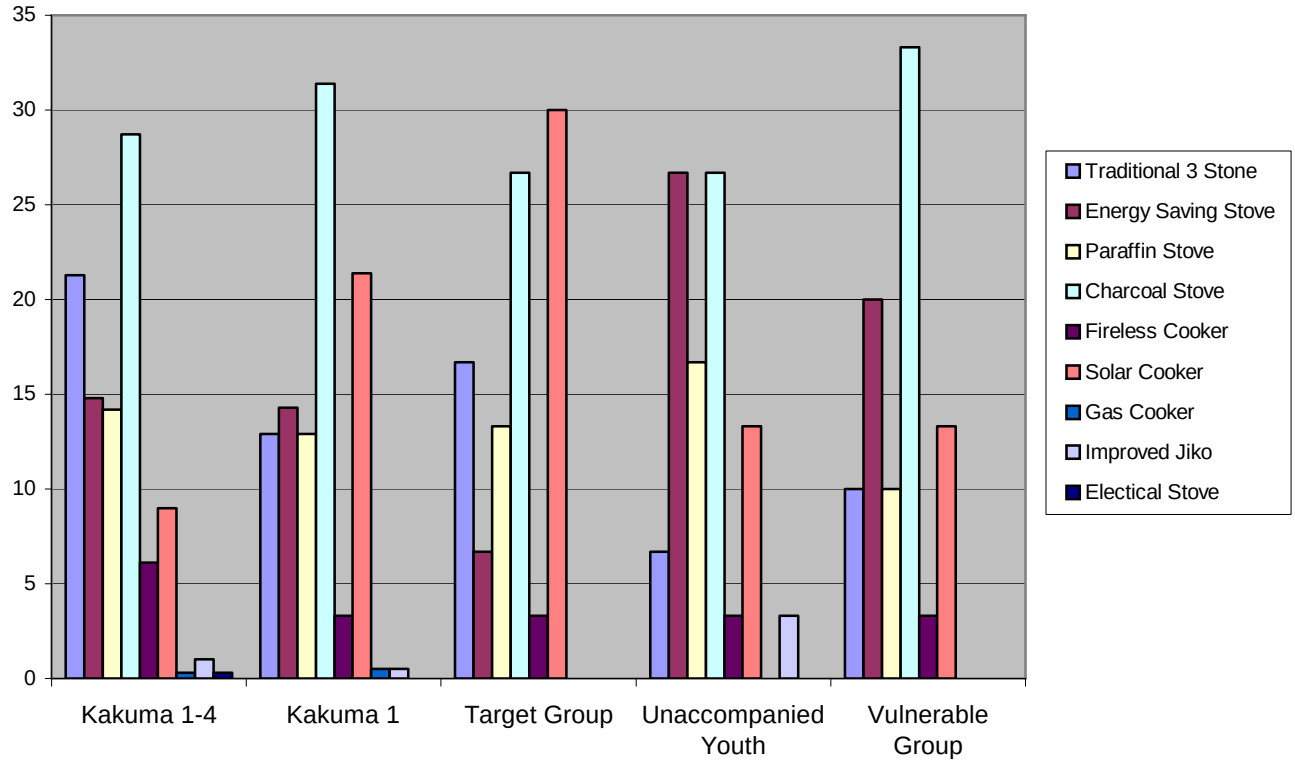
Overall, firewood use is widespread within the camp, with 69% of the respondents in the firewood measurement study using the traditional stone fire. Charcoal is largely used with All Metal Stove (AMS). Only 3 % reported using improved charcoal stove and these were from Kakuma 3 where a significant proportion of the households posses this coking device. 12% of the respondents in the firewood measurement study used solar cooker, mainly to mitigate fuel constraints. Kerosene use among the general group of respondents is much higher than that among the measurement group.

In the general household study as well as in the fuel measurement study, firewood and charcoal are used much more frequently than solar cookers. Thus about 80 % of households interviewed in the fuel measurement study indicated that they do not use solar cookers at all, in comparison to 10 %, 14% and 48% for firewood, charcoal and kerosene respectively.

When asked to indicate preferred cooking device given a choice, the respondents rated the All Metal Stove (AMS) first (29%), the traditional three stone second (21%,), the energy saving stove third (15%), the paraffin stove fourth (14%), and the solar cooker fifth (9.0%). The figure for those that would prefer the solar cooker above all other cooking devices is roughly consistent with the proportion of respondents who indicated they used the solar cooker three and more times in a week (9.8%)

As captured in figure 6 below, further analysis by cross tabulation reveals differences in cooking technology preferences across space and groups in Kakuma. For instance, preference for use of the All Metal Stove (AMS) (at 31%), is much higher than the camp average. The results also indicate that the vulnerable group (at 37%) have the highest preference for the All Metal Stove (AMS) in the camp, and the target group, as expected, showed the greatest preference for the solar cooker (30%). Preference for solar cookers in Kakuma 1 (at 21%), which was the point of intervention by SCI, was also markedly higher than all the Kakuma's combined (9%), indicating a general higher awareness about the solar cookers and appreciation of its utility. Indeed, if Kakuma 1 respondents are isolated from the general camp population, the overall cooking device preference rating for the solar cooker jumped from fifth to second, only behind the All Metal Stove (AMS).

Figure 6: Cooking Technology Preference



N/B Charcoal stove in the legend for fig 16 above is the All Metal Stove

3.2.2 Comparison of hours spent per cooking device

Most households use one fire for cooking all their meals. Multiple fires are found in isolated cases, normally among the well to do and large households within the refugee community. In cases where use of multiple fires exists, both charcoal and firewood are used. The duration of cooking depends on the size of the household, type of food cooked, type of cooker on which it is cooked and the pre-cooking process if any.

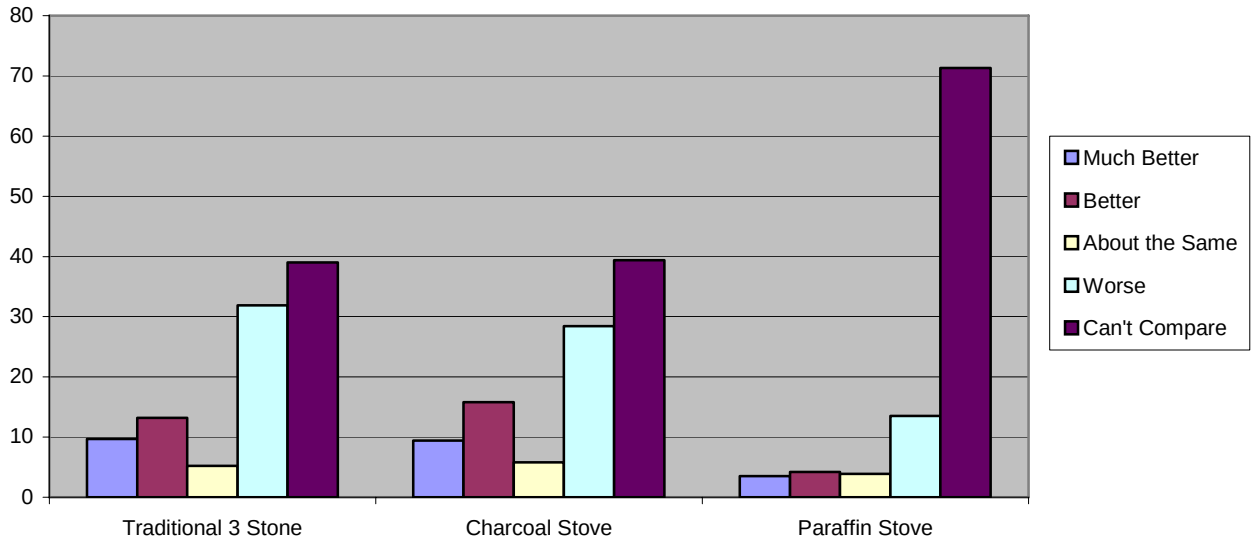
Table 5 below provides a summary of the types of food cooked and the duration taken to cook them on different Cooking stoves for a family size of 6. As the table shows, the All Metal Stove (AMS) generally cooks faster than the traditional 3 stone fire. There is no marked difference in duration of time in cooking food between the two different types of charcoal stoves, but there is substantial difference in the amount of charcoal used.

Table 5: Summary of duration to cook different foods on different stoves

Type of food	Duration on 3-stone fire	Duration on All Metal Stove (AMS)	Duration on Improved charcoal stove	Duration on Solar Cookers
Kisra	45-60 minutes	30 – 40 minutes	30 – 40 minutes	-
Beans	1 –1.5 hrs	45 – 60 minutes	45 – 60 minutes	2 hrs(pre-soaked) 4-5 hrs (hard)
Kudhura (muere)	20 minutes	15 minutes	15 minutes	45 minutes
Pasta and Stew		60 minutes	60 minutes	2-3 hrs
Rice and stew		45 minutes	45 minutes	2-3 hrs
Ugali and Stew		50 minutes	50 minutes	2-3 hr
Githeri	3hr	-	-	3 hrs(pre-soaked) 4-5 hrs (hard)
Tea	10 minutes	10 minutes	10 minutes	-

Emerging trends show that firewood is preferred for cooking the hard foods (e.g. beans and maize), Kisra, Ugali, porridge and tea, while charcoal is used across board. Solar cookers are typically used for cooking grains, stew, and other foods except kisra, porridge and tea. Figure 7 below shows how respondents compare the solar cooker to other cooking devices in regard to time spent cooking.

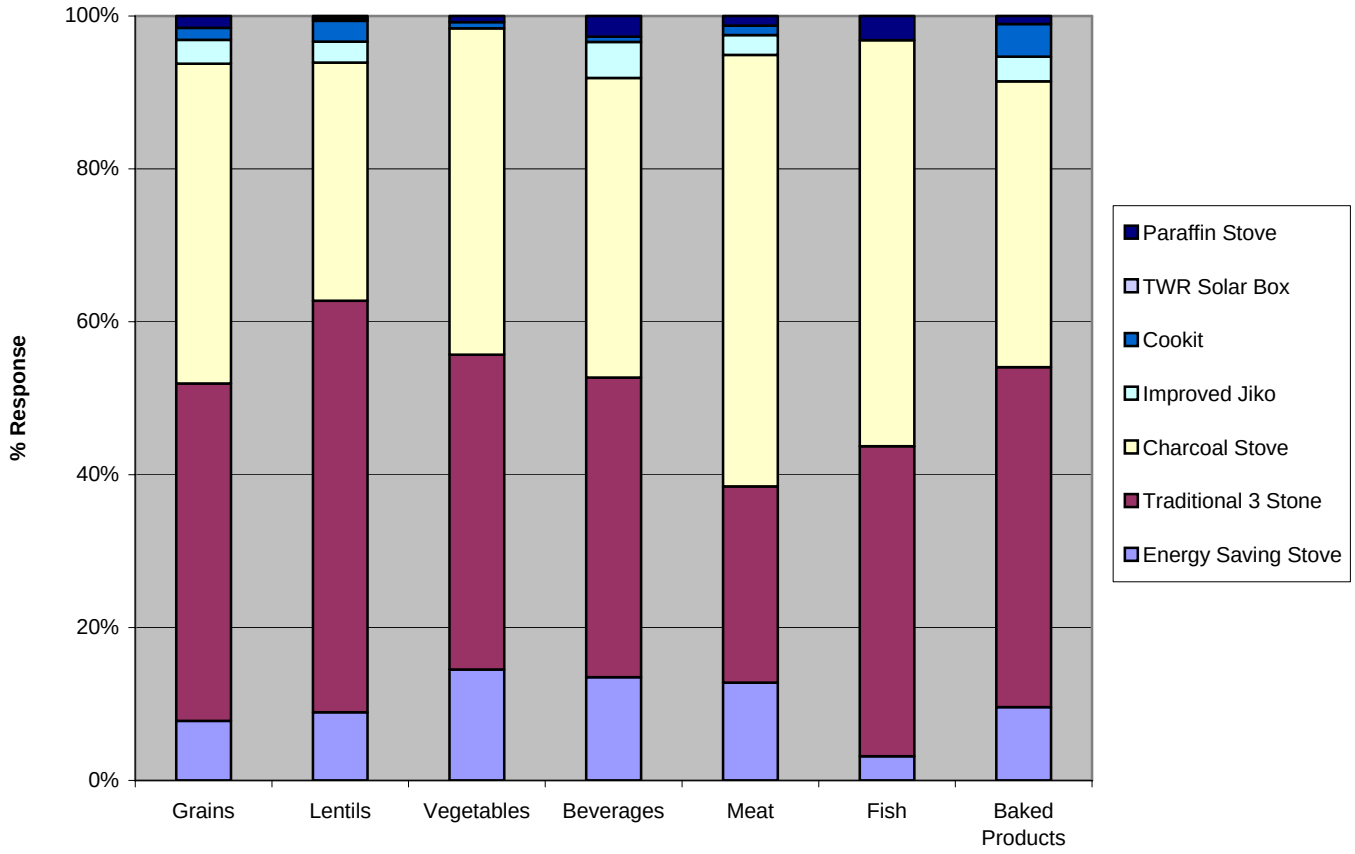
Figure 7: Comparison of Solar Cooker to other Cookers in Relation to Time Spent Cooking



As the figure 7 above shows, the solar cooker is not rated very well in regard to time spent cooking, particularly compared to cooking devices powered by charcoal, firewood or paraffin. In few instances, however, it was rated as about the same, or even much better. Significantly, the majority of respondents were in no position to compare, given the high proportion of respondents who do not use solar cookers at all for preparation of meals in

their households. Figure 8 below is a graphic presentation of the cookers used for cooking various foods.

