



**Solar Cookers International**

# **Sunny Solutions Project; Nyakach.**

## **Report on Impact Evaluation.**

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## TABLE OF CONTENTS

1. Executive Summary.....	6
2. Introduction.....	10
3. Literature Review.....	12
4. Methodology Tools and Procedure.....	15
➤ Stakeholders workshop.....	15
➤ Household fuel expenditure.....	15
➤ Meetings with SCI staff and SCOREPs.....	16
➤ Household survey.....	16
5. Findings.....	17
➤ Impacts of solar cooking in Nyakach.....	17
➤ Household fuel expenditure.....	21
➤ Meetings with SCI staff and SCOREPs.....	22
➤ Factors that may have affected project implementation....	22
➤ Achievements of projects core and systemic objectives.....	23
➤ Factors that positively and negatively influence solar use...	26
6. Conclusion and recommendations.....	28
7. Appendices.....	29

## **LIST OF TABLES AND FIGURES**

<b>List of Tables and Figures;</b>	<b>Page</b>
Table 1: Figures disbursements to Sunny Solutions Project in Nyakach from 2003 - 2007.....	14
Table 2: The distribution of population and sample size.....	16
Figure 1.a: Comparison of different fuel types use between 2003 and 2008.....	17
Figure 1.b: Relationship between education level and extent of solar usage.....	18
Figure 1c: Comparison of methods used in getting fuel between 2003 and 2008..	18
Table 3: Approval/disapproval ratings on witnessed reductions in diseases among adults and children.....	20
Table 4: Approval/ disapproval ratings on challenges experienced by adoption of solar cooking.....	20
Table 5.a: Household fuel expenditure experiments findings for TEST.....	21
Table 5.b: Household fuel expenditure experiments findings for CONTROL.....	21
Table 6: Number of people reached from 2003 to 2007.....	23
Table 7: Comparison between proposed budget and expenditure between 2002 – 2007 .....	25

**LIST OF ABBREVIATIONS AND ACRONYMS**

SCI	Solar Cookers International
NYACODA	Nyakach Community Development Association
SCOREP	Solar Cookers Representatives
MoU	Memorandum of Understanding
US	United States of America
CBO	Community Based Organization
NGO	Non Governmental Organization
Ksh	Kenya Shillings (Local Currency. RoE: US\$ = Ksh 65)

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## **EXECUTIVE SUMMARY**

### **ABOUT THE STUDY**

The client, Solar Cookers International (E.A) herein referred to as SCI is a Non-profit organization implementing the Sunny Solutions Project in Nyakach Constituency, Nyando District, in Nyanza Province, Kenya. It aimed at assisting the communities use the power from the sun to cook food and pasteurize water for the benefit of the people and the environment. The project has been on the ground since 2003.

SCI commissioned Archway Technology Management Ltd here in referred to as Archway to carry out an impact evaluation on the project to determine the levels of benefits that have accrued to the community since the inception of the project.

This study; “***the impact evaluation of Sunny Solutions Project in Nyakach***” was guided by the following key evaluation objectives;

- Identify the impacts of solar cooking in Nyakach in general and on specific vulnerable groups
- Identify factors that positively and negatively influence solar cooker usage.
- Identify significant factors that may have affected project implementation.
- Establish to what extent the project’s core objectives and systemic objectives were met and document any lessons learnt.

The exercise adopted **interactive participation methodologies** that ensured full involvement of all the stakeholders in developing action plans, implementation of the action plans and analysis of findings. The methods employed include several meetings with client and Solar Cookers Representatives (SCOREPS), stakeholders’ workshops, Literature review, monitoring of household fuel expenditure and Household survey.

### **IDENTIFIED RESULTS**

Here below is a summary of the study results in line with each evaluation objective;

#### **Impacts of Solar Cooking in Nyakach in general and on Specific Vulnerable Groups:**

##### ***Social impacts***

Solar cooking was reported in 62.7% households and was mainly used for boiling water and preparing foods such as vegetables, meat, fish and cake baking. These foods were predominantly cooked using firewood and charcoal before the introduction of the technology<sup>1</sup>. This is a significant shift in technology preference. Solar cooking has relieved significant pressure on use of these traditional fuels. Households using firewood and charcoal have since reduced by 9.1% and 16.7% respectively during the project life. Collection of firewood has also reduced by 21.5% in same period.

Buying and collecting firewood are the two most common methods households use in getting firewood<sup>2</sup>. Before introduction of solar cooking, 80% of the households got firewood by collecting, this has since reduced by 21.5% as revealed from the household survey. This has relieved pressure and drudgery on the girls, women and children who were found to have the duty of collecting firewood. There is a perceived reduction on conflicts over firewood within the homestead between parents and children, husbands and wives, co-wives and in-laws.

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<sup>1</sup> SCI, Baseline Study Report 2003, Pg 21, 4.2.3

<sup>2</sup> SCI, Baseline Study Report 2003, Pg 20, 4.2.2

Increased self esteem and recognition among solar users as well as the SCOREPs was reported. Ms Jessica Ochieng of Eastern Nyakach (Northern Zone) who has been presenting the solar cooking technology at a vernacular FM Station (Radio Ramogi), aired from Nairobi is seen as a role model among her peers. This has improved her social status in the family and the wider community. Further, involvement in the sale of CookKit has motivated some SCOREPs into venturing into some small businesses, hence economically empowered. They are saving with and borrowing from a micro-lending institution (SAGA); their spouses treat them as partners in decision making in household matters especially budgeting.

The project made major contributions towards cultural transformation in changing the community's attitudes and practices. The introduction of solar cooking has proved to the community that outside cooking is safe and fear of witchcraft and poisoning has banished. Mainly because use of CookKit ensures the food is well covered to the extent that the scent of the food cannot be detected. Men in Nyakach have found solar cooking convenient hence increased cases of men cooking were reported in 94% of the households.

The project has contributed towards cohesion of women groups in the larger Nyakach community to promote their social and economic welfare. The project managed to work with and build the capacity of about 247 different women groups in the five years. Some groups were formed with the objective of purchasing CookKits for each other in a merry - go round fashion. These groups have acted as the entry points into the community by other organizations both local and international. Increased social interaction among households using solar CookKit was also reported. These households are viewed as having a higher social status in the community. It has put them in a different social status in the community.

Solar cooking was reported to save time in 98.8% households as people can cook and attend to other activities that promote their well being.

### ***Economic impact***

The reduction in use of firewood and charcoal has resulted to significant savings on households' fuel budgets. This impact was acknowledged by 98.8% of the households in the survey. The household fuel expenditure monitoring experiment results showed that households supplementing conventional fuels with solar are able to save up to 46.7% on their fuel budgets. The community through their representatives in the stakeholders meetings confirmed that they are able to attend to other family needs such as buying books for school children, paying medical bills and even acquiring property. Families carry their CookKits kilometers away from home to prepare meals as they till their farms without much disruption. This translates to increased productivity among the households.

*Debora Malago one of the SCOREPs from Thur-Dibuoro; managed to use the savings from fuel budget to buy chicken which were later sold to buy sheep. The sheep were sold to buy a cow. Deborah has also witnessed reduced daily fuel budget from Ksh.40 to Ksh 10 over time*

### ***Health and environment impact***

Diarrhea, cholera, dysentery and typhoid were the major water born diseases with high prevalence particularly among children below 5 years in 2003. This was largely attributed to use of non pasteurized water due to high costs of fuel. Solar CookKit has assumed a significant role in water pasteurization in 53% of the households. Water related diseases like diarrhea have reduced among children and adults by 78% in both cases *re-confirming a survey conducted by SCI in 2005*. Households interviewed reported reduction of Ear Nose and Throat (ENT) diseases by 71% among children and 85% among adults as a result of

reduced exposure to smoke. Households reporting a reduction on chest related ailments were 70% and 84% on children and adults respectively. Eye irritation is an ailment related to constant exposure to smoke and was reported to have reduced in 71% and 85% among children and adults respectively.