Figure 8: Cookers Used for Various Foods



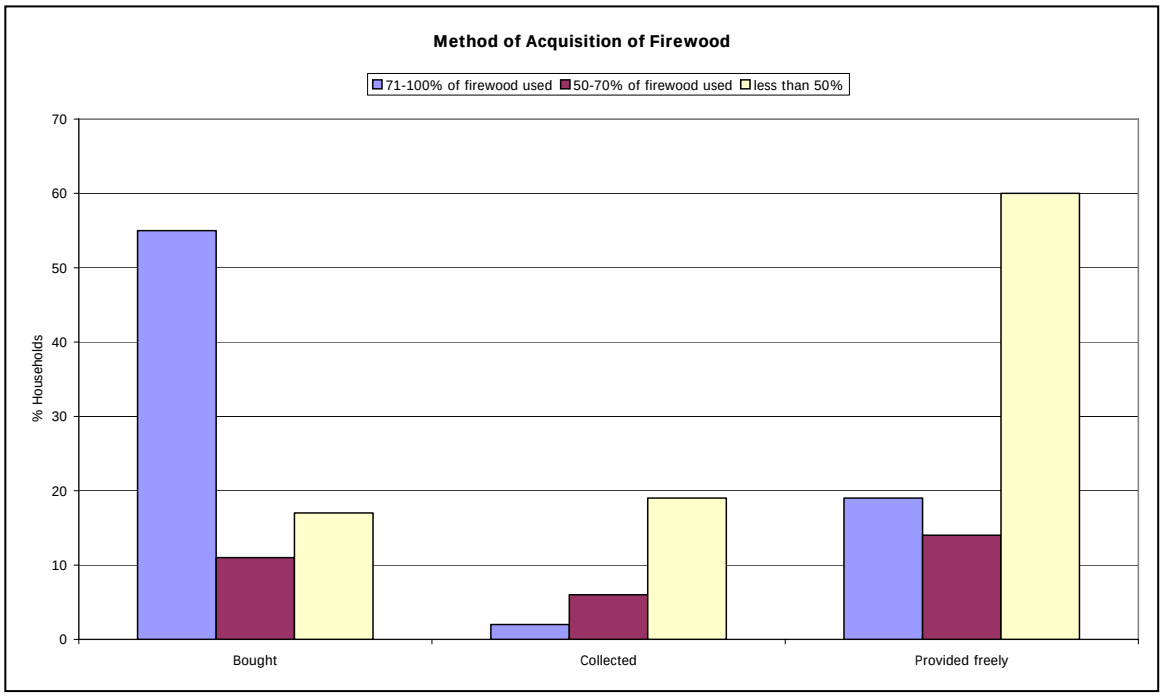
3.3 Amount of time spent in firewood collection

The camp management does not officially allow collection of firewood[5]. Even though no firewood rations had been distributed since May 2003, only minimal wood collection outside the camp occurs. More than 98% of the wood and charcoal used is purchased commercially from the markets within the camp or provided by GTZ as firewood rations. Accordingly, the time saved by use of solar cooking is principally that time used to queue for rations and or visiting the firewood markets to make a purchase.

Figure 9 below shows the percentages of total firewood use per household and the methods of acquisition of firewood at the camp based on the general survey. As shown in figure 9, a majority of households (more than 70%) indicated that firewood used is either purchased or obtained as rations.

[5] Based on an interview with Mr. Siyad Samatar of GTZ Kakuma

Figure 9: Frequency of acquisition of firewood and charcoal –33 Households



In the absence of firewood rations, firewood used within the camp is largely purchased from the market, with minimal foraging especially for those in Zone 4 near the river. Homesteads near the river were found to have logs salvaged from the river, which the families split and use when wood rations are not forthcoming or there is no money to buy firewood or charcoal.

Time spent collecting firewood firsthand by any household is therefore limited or non-existent. Minimal collection of bits of wood from the fences used building material and splitting of large logs occurs within the same community. Time spent collecting wood is therefore minimal. Observations and informal discussions indicated that refugee women and girls are the ones who buy and, or, fetch both firewood and charcoal, while a mixture of both Turkana men and women do sell both firewood and charcoal. Among the refugee community only men sell firewood.

3.4 Amount of cooking fuel used

To determine the amount of fuel used for cooking, it is important to first understand the cooking habits, including frequency of meals, types of food cooked, appliances used to cook, fuels used and the mode of purchase. The windy nature of the area and lack of wind barriers in Kakuma 1 means that firewood burns faster leading to a higher cooking energy consumption for each meal cooked.

Based on surveys, interviews and discussions with the refugee communities it was established that refugees typically consume an average two meals a day; porridge or tea for breakfast (between 6 and 8am) and full meal dinner (5.00 – 8.00 pm). A minority can afford lunch (11am -1.00 pm) while the rest can only afford one meal for reasons of food and fuel shortages. From the general survey of 310 households, 22%, 50% and 24% of the refugee population cook, one, two to three meals a day respectively.

During the fuel measurement period, heavy rains were experienced and food rations were also being given. It was expected that these two factors would have a substantial effect on the fuel consumption and choice. Surprisingly, it was observed that the rains and the rations did not substantially affect the amount of fuel used. Rather, fuel use changed minimally by type from firewood to charcoal. Charcoal is generally preferred when it rains as it can be easily kept indoors, away from the rain. Homesteads tend to flood, including the areas where the three stone fire is set, hence discouraging the use of firewood. On the contrary, the Jiko can be carried around or used inside the house when it rains and the grounds are flooded. Table 6 presents a summary of fuel use by meals and per capita based on a 6-day measurement period.

Table 6: Daily average charcoal consumption per household

Fuel Type	Breakfast (kg)	Lunch (kg)	Dinner (kg)	Average Daily Total (kg)	Per Capita(kg)
Charcoal	0.8	1.4	1.2	3.4	0.38
Firewood	1.2	1.8	1.4	4.4	0.5

From the firewood measurements, the daily average charcoal use per household is 3.4 kg of charcoal per day per household. This concurs with interview findings that a bucket of charcoal (10 -13 kg) lasts on average 3 days in an average household. Per capita charcoal consumption among the households interviewed stands at a low 0.4 kg per person per day.

Daily average firewood consumption stands at 4.4 kg per household, the highest consumption occurring at lunch as with charcoal. Per capita consumption for charcoal over the same period was 0.5kg per person per day. This shows that more firewood is required to cook the same amount of food than charcoal at any given time. The finding that the highest consumption of both charcoal and firewood occurs at lunch can be explained as follows:

- To save fuel some families cook once and eat the food over several meals. Most food is therefore cooked at lunchtime so that minimal cooking is done in the evenings.
- Since for many families breakfast is intended mainly for the young ones, lunch is normally the big meal to provide enough food for all the adults, hence more fuel use.

There is a marked difference in the frequency of acquisition of firewood and charcoal. This could be the result of the standard measuring units (bundles and buckets) for the two different fuels and cost issues. Table 5 outlines the frequency of acquisition of charcoal and firewood.

Table 7: Respondents and their frequencies of acquisition of fuels

Fuel	Daily (%)	Every 2-3 days (%)	Weekly (%)	Monthly (%)	Varies (%)
Charcoal	6.1	27.3	36.4	3.0	21.2
Firewood	9.1	15.2	12.1	6.1	33.3

The general trends for fuel acquisition shows that a majority of those using firewood purchase supplies weekly or bi-weekly while those using firewood tend to buy on as-required- basis.

The refugees are very conscious of energy use and apply various energy conservation measures that allow their fuels last longer and cook more meals. The most common energy conservation measures are pre-soaking of grains before cooking, putting off of fires after cooking and cooking large meals at a time. These measures are being promoted by GTZ and SCI as part of their programs.

3.5 Amount of Household incomes spent on cooking fuel

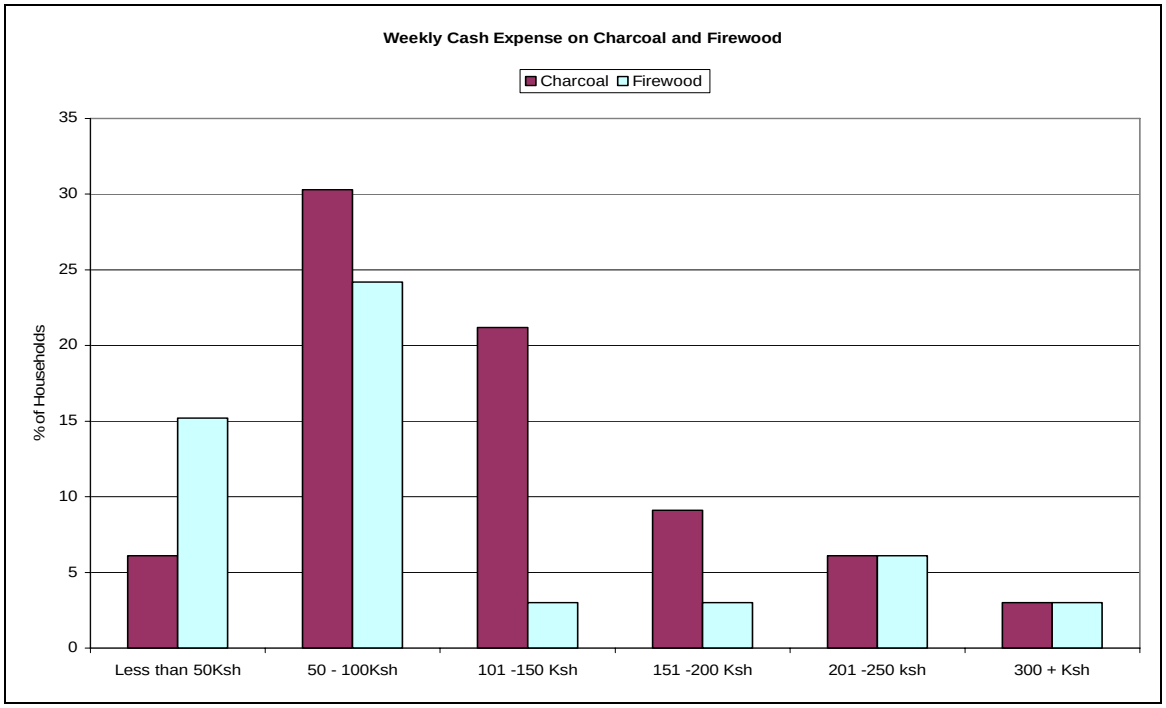
Firewood and charcoal are purchased either in cash or by barter for grains. As indicated here in earlier sections, local Turkana vendors prefer to barter firewood and charcoal for grains, especially maize. Other grains especially lentils are sold when food rations are given out. One of the objectives of SCI is to reduce the amount of food bartered for firewood. It is therefore important to provide an indication of how much money and grains is spent on procuring cooking fuel.

Households were found to purchase charcoal from hawkers and from the central markets on a 50:50 basis. The frequency of purchase varies, but the largest group purchased weekly or bi-weekly. This reinforces the point raised by the households that a 10-13 kg bucket of charcoal costing Ksh. 70 lasts 2-3 days, making charcoal an attractive fuel in terms of cost and cleanliness advantage. Charcoal stoves are cleaner and can be used indoors or in enclosed spaces, avoiding the effect of outdoor wind, which usually translates to more charcoal being required to cook a meal. Thus charcoal appears to be cheaper in comparison to firewood, thereby enhancing people's preference and demand for it.

As well, it was noted that especially single men (unaccompanied youths/ family size 1) with some incomes who use charcoal predominantly gave up their firewood rations to larger households and the poorer members of the community. Minors and unaccompanied youth constitute the majority of those bartering food rations to purchase firewood and charcoal.

Survey results show that 75% of the respondents bought charcoal using cash, while 52% exchanged food rations for charcoal. In contrast, 55% purchased firewood in cash while 18 % used food rations. Figures 10 and 11 below outline the weekly expenses on firewood and charcoal in terms of cash and grains respectively.

Figure 10: Cash weekly expenses on firewood and charcoal

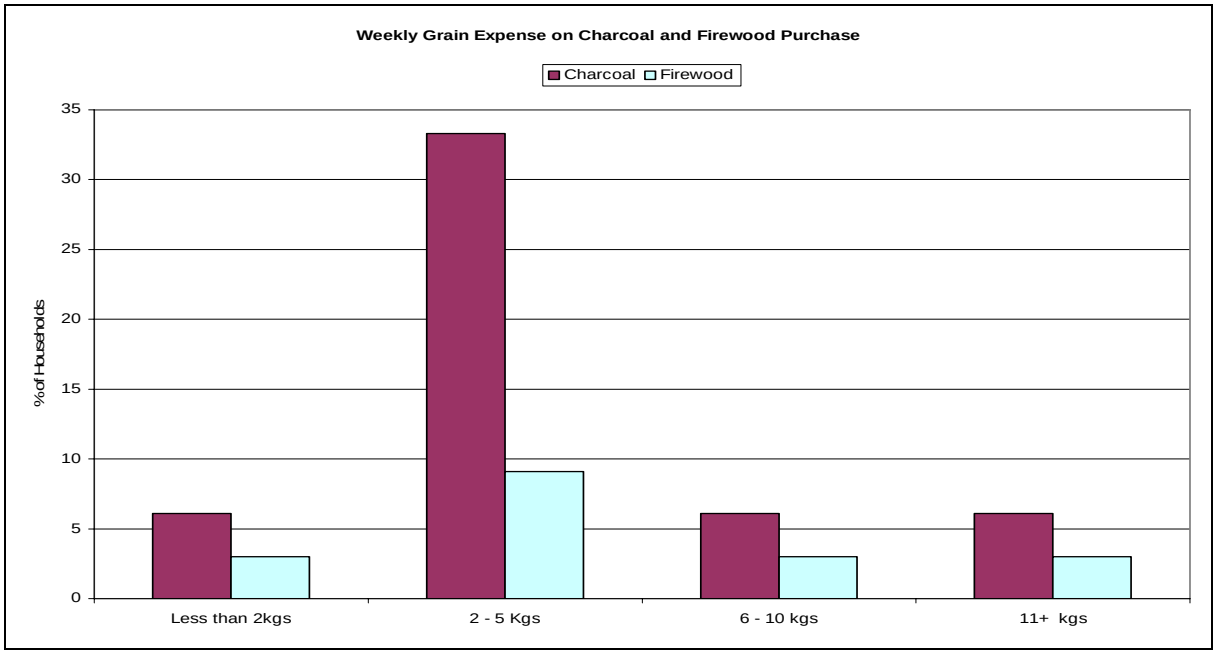


In terms of cash expenses, approximately 75 % and 90 % of households using firewood and charcoal respectively spend upwards of Ksh. 50 - 100 per week or Ksh 250 -450 monthly on purchase of cooking fuels. On average, households spend Ksh. 340 and Ksh. 550 monthly on firewood and charcoal respectively. These figures agree closely with the results of the general survey, which indicate similar trends.

As well, of the households that barter grains for fuels, approximately 45% and 15% for firewood and charcoal respectively barter more than 2 kg. The amount of grains bartered most falls in the 2-5 kg range for approximately 35 % and 9% of the respondents for charcoal and firewood respectively. On average households that barter grains for cooking fuel barter 8.2 Kg. and 20.4 kg monthly for firewood and charcoal respectively. In monetary terms this translates to Ksh. 164 and Ksh. 408 respectively. However, it must be noted that not all households that use either firewood or charcoal barter grains in return for the fuels.

Based on figures supplied by the households that participated in the fuel measurement survey, the average monthly household income for the refugees is Ksh. 2,100 per month. This figure is probably high for the typical refugee family, but intervening variables such as remittances from relatives abroad, for especially Somalis, Ethiopians and Sudanese, and income from businesses particularly in phase 5, inevitably skew the average income figures. In terms of cash expenses, fuel purchases comprise 16% for firewood and 26% for charcoal, giving an average total of 42% of the monthly incomes being spent on cooking fuels in addition to the grains. This constitutes a considerable proportion of the refugee household income and no doubt has a significant effect on their food security and quality of life. A cross tabulation of monthly incomes and expense on fuels yielded no direct correlation between family incomes and the amount of money spent on fuel.

Figures 11: Grain Weekly Expenses on Firewood and Charcoal



3.6 Savings as a result of Solar Cooking

Estimating potential saving for a variety of households is a complex process that would have to take into consideration a host of parameters. The potential savings arising from solar cooking as outlined hereunder are based on average consumption patterns established from the cooking fuel measurements and the frequency of use of solar cookers. Additionally an attempt is made at establishing the potential savings in an average household. This figure can therefore be extrapolated to provide the required indications. Cookit usage rates are influenced by food distribution, sun conditions, low winds and the availability of cookits. These factors have been assumed constant.

The average daily household consumption of firewood and charcoal is 4.4 kg and 3.4 kg respectively. The largest percentage of this consumption is due to lunch/ daytime meals at 1.8 kg and 1.4 kg for firewood and charcoal respectively. Given that a majority of the refugees eat one meal a day, it can be realistically assumed that solar cooking could in the best case replace all the fuel required to cook lunch for a household. For those households who can afford more than one meal a day there is a possibility of replacing some of the fuel used to cook dinner. Others largely cook tea and porridge to eat with what is left at lunch, a scenario in which cookits would not be appropriate.

Assuming that the cookits could replace all the fuel used to cook lunch, the maximum potential saving per household on firewood and charcoal that could be attributed to solar cooking per household per month would be 54 Kg and 42 kg for firewood and charcoal respectively.

In monetary terms the saving per month from solar cooking for an average household is Ksh. 265 and Ksh. 245 for firewood and charcoal respectively. Additionally saving on food rations would be 25 kg of grains for firewood and 21 kg of grains for charcoal per household per month. For households with no incomes this would mean better diets or more resources to buy other necessities. Benefits of time savings are minimal (see section3.3) while health related benefits, such as lower exposure to Acute Respiratory and Eye Infections cannot be quantified.

Figure 12: Comparison of Solar Cooker with other cooking devices in Relation to Savings on Expenditure

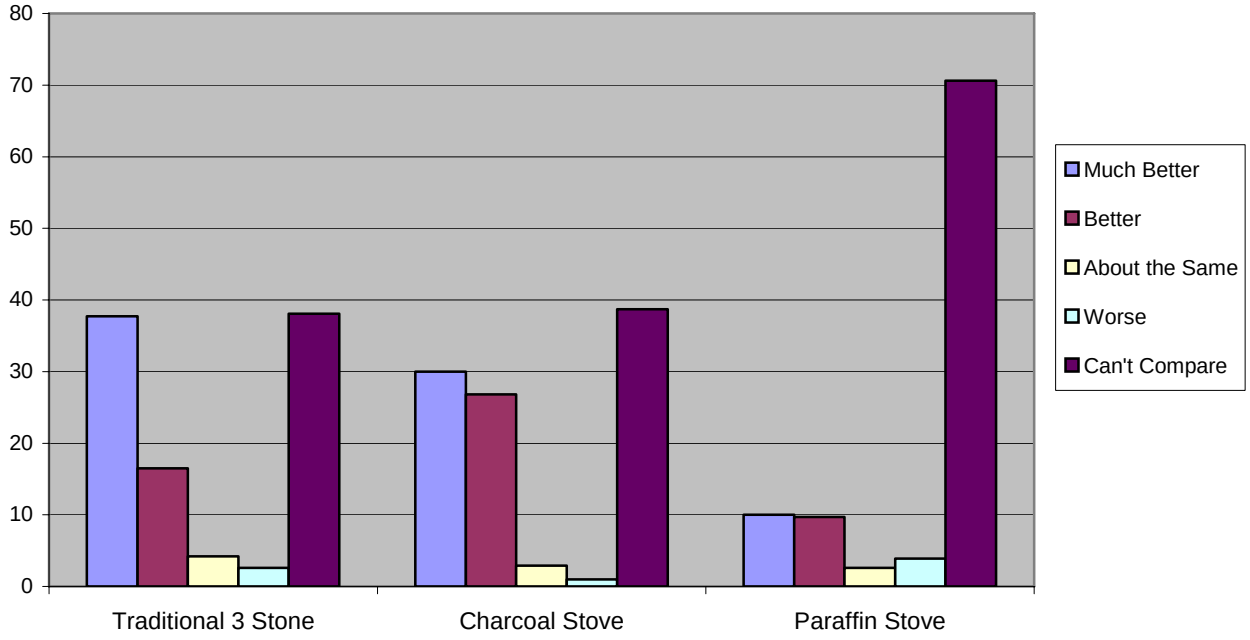


Figure 12 above shows that respondents in Kakuma confirm the advantages, from the perspective of savings on expenditure, of using solar cookers. Thus the solar cooker was rated as much better than the traditional stone cooker, the All Metal Stove (AMS), and the paraffin stove in regard to savings on expenditure. In comparison to the All Metal Stove (AMS) in particular, the solar cooker was rated more strongly as a much better or better option by 57% of the respondents, perhaps pointing to the generally high household expenditure on charcoal. 3% said they were about the same, 1% said the solar cooker was worse, and some 39% could not compare. Measured against the traditional three stone fire in the same respect, 54%, said the solar cooker was much better or better, 4% said they were about the same and 3% said the solar cooker was worse. Some 38% could not compare. Compared to the paraffin stove, it appears the gap in expenditure was not too large as with the firewood and charcoal based cooking devices. Thus only 20% of respondents said the solar cooker was better or much better than the paraffin stove, 3% said they were about the same, 4% said the solar cooker was worse, and significantly, 71% could not compare.

4.0 PROJECT IMPLEMENTATION

Interventions to address identified problems are often classified as developmental or relief[6] efforts. The kind of intervention that the Solar Cookers project made was palliative in the initial stages, hence relief, but as it is now, it may be referred to as developmental, since the Solar CooKits in Kakuma now aim at supplementing the other energy sources in the camp but not on saving any lives.

Hereunder we discuss the management process and structure for the solar cooking project as well as three related issues that result from the nature of implementation, viz, relevance, performance and success (including sustainability).