The reduction on use of firewood, charcoal and agricultural residues translate to a decrease on the number of trees and shrubs removed from the environment. Maintenance of hedges or fences has enhanced security of homesteads. This significantly contributes to reduction in deforestation as a major environmental achievement of the solar cooking. Though no statistics was found to support this argument, the government through the area provincial administration confirmed there is decrease in logging in the area. Households also acknowledged increased cleanliness of their cooking areas which otherwise would be littered with pieces of firewood and agricultural waste.

### ***Educational and Institutional impact***

Solar cooking requires that the beneficiary is taught how to use and maintain the equipment. This has resulted into a greater awareness by the whole community on the sun's potential and the spread of additional skills and knowledge on using solar cookers. The community has enriched their knowledge on fuel savings techniques. This has in turn made Nyakach the epicenter from which solar cooking skills and solar cookers can spread to other parts of Nyanza. This is evident from the number of CookKits sold outside the project area and requests for cooking demonstration by various groups both far and near Nyakach. Planning and budgeting for cooking at household levels is a positive impact on the community as a whole, since solar cooking begins early one needs to be adequately prepared. Additionally, the SCOREP movement has proved itself as a formidable team through which awareness creations and selling CookKits was achieved and can continue beyond the project phase. There will however be the need of support from the stakeholders, development partners including micro-lending institutions.

### ***Technological impact***

There is enhanced awareness and skills in the community on the potential of using sunshine to cook. About 59% of households use solar cooking to prepare lunch and also bake their own cakes during special occasions. The technology has been accepted and adopted in Nyakach and the CookKits are assembled locally, by women and youths. At the time of carrying out the evaluation, nearly 1,000 households had made down payments and striving to own solar cooker. The current version of the CookKit has been branded "OYWA" which means Nyakach. This version won the Pan African Women Inventors and Innovators Award (PAWII) in Ghana in 2005. Teachers also used the technology to promote practical teaching of sciences in schools (PACE documentary).

### **Factors that positively and negatively Influenced Solar Cooker use and usage:**

Factors that influenced solar cooker use and usage in Nyakach have been identified and categorized under social (awareness, attitudes and practices), economic, health and environment, educational, institutional and technological.

#### **Factors promoting use/usage of solar cookers in Nyakach**

- Encourages cleanliness and hygiene, men, women and children can easily use CookKit, families can bake own cakes usually used during special functions and that families are able to cook different foods with several CookKits at the same time.
- It affords the cook time to do other things e.g. reading, socializing.
- Money saved on fuels budgets is used to attend to other family needs
- It is convenient in pasteurizing water for drinking;
- Promotes the culture of planning for cooking, baking and other areas of life
- CookKit is portable and does not burn

- Enables families harness natural resources/renewable energy (transformation)

#### **Factors undermining use/usage of solar cooking in Nyakach**

- It is weather dependent and cannot be used at all times.
- Can not cook some foods
- Attitudes that solar cooked foods are not well cooked (this was however disputed by stakeholders validating findings)
- People need training on how to use CookKit unlike other stoves
- plastic bags wear out and with time can be expensive
- Can not serve large families (Nyakach has average household of six people)

#### **Significant factors that may have affected project implementation**

The factors that may have affected project implementation can be looked at under different categories namely; circumstantial, structural, organizational, Financial and natural. Sunny Solutions Project is SCI's largest project amongst a free settled community. Lessons learnt from refugee camps could not fully inform its implementation. The lessons were remodeled to fit the circumstance. Organizationally, the locals did not have experience in solar technology hence need for capacity development for the recruited staff. Inadequate transport and communication facilities hindered coverage of the project area at initial stages before the project vehicle and cell phone were acquired

The government lacks a strong policy that supports promotion and use of renewable energy. There are no government middle level officers to support use of solar cooking technology; constant fluctuation in exchange rate of the shilling against the dollar and inflation eroded the real value of the financial resources; CookKit is weather dependant gadget and was difficult to promote during rainy seasons. This has come out as one of the major hurdles in its promotion to the community.