4.1 Project Management

Those who are involved in the day to day implementation and management of the project at the community level range from the Project Officer (PO) who is the team leader and provides guidance to the running of the programme both administrative and programmatic. She reports to the SCI office headquarters in Nairobi. Under the PO is the field supervisor who basically is in change of linking the project activities and the PO. Here activities include things such as User Training workshops, home visits, Group demonstration, Transect walk, Refresher Training and Maintenance of the Solar Cookits. There are both the TG and OP Monitors whose work is to advice and maintain contact with the day-to-day users of the Solar Cookits. Overall the SCI office in Nairobi works with those at the camp and has a clear link with the head office in Sacramento, the United Sates of America.

4.2 Project Relevance

The need to introduce Solar CooKits came from the realization that the refugees in Kakuma needed to cook regularly and used up a lot of resources on cooking fuel. So as to satisfy one of the basic human needs, that is food. The prevailing scenario at the inception of the project, and which still persists to date, is the fact that the firewood rations provided are not only insufficient but also irregular, thus the need for alternatives. The alternative being provided by the SCI in form of Solar CooKits is filling a critical gap in the domain of domestic energy sourcing and utilization. The firewood supplied to the refuges measure between 5-7kgs per bundle and it is expected to last for 15 days. SCI's experience with the refugees shows that this firewood does not last for the required minimum days while the supply is also irregular. The solar cooking technology therefore offers an alternative that supplements the scarce firewood resources. In addition, the majority of the refugees cannot afford to purchase sufficient alternative firewood in instances where firewood distribution is not being carried out and hence the use of the Solar CooKits is a comparatively cheaper alternative.

From an environmental point of view, scanty woody resources in the Kakuma environment often means high competition for firewood between the refugees and the host community. Solar cooking hence offers an energy alternative for cooking purposes. The refugee camp set up is also an enclosed one, making it difficult for them to freely search for firewood. In this context the introduction of solar cooking was highly relevant.

[6] Development here is used to denote that type of planned change that has been thought of in the planning and preparation process with clear implementation structures while relief is used to denote the kind of intervention that is spontaneous, short term in terms of time frame and is often aimed at saving lives.

Kakuma camp is located in the arid northwestern part of Kenya, and receives an annual rainfall of less than 250 mm, with most days remaining dry and sunny. The relevance of the solar cooking project is therefore also strengthened by the relationship between the weather and solar cooking requirements. Solar cooking requires sunny and bright days that are free of wind to provide the heat concentration required for effective use of solar-based cooking implements.

The use of the refugees as the staff at the community level is also an additional plus for the project, since the current orientation in sustainable project conception is to utilize the local resources (including personnel) as much as possible. This gives the project some innate life that keeps it alive and fosters the target community's identification with, and ownership of the project. From a different perspective, such arrangements are a source of conflict with locals who often feel alienated from the benefits that accrue from development interventions. Indeed, discussions with the Turkana during the firewood market survey revealed that many are dissatisfied with the fact that while they play host to the refugees, they do not enjoy the variety of services provided by relief and development agencies located at Kakuma camp.

4.3 Project Performance

The survey of Kakuma camp residents indicated that given a choice on the cooking technology they would want to use, the refuges ranked the use of the Solar CooKits fifth after the All Metal Stove (AMS), traditional three stone, energy saving stove and paraffin stove (see figure 6). Solar cookers were therefore preferred to the fireless cooker, improved jiko, gas cooker and electrical cooker. In the case of the latter two, it is our opinion that most refuges regarded them as simply out of reach, or may have never known about their existence at all. The finding shows that solar cooking by the refugees is an option that can be improved and exploited further.

A monitoring and evaluation process is in place. This looks at concerns such as:

- Assessment of the road map to analysis performance and achievement,
- Continuous cross checking of cash books for analyzing the cash balance,
- Audit of accounts every three months,
- Members meetings to review performance and it's results on a monthly basis,
- Reporting to members and donors on a monthly basis, and.
- Field monitoring by donors.

The aforesaid notwithstanding, one of the anomalies identified is that it was not easy to establish the exact number of Solar CooKits[7] that have been distributed so as to gauge project performance in terms of uptake and usage. Records that were availed during the review demonstrated this anomaly as shown in the home visit summary conducted in May 2003, just a few months to the evaluation.

[7] A clear inventory of the number of CooKits distributed was not so easy to establish.

Table 8: Home Visits conducted in the month of May 2003

ZONE	No. of kits counted	No of homes visited	No. of Solar Cookits in use[8]
Zone 1	1340	539	
Zone 2	920	599	
Zone 3	1120	560	
Zone 4	1300	520	
Zone 5	1160	540	
Zone 6	1280	630	
Zone2, 3	316	320	
TOTAL	**7,436**	**3708**	

Source: SCI Records, 2003

A critical analysis of the monitoring and evaluation parameters further revealed the following:

- There was weak evidence of best project accounting practices in the field office, and our request to have a look at cashbooks maintained by the project officer was not fulfilled.
- Monthly meetings to review performance were taking place, minutes of these meetings were not done in time for reference purposes. Perusal of the files indicated that this gap needs to be filled[9].
- Field monitoring by SCI Office in Nairobi was taking place, as evidenced by periodic visits to the camp and also through regular correspondence by e-mail and phone

The free distribution of Solar CooKits at the inception of the project may have compromised the effectiveness of introducing user fees. A number of refugees interviewed as key informants, or in FGD's, intimated that the introduction of the user fees had affected the performance of the project and a number of refugees that had hitherto used Solar CooKits did not purchase them.

The introduction of user fees in any community development project is often likely to elicit resistance[10], and thus broad based consultations involving all the stakeholders is often encouraged. In the case of Solar CooKit sale in Kaluma, information gathered during the evaluation indicates there was an information gap. Some of the project monitors talked to for instance did not know what necessitated the change in policy! The records in the field office did not also indicate the nature of consultation over the user fees issue, perhaps

[8] There should be an amendment in this table to establish the number of Solar Cookits in use since information obtained from the field indicated the fact that the number of Solar Cookits counted did not necessarily reflect those in use as some were destroyed by termites etc but the owners still preferred to keep them, hence adding to the statistics!

[9] It emerged from the field that there might have been considerable effort put in either reconstructing the files or having new information introduced due to the impending evaluation.

[10] This is largely because a number of communities have a donor dependency syndrome and so would wish to be given things freely. Experience elsewhere has shown that this is even more serious in a refugee set up because they often consider themselves as helpless and poor (even if they are not) to be sympathized with given the varying "sympathetic" circumstances that led them flee their countries.

confirming the widely held perception at the community that the user fee idea was introduced without benefiting from sufficient consultation. This could be an explanation for the resistance in buying the Solar CooKits, and hence the lower numbers of Solar CooKits bought than would have been anticipated. Information obtained during the key informants interview also did confirm the position that consultations across the board were not carried out, as would have ordinarily been the case.

> ***... While the idea of user fees is potentially useful in the sustainability of development interventions, the way this is done (especially mid stream) determines a lot whether the client community will embrace and own the idea or not. This consequently affects project performance.***

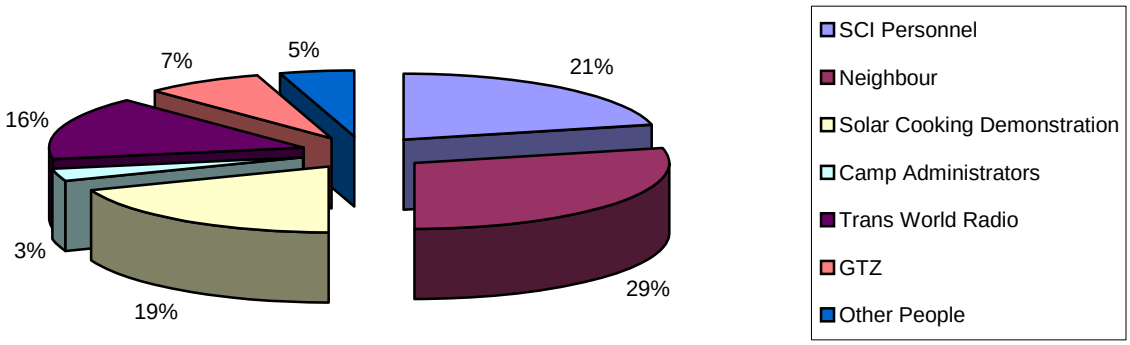
Whereas LWF provided institutional hosting to SCI through it's Community Empowerment Programme to implement the CooKit project, the fact that the project at the field office level lacks some basic administrative infrastructure for a project has hampered it's successful implementation. Getting the Project Officer was often problematic since she did not have unfettered access to a fixed office from which she could easily be found, as a number of the camp staffers noted[11].

Infrastructure in the form of a co-ordination point is key to facilitating project performance. While the PO had a field office in the camp, which is hardly visited (from observations made during the evaluation), there is also the need to establish a fully functional and equipped operations base, where interaction can be easily facilitated with clients and the other agencies. Placing the solar cooking project in the department of community services at LWF resulted in lack of visibility for the initiative.

The need for a project computer and at least a motorcycle for the PO may have been overlooked at inception, perhaps with good reasons then, but the reality obtaining presently dictates otherwise. The sheer numbers of people involved and the Solar CooKits distributed all point to the necessity of adequate project infrastructure to facilitate efficiency in co-ordination, supervision and general implementation. From our interviews with the PO, the absence of a vehicle or an efficient alternative made the distribution of the Solar CooKits by the use of bicycles very cumbersome, as the area to be covered is wide, hence making the process very slow. Figure 13 below shows the responses to the question on how information on solar cookers was obtained.

[11] The evaluation obtained information that at some point the UNHCR had wanted to obtain some critical information from SCI's PO but was unable within a space of one month due to inability to trace her!

Figure 13: Sources of Information on Solar Cooker

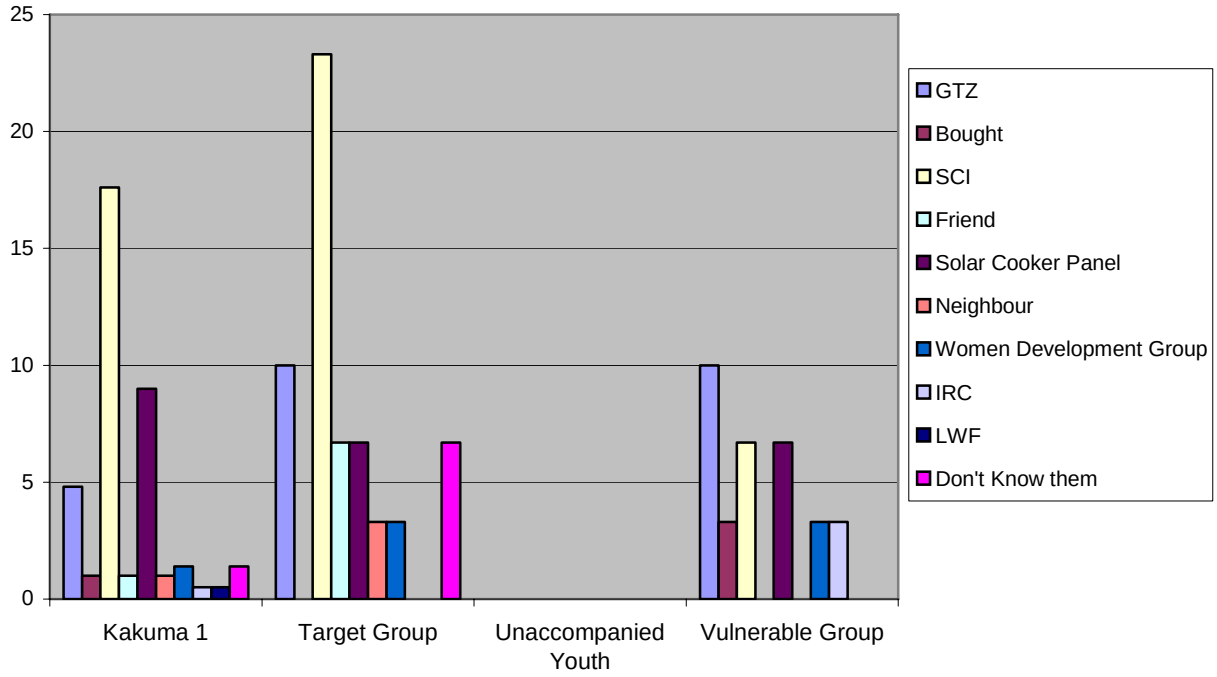


Tellingly, only 21% of the respondents who had heard about a solar cooker mentioned SCI personnel as the source of their information on the solar cooker. 19% more had known about the solar cooker at solar cooking demonstration, some of which SCI organized. But neighbours were the most important source of information on the solar cooker (29%). The other significant sources of information on the solar cooker were Transworld radio (16%), GTZ (7%) and camp administration (3%). A more worrisome issue in our view was ignorance of many respondents on where they could find the solar cooker. This in spite of efforts on the part of SCI to make the same available at the field office. Self evidently, the communication strategy to inform all potential users on where the Solar CooKits could be obtained was only partially successful. This was the case especially with communities living outside Kakuma 1,such as the Lotoko community in Kakuma 2 phase 2, and the Somali Bantu in Kakuma 4.