#### **Extent to which the project's core objectives and systemic objectives were met and document lessons learned.**

The project met all its core and systemic objectives. The project directly reached 113,616 people through promotional and awareness creations demonstrations. A total of 3,154 CookKits were sold to 2,593 households who also received Water Pasteurization Indicators (WAPI). Collaboration and links to promote Sunny Solutions Project was very evident as SCI worked with 247 different groups within and outside Nyakach. Eighty eight households are reported buying a second and even third purchase of CookKits, which indicates the benefits, derived from the first CookKit bought and sustain adoption. *Nyakach had a population of about 140,000 people by end of 2007*

Attitude change indicators include: Many households acknowledged that there is an increase in cases where men cook. With 63% of households consistently using CookKit explains that the people of Nyakach no longer suffer from techno phobia. The people have moved away from traditional schedules as they can prepare their meals early while sunshine is abundant.

The adoption of local sales agents' strategy, SCOREPs backed by zonal supervisors is clear proof that knowledge and skills are within the community and with a modest financial backing the community is capable of "enabling sustainable or independent spread of access to solar cooking and solar cooker supplies" upon phase-out by SCI. there may however be need for minimal support from development partners and government agencies, with SCI's participation as lead partner for networking.

The Sunny Solutions project has developed a responsible image locally and internationally and this has been acknowledged through various awards and honors.

## **SECTION I: INTRODUCTION**

### **1.1. About Solar Cookers International and the Sunny Solutions project**

The client Solar Cookers International (E.A) is the regional chapter of the Solar Cookers International (SCI) that is classified in the US as 501 (3) non profit organization. It was founded in 1987, and is based in Sacramento, California. Its mission is; **“to assist communities use the power of the sun to cook food and pasteurize drinking water for the benefit of people and environments.”** SCI’s main tools of trade are the CookKit a simple, portable panel – type solar cooker, and the water pasteurization indicator (WAPI) that indicates to you that your water is safe for drinking after heating it on a solar cooker. SCI began as an information exchange and educational organization among its members. In 1994 it began implementing projects mainly in two refugee camps Kakuma, north western Kenya and Aisha in eastern Ethiopia. These two projects were implemented and the final evaluation indicated that solar cooking was indeed a viable option for people living in sun rich areas suffering fuel wood scarcities.

**Sunny Solutions project** in Nyakach, Nyando District, Nyanza province in Kenya is Solar Cookers International’s largest project amongst a free settled community after successfully implementing two refugee projects in the past. Sunny Solutions project begun in late 2002 with a baseline study.

Prior to this, there was competitive bidding for the project after it was advertised in one of the local dailies and 153 organizations applied. A thorough scrutiny followed and the search narrowed to three organizations. Then followed a verification field visit of these three sites and after analyzing the corroborating data, Nyakach Community Development Association’s (NYACODA) proposal to pilot the project emerged the winner. Having selected the community to partner with, SCI proceeded to sign a Memorandum of Understanding with NYACODA. In the discussion that preceded the MoU, NYACODA stated that Nyakach was made of two distinct ecological and climatic zones and that all these needed to be included in the project.

The baseline study was designed to establish the status quo in terms of fuel wood needs, diets, socio – cultural practices influencing energy provision to households, patterns of water collection and treatment and community health especially in relation to water related diseases and community development ventures. After the baseline study, SCI came up with a project design that was to guide project implementation. The Project’s goal is to establish a self – sustaining spread of solar cooking and solar water pasteurization in Nyakach. The specific objectives were split into core and systemic objectives;

#### **Core objectives:**

- Introduce and spread solar cooking in Nyakach to 100,000 people in 4 years.
- Promote solar water pasteurization to 15,000 people in Nyakach in 3 years
- Foster links with other common groups and agencies in Nyakach to ensure broad access to solar cooking technology
- Enable commercialization of solar cooking supplies through support of 4 entrepreneurs selling 3,000 CookKits in 4 years.