By its very nature the Solar CooKit project required effective Inter-agency sharing of information to succeed. Discussions with the staff of the other agencies however indicated that the majority of them were not fully in the picture in respect to SCI's project, other than being aware of the distribution of Solar CooKits. Joint capacity building sessions, and the exchange and dissemination of information, for example through incorporation of the SCI activities with those of organizations that had newsletters were largely absent, again calling into question the quality of partnerships and sharing and cooperation [12]. Figure 14 below shows the responses given by those using solar cookers to the question about the source of solar cookers used in the Kakuma camp. From the figure it is the target group that most easily identified SCI as the source of the solar cookers they use, meaning that they were furnished with sufficient information. Awareness levels about SCI's solar cookers was also high in Kakuma 1, which, as already noted, was the point of intervention.

[12] Some level of inter-agency cooperation was taking place though. These include the joint demonstration between SCI and GTZ during the World Refugee day on 20th June 2003 when a cake was prepared using the solar CooKit. Collaboration with WFP stopped about six months before the evaluation. SCI was not included in the subsequent GTZ project document due to financial constraints.

Figure 14: Source of Solar Cookers Used in Kakuma



Confirming the phenomenon of sharing/lending out of solar cookers, a significant proportion of the respondents simply mentioned their neighbours as the source of the solar cooker they had used. GTZ was mentioned as the second most important source of solar cookers used in the camp, perhaps attesting to Its generally greater visibility in development matters at the camp, and in particular its role in firewood distribution, hence the perception among some refugees that it is also behind the distribution of cookits.

4.3.1 Development Agencies' Impressions about Project Performance

Interviews with people interacting with SCI and those making use of the Solar Cookit in any significant degree gave insightful information on how different actors within the refugee camp view the work of SCI.

Table 9: Impressions about project performance

Organization	Overall Comments and Impressions
German Technical Co-operation (GTZ)	• That while the introduction of the Solar Cookits was meant to reduce dependence on fuel wood from an environmental point of view, this has largely been achieved in respect to the households using the solar cooker, although the overall number of households utilizing it may be few. This is due to the persistent complaint that it is generally slow and cannot be used to prepare food for large families • That the Solar Cookits were initially introduced as free and this may have affected the way the Solar Cookits have been used since then, as communities tend not to value things given to them "free'.

	• That there have been efforts at having joint demonstrations, something, which is commendable. • That there is need to improve on the design of the Solar Cookits so that they are not susceptible to wind and the effect of rain
World Food Programme (WFP)	• That the use of Solar Cookits is environmentally friendly in terms of conservation of wood resources, but WFP is not able to state the extent to which this has been realized. • WFP does not have information on the proposed exit strategy that is being envisaged by SCI, underscoring the point of lack of sufficient information by stakeholders on the exit strategy
Lutheran World Federation[13] (LWF)	• LWF Acknowledged having information of activities undertaken by SCI, the benefits that have accrued, the challenges and the exit strategy. Their working relationship has been good, with each complementing the other's efforts. • The level of information exchange has been excellent between the two, and includes the sharing of progress reports and situational reports • They have held joint capacity building and training sessions also aimed at awareness creation on the use of Solar Cookits
United Nations High Commission for Refugees (UNHCR)	• While UNHCR appreciated the efforts by SCI, it has misgivings about a number of challenges, particularly staffing issues (Whether the PO is overworked), and issues of exit strategy, that may have a negative impact on achievement of project objectives. • That the levels of awareness of the use and benefits of the Solar cookit may not have been fully exploited

Overall, a number of the collaborating organizations were not able to determine the impact of the project on the refugees. It also emerged that they were largely unclear on the exit strategies that are in place and therefore couldn't comment much on the subject. Without belabouring the point, keeping stakeholders and collaborators abreast of the processes to be executed should be considered pivotal in project implementation.

4.4 Project Success

Hereunder we comment on project success within the context of the extent to which outputs envisaged have been realized, and the intended overall impact achieved.

[13] This is the agency that houses Solar Cookers International at the camp level although it was also established that SCI had not renewed the annual contractual arrangement it has with LWF in view of plans to phase out the project in its current form.

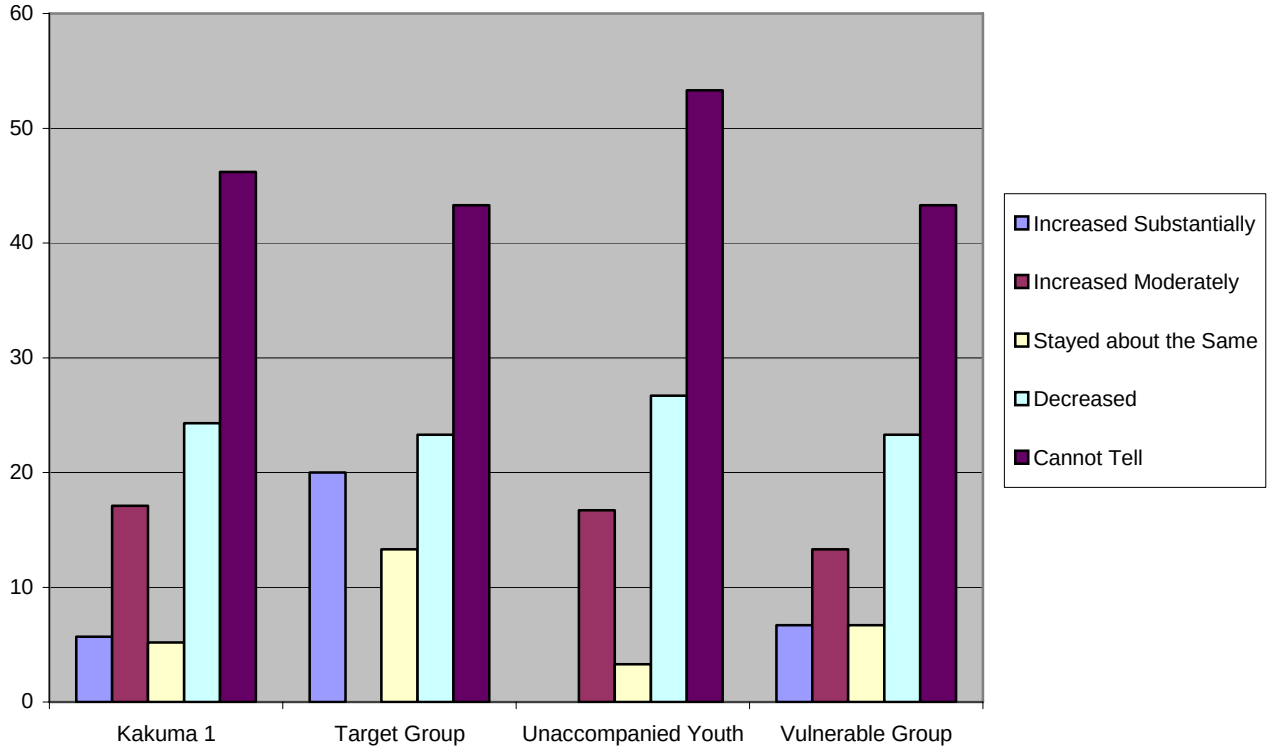
4.4.1 Awareness levels raised

Awareness has been raised on the need to use Solar CooKits as opposed to firewood or charcoal for purposes of conserving the environment. The Kakuma refugee camp is situated in an ecologically fragile area and efforts aimed at introducing and using alternative cooking technologies for the purposes of conserving the environment should be aggressively promoted.

Information from the general survey indicates that the awareness levels of solar cooking options are high. Asked whether they had heard about a solar cooker, an encouraging 87% of respondents replied in the affirmative and only 13% replied in the negative. Further, 41% of the respondents said that they had used the solar cooker at some point. Of the respondents that have used a solar cooker, the Solar Cookit was the most frequently mentioned device (36%). Others had used the box solar (5%), and the carton solar (2%). Levels of awareness were overally lower in Kakuma 2,3 and 4 since there are fewer Solar CooKits there compared to Kakuma 1 where the thrust of the project was.

Similar proportions of respondents (20%) believed the general use of the Solar Cookit had declined/increased in the camp over the preceding few years, and another 5% thought it had stayed the same. 54% could not tell. Figure 15 below illustrates what different sections and groups in Kakuma thought about the relative decrease/increase in Solar Cookit use in the camp.

Figure 15: Usage of Solar Cookers in the Preceeding 3 Years



In view of the planned commencement of the SOCOCO initiative, deliberate efforts aimed at raising awareness levels on the need and benefits of using the Solar Cookits, rather than simply knowing that they exist are required. The following proposals should be considered by SCI:

- Awareness raising campaigns apart from the demonstrations, which appear limited in terms of those reached. These could target institutions and social gatherings.
- Developing a reader friendly and community sensitive Newsletter that provides relevant information to the potential users. The current newsletter may be good but was evidently not designed for community use, in view of its format and language.
- Enhancing information flow between the supervisor, trainers and the monitors as this could be a missing gap towards facilitating easy flow of pertinent information.

4.4.2 Provision of requisite skills, uptake and use of solar cooking

The project has provided considerable skills[14] and built the capacity of the refugees to use and maintain Solar CooKits. The skills have benefited especially SCI staff at the community level, ranging from the field supervisor, the monitors and the trainers. These skills will no doubt be put to good use during the implementation of the Solar Cookers Cooperative.

In the FGD discussions, it emerged that the issues covered in the trainings include but are not limited to:

- How to measure the quantity of water relative to what is being cooked.
- How to set the Solar Cookit in the sun relative to the direction where maximum heat will be tapped.
- How to improvise wind breaks as the need may arise.
- The point at which to have the black lid repainted for maximum energy storage.

According to the FGD's, there is need to improve on the following:

- During demonstrations the refugees are often made to bring alongside their own foodstuffs, something that they resent. In our view, however, this should be seen as the community's contribution to the solution of problems.
- Systematic refresher training courses, apart from the demonstrations should be introduced as a number of refugees indicated the need to have the skills refreshed from time to time.

[14] These skills range from those of supervision, follow-up, report writing, demonstration and ability to work with others, something that is acquired in community development over a long period of time. Also, there have been capacities built in ability to develop work plans, weekly reports, make basic analyses and draw logical inferences.

Figure 16: Estimated Number of Days Solar is Used in Kakuma

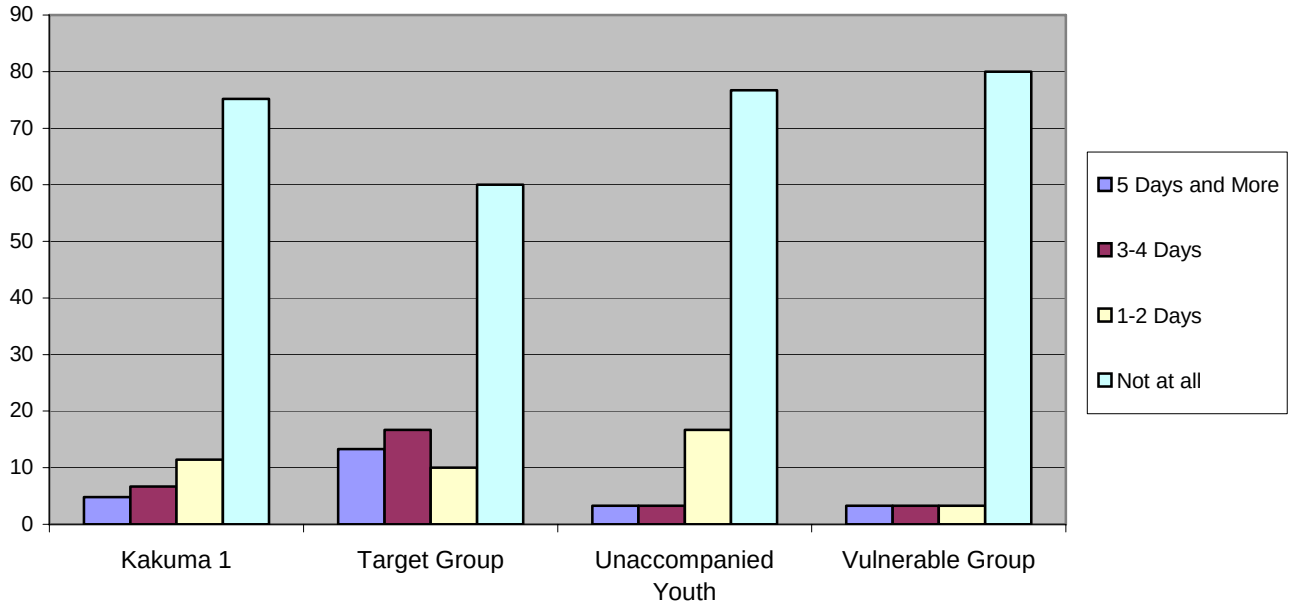


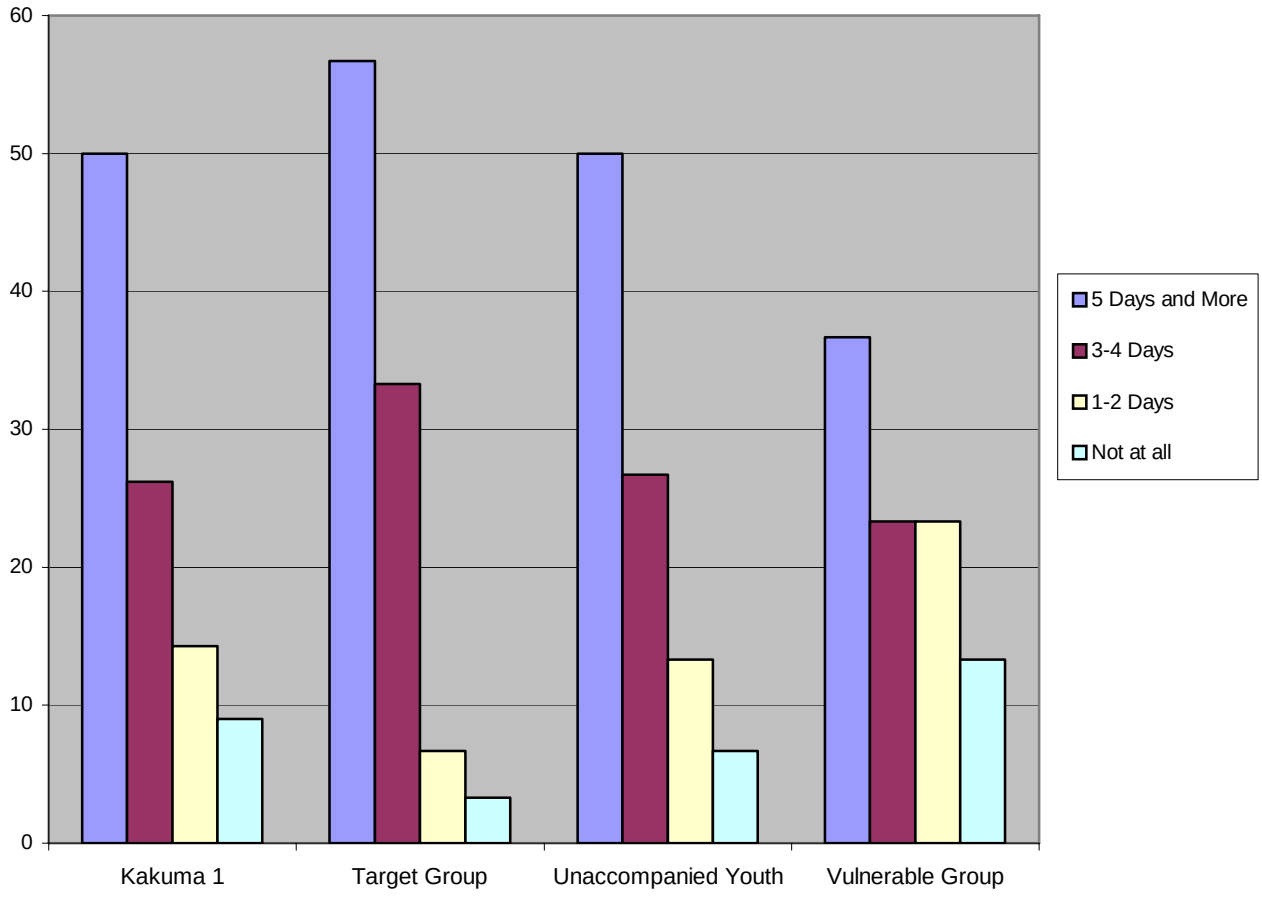
Figure 16 above shows the extent to which different segments of the Kakuma refugee population have taken up and use solar to cook. In Kakuma 1, where the project was implemented, 23% of respondents used the solar cooker for at least one day in the week, above the camp average of 18%. Those who used solar devices to cook for three days and more also stood at 12%, also above the camp average of 9%. But the more dramatic figures are for the target group. In this group, utilisation of solar cookers is 40% for between one and two days in a week and 30% for three and more days in a week.

4.4.3 Need for Environmental Conservation

The refugee community, especially those using the Solar CooKits, has acquired a new attitude to preserving the environment. This is important especially as the use of charcoal and firewood is deleterious to environmental sustainability.

As figure 17 below shows, the number proportion of refuges that use firewood for only 1-2 days in a week or for none of the days at all is significant. Thus in Kakuma 1 for instance, 14% of the respondents used firewood for only 1-2 days in a week and some 9% did not use firewood at all in the week. Among the target group, some 10% used firewood only 1-2 days a week, or for none of the days at all. Of the unaccompanied youth, about 20% used firewood only 1-2 days in a week, or for none of the days at all. These figures are especially significant because further analysis showed that most of those who used firewood sparingly were also using charcoal sparingly, therefore suggesting that this is the group that has become strongly sensitised to the need for environmental conservation. It is only among the vulnerable group that a good portion of those who used firewood rarely was on the other hand using charcoal for most days of the week.

Figure 17: Estimated Number of Days of Firewood Usage in Kakuma 1



The solar cooking project has also integrated quite well with the other energy utilization projects in the camp. Whereas the use of Solar CooKits in and of itself is not regarded as the panacea to the energy problem in the camp, it is yet highly appreciated as a source of energy complementing the other different energy sources.

4.5 Benefits and limitations posed by the project

From especially Focused Group Discussions (FGD), informal discussions, key informant interviews and informal discussions, the refugee community pointed out the benefits and limitations of the project largely within the context of its implementation and also relative to the other domestic energy sources such as charcoal, firewood and paraffin.

4.5.1 Benefits of the project

Firewood distribution in the camp by GTZ is infrequent and usually insufficient, and the use of Solar CooKits therefore fills a critical gap by enabling cooking to go on in the camp when firewood rations delay, and consequently sustaining lives.

The project has been able to produce a change in lifestyles for a cross-section of the refugee users. Among the women that use solar cookers regularly, the implements have occasioned a dramatic change in daily routines such as seeking firewood from the market, thereby

releasing time for other engagements. For the men, it was established that it had changed somewhat, perspectives about domestic chores. Thus whereas Sudanese men would ordinarily not cook due to stereotypes, they comfortably cook using the Solar CooKits, which are generally not regarded in the same way as fire-based cooking devices.

Information obtained during FGD's indicate that prior to the banning of firewood collection of refugee women faced perils such as the threat of rape, physical assault by Turkana/hostile fellow refugee communities, encounters with dangerous snakes and a general pressure on time to execute myriad domestic chores. The introduction of Solar CooKits was therefore said by some women in the FGD's to have contributed to the reduced danger of rape, and reduced threat of physical assault and snake/animal attacks at the time when firewood collection was still widespread.

FGD's among the disabled and the vulnerable indicated that the use of Solar CooKits is helpful to them since it was not as time consuming and energy sapping as collecting firewood rations or purchasing charcoal. A number of these individuals however noted that they are not using Solar CooKits because they are unable to afford them. This in spite of price reduction for those categorized as vulnerable by SCI. During one of the home visits, it was evident that the unaccompanied youth who stay in the groups of 2-5 are unable to purchase the Solar Cookits due to costs, but in instances when they have had access to a Solar CooKit, it has been very useful to them.

It was established that while other cultures like those of the Sudanese may not allow men to collect firewood and consequently cook, the use of the Solar CooKits has made it easy for them to prepare their own foodstuffs. This development has contributed to demystification of abiding stereotypes, and taboos, in regard to cooking by Sudanese men.

The use of the Solar CooKits was said by most respondents to have a positive correlation with the management and conservation of the environment, particularly through the reduction in the use of firewood and charcoal, which has contributed to immense degradation in the fragile Kakuma environment. In view of the concern for environment conservation in contemporary development planning and implementation, the use of the CooKits is clearly beneficial.

Some of the women interviewed said that the use of the Solar CooKits had afforded their girl children improved opportunity to attend school, as opposed to confining them at home for purposes of fetching firewood as the case may have been.

The use of the Solar CooKits eliminate the possibility of food burning, an issue that those interviewed were very happy about. According to their accounts, it was possible to leave food cooking as one attended to other livelihood responsibilities. The Solar CooKits were also noted to guarantee children's safety, in contrast to other cooking technologies that often burnt children.

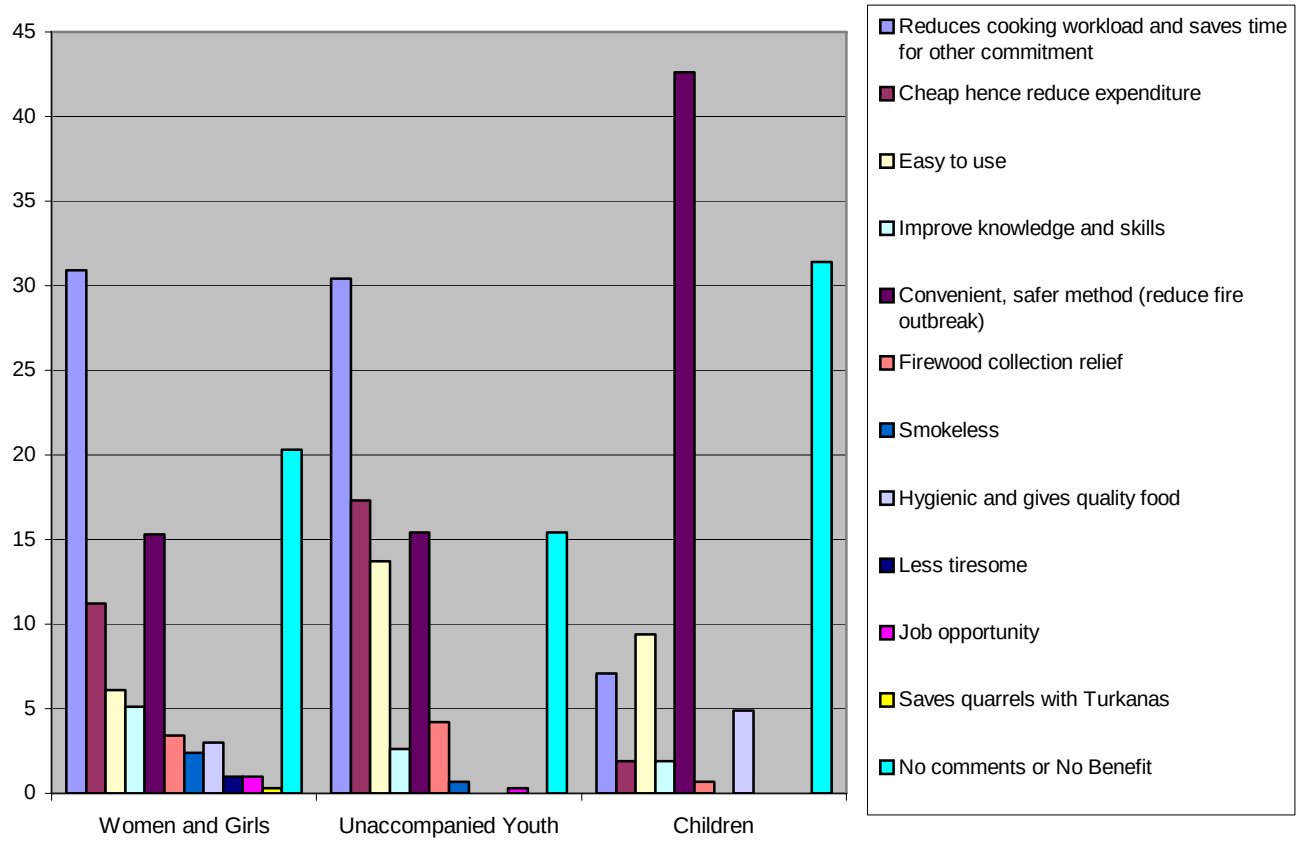
Use of Solar Cookits for water pasteurization was also said to have contributed to the reduction of the incidences of water borne diseases. This positive impact consequently contributed to more lives saved, especially those of children under five.

The implementation of the project has provided the project staff with skills on project implementation and management, which they can employ to good effect in other developmental circumstances and also in the Solar Cookers Cooperative.

The project has provided employment opportunities in a set up that is characterized by general hopelessness and idleness. Information availed during the evaluation indicated that there were a total of over 40 job opportunities created directly,[15] and over 50 others indirectly. No doubt the incomes from such employment have had positive welfare consequences for households of the employed.

Projects such as the one implemented by SCI usually also help build the sense of worth of beneficiaries, especially, for those who come from dehumanizing and disadvantaged backgrounds such as refugees. They often contribute to confidence building besides transmitting the skills that are taught. Figure 18 below summarizes comments made in regard to the benefits of solar cooking for different segments of the camp population.

Figure 18: Comments on Solar CooKit



Substantial savings at household level are also made when solar is used for cooking as opposed to the other sources of domestic energy (see section on energy use).

[15] At the community level, these refer to the Supervisor, Trainers, Monitors, Watchmen and Painter.

4.5.2 Limitations of the project

Solar CooKits are prone to theft and loss since they can be easily carried away or drifted by wind. Also, the unaccompanied minors who use Solar CooKits noted that when they left food cooking while out in school, they would often find the otherwise cooked food stolen. This therefore means the Solar Cookit users sometimes have to stay put to watch the food cook. Arguably, the benefits of time saved are nullified in this instance. There is therefore the need to rethink the design of the Cookits to make it less prone to be drifted by wind.

Users of Solar CooKits reported being unable to prepare sufficient food for large families. This makes such families use the Solar CooKits only when they are preparing food for a smaller number of persons. Otherwise they rely on either charcoal or firewood to prepare a family meal. As Halomo Tatar C/No. 102841 (She is aged 63, with a family size 10 and is from the Somali community staying in Zone 5 group 8), noted...

…With a large family like mine, one Solar CooKit cannot cook enough food for whole family. I usually cook pasta, Rice, Meat, Beans, ugali and Bread for my family. Hoverer I am trying my level best to raise some money, in order to buy extra Solar CooKits, as most of my money I use for buying firewood and oil. I ended up saving up to 200 Kenya Shillings a month when I used the Solar CooKit…and the saving is used to buy extra firewood/charcoal for the family.

With 27.7% of those interviewed reporting to have family sizes of ten and above, the highest figure, it implies that a large proportion of the refugees are unable to use the Solar CooKits consistently to prepare food for family sizes of 10 and above.

The Solar CooKits can only be used for limited sunny periods. This in essence reduces the days during which cooking can be done with the Solar CooKit. When it rains or it is very windy solar cooking doesn't take place. The Solar CooKits are also easily susceptible to attack and destruction by termites, thus making users fail to get optimal utility. The Solar CooKits eaten by termites are usually thrown away as they are beyond repair.

While the use of the Solar Cookit comes in handy in water pasteurization, it was noted during transect walks during the evaluation that a number of those found using it had forgotten to insert the devise that helps in determining whether water has actually boiled or not, and hence resorted to guess work! This brought in sharp focus the technology in use and whether the aforesaid device needs to be inbuilt to avoid instances of forgetfulness.

4.6 Project Sustainability

Discussions held during the review period pointed to the fact that the project may be facing an "identity crisis". The majority of beneficiaries did not have a sense of ownership of it and kept making reference to SCI when asked questions on use, cost, maintenance etc. Issues such as this impact any exit strategy that may be consequently used.

The nature of the project means that a critical sustainability issue relates to technology transfer and capacity building. Thus, ordinarily, the client community is provided with skills for designing and adapting a technology so that the same can be locally produced or local manpower can use and repair the equipment even if the actual development of the same could be outside the community in question. In the case of Solar CooKits, all the requisite materials come from an external source.

A critical look at the SCI project gives the impression that issues of sustainability were not planned for during the conception and initial planning. Clearly the idea of forming the solar Cookers Cooperative (SOCOCO) came about as a result of a careful reflection on the progression of the Original project vis-à-vis desired and re-evaluated project outcomes.

Exit strategies need to be shared with the client community as the project implementation is on course, rather than embarking on it at the end, as the case seems to have been. Nonetheless, given the circumstances under which the project was conceived, there would perhaps have been no other better alternative to the formation of the Solar Cookers Cooperative (SOCOCO).

The cooperative plan was relevant also because the only realistic way for solar energy to play a significant role in energy supply at the camp is for it to be taken up in certain crucial niches. Potential niches include groups such the vulnerable, and unaccompanied youth, and the high energy consuming activities such as baking products, and mass cooking of cereals.

Objectives of SOCOCO are:

1. Ensure access to solar cooking equipment and services in the Kakuma refugee after SCI has left.
2. Support the solar users and new arrivals in the camp.
3. Serve as an avenue towards the commercialization of solar cooking technology as an Income Generation Activity (IGA).

The following are anticipated once the cooperative commences it's activities:

1. The current staff that is willing to be members will be given a chance upon payment of registration of Ksh. 600,000.
2. There will be a shop that will sell Solar CooKits and plastic bags.
3. The shop attendants (former staff and cooperative members in a rotational manner) will train new users who buy the Solar CooKits.
4. The cooperative members will assist in equipment maintenance at a fee.
5. Cooperative members will create awareness and sell other energy saving technology for example ha basket.
6. The shop will sell cooked food (as much as possible solar cooked food).

To date, there has been some positive steps towards putting into actions some of the thoughts on the formation and operations of the cooperative. Training has already been provided on the basic of cooperatives and their management, covering the management and human resources issues.

Factors to be borne in mind in the phase out are:

1. That the refuge environment is very temporal with the refugees having a "moving away anytime" mentality rather than that of permanence. This camp dynamic has to be borne in mind in the conception of the cooperative.

2. While there may be temptation to make the cooperative to be a fully-fledged business initiative this should not override the initial objective of encouraging and promoting the use of solar cooking.
3. That the need to increase solar cooking in the camp should also be preceded by the technology challenge of developing Solar CooKits that are not only fast but also those that can prepare large amounts of food at one go.
4. That contrary to the recruitment of the solar cooker staff who are illiterate, the cooperative should have the "private sector" orientation and employ those who are well trained in the management of people, and able to grasp basic finance and accounting systems.
5. That there should be clear, precise and definitive responsibilities coupled with a clear monitoring framework so as to avoid overcrowding as has been the problem of many community based income generation activities.
6. That the phase out should be gradual and systematic so that the refugees don't feel abandoned and consequently abandoning the project.
7. SC1 should also explore possibilities of working with GTZ for the continuity of Solar CooKit distribution in the camp as a step towards having collaboration with the other actors in the domain of energy use.
8. The need to have technology transfer in the Solar CooKit production so that the Solar CooKits can also be produced within the camp, with a consideration of making the production site into an energy conservation and training center.
9. The need to make the refugee community identify with the project by inculcating a sense of ownership and belonging and by using promotional activities so that the initiative becomes a self propelling one.
10. The need to have some information "kiosks" so that the community can be able to have a definitive place where they can access information and also the need to consider a simple and easy to read mouth piece, perhaps a newsletter to relay information.

4.7 Lessons Learnt

The following lessons are emerging from the discussions under the section o project implementation and need to be borne in mind in the event of any undertaking of such a nature in the future:

- That any energy utilization project based on the use of solar power should be conceived within certain succinct assumptions instead of focusing only on objectives and anticipated outcomes.
- That while the project conception and implementation should not be static but dynamic, the involvement of the client community should be borne in mind in critical turning points in a project life cycle, such as introduction of user fees
- That there is need for project implementers to have clear operational linkages with other stakeholders so as to be able to have their activities also incorporated in the activities of the other actors, with a view to maximizing on synergy building and complementarities, and minimizing working at cross purposes.
- That the phase out strategy of any development intervention should be conceived from the outset to enable sufficient time for information sharing and reflection by all the stakeholders so that upon introduction, it is owned and understood by all actors that stand to lose from an abrupt stop to the program.

- That the need to have a baseline survey before commencement of any development is pivotal as this will be used a benchmark in determining the impact realized.
- That while the need to have monitoring tools is sometimes considered a foregone requirement in development planning and implementation of projects, such tools should be realistic, while taking cognizance of the need to build the capacity of the both the implementer and beneficiaries to utilize such tools.
- That there has to be sufficient understanding on the part of all concerned about the rationale for change in project design, such as from OP to TG, with regard to the overall desired impact.

APPENDICES:

Appendix one: Key informants and Focus Group Discussion Participants

1. Solar Cookers Trainers and Monitors meeting held on the 8th of August 2003

	Name	Zone	Category
1	Simon Aduer Ring	4	T.G monitor
2	Santino Mnkal Ngor	3	T.G monitor
3	James Wol Chol	4 and 3	O.P monitor
4	Angelo Riang	1	T.G monitor
5	Aok Gang	1	Trainer
T	Regina Poni	3 and 4	Trainer
7	Akwata Abang'	4	Trainer
8	Grace Deng Akooni	4	Trainer
9	Shadrach Alumai Rima	3	Supervisor
10	Rachael Athiak Riak	4	Trainer
11	Rebecca Akuc	3	Trainer
12	Amina Ahmed	3	Trainer
13	Kuer Angok	1	Trainer
14	Mursal Mukhtar	5	T.G Monior
15	Amina Kasfa	1	Trainer
16	Monica Atiku	6	Trainer
17	Mary Yar	6	Trainer
18	Rebecca Nyul	1	Trainer
19	Mary Kuany	3	Trainer
20	Martha Atho	3	Trainer

2. Focus Group Discussion with Case Workers Peace Building and Conflict Resolution

	Name	Camp
1	Abukar Mahamud Madimba	Kakuma Somali Bantu
2	Sttiddad Adbuiur Abdullahi	Kakuma II Somali
3	Maler Samuel	Zone 4
4	David Atem Ayuel	Kakuma II phase 2
5	Daniel Kuer Bol	Kakuma III
6	Paul Mator Manyak	Peace Facilitator
7	Langoya Francis	Kakuma III
8	Naomi Alek Guot	Zone 6
9	Deborah Elijah Agok	Zone 2

3. Focus Group Discussions with Community Leaders held on 9th August 2003

	Name	Area
1	Shanyalo Adio aweso	Bajuni Community Kakuma 2
2	Maryam Hassan Osmani	Bajuni Community Kakuma 2
3	Reid Njoka	Protection area Kakuma 3
4	Tereza Enjok	Kakuma 3
5	Julie Brown	New Area Kakuma 3
6	Michael Brown	New area Kakuma 3
7	Ibrahim Adan Asdulle	Secretary Bor. Kakuma 3
8	Kasahun Daba	Ethiopian Act. Chairman Zone 5
9	Mohammed Ahmed Alkadir	Somalki Barawa Community Chairman phase 2
10	Fatuma Ahmed	Somali Chairlady
11	Thiang Aketch ATEM	Kakuma 3 Secretary and acting Chairman
12	Santine Makol	SCI Monitor
13	Rehema Khami	SCI Trainer
14	Santino Makol	SCI Trainer

4. Interview schedule with Women Solar Cookers Users

	Name	Area	Zone	Group
1	Aaboka Anger	Kakuma 1	1	12
2	Abuk Youk	Kakuma 1	1	11
3	Adau Buol	Kakuma 1	6	8
4	Josephine Nazere	Kakuma 1	1	5
5	Tersa Nakalango	Kakuma 1	1	5
6	Clementina Moses	Kakuma 1	1	5
7	Rebecca Akuch	Kakuma 1	2	10
8	Amer Deng	Kakuma 1	2	17
9	Elizabeth Paul	Kakuma 1	2	21
10	Aduf Wieu	Kakuma 1	3	35
11	Amer Yuot	Kakuma 1	3	36
12	Rachier Ayen	Kakuma 1	3	36
13	Mary Nyatut	Kakuma 1	3	36
14	Tabitha Pakalang	Kakuma 1	3	36
15	Mary Awuong	Kakuma 1	3	8

Summary Schedule of List of Key Informants

	Name of Organization	**Person(s) Interviewed**
1	German Technical Co-operation (GTZ)	Mr. Siyad Samatar
2	World Food Programme	Ms. Askale Teklu
3	Solar Cookers International (SCI)	Mr. Solomon Okumu and Ms. Virginia Ruguru
4	Lutheran World Federation	Ms. Hellen Lipo and Ms.Evangelin
5	United Nations High Commissioner for Refugees (UNHCR)	Mr. Stephen K. Kajirwa

Appendix two: HOUSEHOLD QUESTIONNAIRE

Date of Interview: _____

Household number: _____

Household location: _____

Enumerator: _____

For supervisor only:

Household back-checked?		Questionnaire checked by:	OE translations done by:
Yes	1	*[Supervisor signature]*	*[Supervisor signature]*
No	2		

Household Selection and interview Procedure

Enumerator:

1. *It is your job is to select a random (this means any) household. In this survey a household is defined as comprising a person or group of persons generally bound by ties of kinship who live together under a single roof or within a single compound and who share a community of life in that they are answerable to the same head and share a common source of food.*

2. Circle the correct responses as appropriate on the questionnaire. Record accurately and clearly the responses to the open-ended questions.

3. If consent to interview is secured, proceed as follows:

Good day. My name is _____. I am from CIR, an independent research organization. We are studying the views of camp residents on the energy sources they use and their cost and availability. Every person in the camp has an equal chance of being included in this study. All information will be kept confidential. Your household has been chosen by chance.

I. ENERGY USE, SOURCES AND EXPENDITURE

1. Please estimate the number of days in a week that the following sources of energy are used in your household.

	Frequency of use			
Energy source	**1. 5 days and more**	**2. 3-4 days**	**3. 1-2 days**	**4.Not at all**
Firewood				
Charcoal				
Paraffin				
Gas				
Solar				
Plant residue				
Other (specify)				

2. For what purpose is firewood most commonly used in your household? Circle as appropriate

    1. Cooking
    2. Heating water for bathing
    3. Heating water for drinking
    4. Drying/food preservation
    5. Other purpose (specify below) _____
    6. Not applicable

3. How many times do you cook in your household in an average day?

    1. Once
    2. Twice
    3. Thrice
    4. More than three times

4. Please list the foods that are cooked regularly in your household and specify the type of fuel (s) you normally use in cooking it, the type of cooker and the average time spent to cook it.

Food	Fuel used in cooking	Type of cooker (s)	Average cooking time

5. Using the ranking scheme below,

    1. Much Better
    2.Better
    3. About the same
    4.Worse

Compare the solar cooker to the following cooking technologies in terms of savings on expenditure, time spent on cooking and quality of food cooked.

Cooking technology	**Savings on expenditure**	**Time spent cooking**	**Quality 0f food coked**	**Cannot compare**
Traditional 3 stone				
Energy saving stove				
Paraffin stove				
All Metal Stove (AMS)				
Fireless cooker				
Other (specify)				

6. Overall, Which cooking technology would you prefer to use if you had a choice?

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7. Please estimate what proportion of the firewood you use is bought, collected, or provided freely by either neighbours or the camp administration.

Firewood source	**1. 70-100%; 2. > 50%; 3. <50%**
Bought	
Collected	
Provided freely	

8. Please list 5 of the largest elements of your average monthly expenses in order of largest to smallest.

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9. Please indicate the quantities of the following energy sources you use in your household in a week and the currency you use to acquire them

Energy source	Quantity	Currency- money (Specify amount)	Currency-other (specify)
Paraffin			
Charcoal			
Firewood			

10. Indicate where your household gets the firewood/charcoal that you buy, collect or get provided with free, the distance to the source of firewood, the household members that actually bring it home, and the availability of firewood at the sources.

Firewood/ charcoal	**Where found** 1.market, 2.shop, 3.neighbour, 4.other; 5.N/A)	**Distance in Km to firewood source** 1. Less than 1 km; 2. 1-2 Km; 3.more than 2 Km; 4. N/A	**Household member bringing firewood** 1.Men, 2.women, 3.boys, 4.girls 5.N/A	*Availability* 1. Always; 2. Often; 3. Rarely; 4. N/A)
Bought				
Collected				
Provided freely				

11. Which of the following means does your household most frequently use to transport the firewood/charcoal home?

1. Hand-cart
2. On feet
3. Bicycle
4. Other (specify)----------

II. SOLAR COOKER USE, UPTAKE AND PERCEPTION

12. Have you heard about a solar cooker?

1) Yes
2) No

13. From whom did you hear about it?

1) SCI personnel
2) Neighbour
3) Solar Cooking demonstration
4) Camp administrators
5) Trans World Radio
6) Other (Specify)----------
7) N/A

14. Have you ever used a Solar Cooker in your household to cook your food?

1) Yes
3) No

15. If yes, what type of solar cooker have you used?

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16. If No, Why haven't you used a solar cooker?

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17. If you use the CooKit, when did you start using it?

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18. How many CooKits have you owned?

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19. Who gave you the solar CooKits you have used?

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20. Comment on your own household's experience with the Cookit?

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21. Have you ever stopped using the CooKit?

1) Yes
2) No
3) N/A

22. Explain your answer in 21 above

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23. What would you say about the number of users of the CooKit in the camp over the last 3 years?

1. Increased Substantially
2. Increased moderately
3. Stayed about the same
4. Decreased
5. Cannot tell

24. Comment on your own view of the benefits of the Cookit to the following

1. Unaccompanied men

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2. Children

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3. Women and young girls

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4. The environment

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25. What do you think should be done to improve the use of solar Cookit in the camp?

III. DEMOGRAPHIC INFORMATION

26. Sex
    1. Male
    2. Female

27. How long have you stayed in this camp?
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28. What is the total number of the members of this household?
    _____

29. What is your age?
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30. Civil status
    1. Married
    2. Single
    3. Widowed
    4. Foster parent

31. What is the highest lever of education attained for each of the household members?
    1. No formal education
    2. Primary education (5 years and below)
    3. Primary education (6 years and above)
    4. Secondary education (incomplete)
    5. Secondary education
    6. College diploma/ University graduate

32. What is your main current activity?
    1. Formally employed
    2. Casual labour
    3. Artisan
    4. Trader
    5. Firewood collection
    6. Not working

33. Which community group do you belong to?
    1. Women development grouping
    2. Local social groupings e.g
    3. Co-operative
    4. Belongs to no group
    5. Other (please specify)----------

Appendix three: SCI – kakuma Fuel Use and measurement Survey

Questionnaire No: _____

Section A: Background Data

1. Date :
2. Enumerator:
3. Area:
4. Gender of Respondent : Female ____ Male__
5. Marital Status : Single ____ Married ____ Widowed ___
6. No. of people in the HH :
7. Respondent's Position in Family : Mother____ Daughter ___ Father___ Son ____ Other (specify)___
8. Head of Household : Female ___Male ___
9. Age:
10. Level of Education:

Section B: Cooking Practice

11. Please list all fuels used in the household, appliances used, mode of purchase, where obtained, frequency of acquisition and weekly expense.

Fuel / Energy Source	Appliance(s) Used	Mode of Purchase	Where obtained from	Frequency of acquisition	Weekly Expense on Fuel
Charcoal					
Firewood					
Kerosene					
Solar/sun					

For Appliance used:	For Mode of Purchase:	For where obtained:	For frequency of purchase:	For weekly expense:
1= 3-stone fire 2= Energy Saving Stove 3= Solar cooker 4= Kerosene stove 5 = Other (specify)	1= Free supply by camp admin 2= Cash 3 = Food rations 4 = Collected free 5 = Other (specify)	1= Camp admin 2 = Shopping Centre 3= collected from fence/ shrubs 4= Other (specify)	1= Daily 2= Every 2-3 days 3= weekly 4= varies 5=Other (specify)	Use currency or rations (specify clearly)

12. At all times are you able to find / buy / receive the fuel that you desire? Yes___ No ___

13. If no, indicate by ticking which fuel. Charcoal_____ firewood_____kerosene_____

14. Please indicate the frequency of meals cooked, duration to cook and amount of fuel used to cook each meal.

Time of day	Meals cooked	Duration of cooking	Amount of fuel used	Type of food cooked
Early Morning				
Late Morning				
Afternoon				
Late afternoon				
Evening				

For Meals cooked:	For Duration of cooking:	For Amount of fuel used:	For Number of people at meals
1= Breakfast 2= Lunch 3= Dinner 4= Other (specify)	1= < 30 minutes. 2= 1 hour 3 = 2 hours 4 = 3 hours 5 = >4 hours	1= Small bindle wood (1 kg) 2 = Medium bundle wood (2kg) 3= Big Bundle wood (4 kg) 4= Small tin of charcoal 5= Medium tin charcoal 6= Large tin of charcoal 7= Other (specify)	1= porridge 2= grains 3= vegetables 4= meat 5=Other (specify)

15. By ticking the relevant column, please rate how satisfied you are with your current supply / access to the following energy sources. For answering why refer to following options:

Energy Source	Level of Satisfaction	Why
Firewood for cooking		
Charcoal for cooking		
Kerosene for cooking		
Solar for cooking		

For level of satisfaction	For "Why"	
1= satisfied 2= Not satisfied 3 = Don't know	A = difficult to collect B = expensive C= not available locally/local supply scarce D = fumes and smoke cause discomfort/illness/sickness	E= locally available F = cheap G = tradition to use the fuel H = other (specify)

Section C: Livelihood

16. What is your occupation, profession, or which activity gives you your major source of income?

17. What is your family's estimated average monthly income?

Fuel Use Measurement Form

The following measurement forms should be carried out for a selected group of households that will accurately and consistently be able to measure and record their fuel use. This questionnaire is intended to verify and corroborate the information provided in the sections above.

a) Firewood:

Date	No. of meals cooked	Amount of firewood (Kg)	Comments

b) Charcoal:

Date	No. of meals cooked	Amount of Charcoal (Kg)	Comments

C) Paraffin:

Date	No. of meals cooked	Amount of Kerosene(liters)	Comments