#### **Systemic objectives:**

- Significantly contribute to change of attitude toward use of renewable sources of energy
- Run an effective program that ensures continued relevance and sustainability upon phase out of SCI in 2007

- Run an efficient, cost effective and replicable project that depicts a responsible image among the organizations, agencies and community in Nyakach.

### **1.2. About the project area; Nyakach**

The project target area; Nyakach comprises of two divisions namely upper and lower Nyakach in Nyando district in Nyanza province in western Kenya region. According to the Government Nyando District Development Plan (2002 – 2008), Upper Nyakach covers an area of 176 square kilometers and the most densely populated (407 persons per Km square. Lower Nyakach is 182.6 square kilometer with population density of 299 persons per Km square. The socio – economic statistics show that Nyando District has a total of 68,371 households with average household size of 4.4 persons; Absolute poverty is at 68.9%; and 90% of households use firewood and charcoal as major source of fuel for cooking.

### **1.3. About the Consultant:**

Archway Technology Management Ltd was established in the year 2000 as a limited liability company in Kenya with file number C.96791. Archway specializes in designing and implementing Community based social products in the fields of social research, community capacity development and community awareness programmes.

### **1.4. Reason for Evaluation:**

Having run its course, the project was due for an evaluation whose outcome may inform decision on its continuation or phase – out. The evaluation was also being undertaken as a standard operation mode for all development initiatives. It also allows SCI and her partners to have a full understanding of the impact of the intervention by documenting its short and longer term impact, its limitations and lessons that can be learnt. The evaluation also looked at the processes used to implement and monitor the project in relation to its goals and objectives. The evaluation was to be conducted in a participatory manner.

### **Objectives of the Evaluation:**

- Identify the impact of solar cooking in Nyakach in general and on specific vulnerable groups
- Identify factors that positively and negatively influence solar cooker use and usage.
- Identify significant factors that may have affected project implementation.
- Establish to what extent the project's core and systemic objectives were met and document any lessons that can be learnt.

## **SECTION II: LITERATURE REVIEW**

Different documents were studied to determine what has been conducted in the implementation of the Sunny Solutions Project. This was aimed at ensuring unintentional duplications and to form framework within which the research findings were interpreted. Because of the uniqueness of the project being SCI's "***largest project amongst a free settled community after successfully implementing two refugee projects in the past***"<sup>3</sup>, much of the literature on similar works was not available. The project document, the proposal, Baseline report and the projects monthly activity reports were reviewed to generate information related to the research problem. This helped in answering the following five questions;

1. Why was the project started in Nyakach?
2. Who was the project to benefit?
3. How was the project to reach the people?
4. What benefits/results were to be realized?
5. By when were the benefits to be realized?

### **2.1. Review of project document and proposal**

#### **Why Was the Project Started In Nyakach?**

The Sunny solutions project was started in Nyakach for the following reasons;<sup>4</sup>

- To learn and document lessons on how settled communities (non refugees) community can adopt the solar cooking technology;
- To save the household expenditure in cooking fuel by about Ksh. 1520 per month for about 3000 households;
- Support business opportunity in solar cooking equipment generating a turnover of about Ksh 2 million for plastic bags and cooker sales during the project life;
- To encourage the utilization of (solar energy) a cleaner, safe and environmentally friendly cooking fuel in Nyakach most of the time.

#### **Who Was the Project to Benefit?**

This project was targeting a population of about 113,126 people in Nyakach (particularly women and children and especially the girl child).<sup>5</sup>

#### **How Was the Project to reach the people/Implemented?**

##### ***Human resource capacity***

a). A system of bringing together resourceful people coupled with training materials was to help the project have technical experts to guide its Implementation. An international network of solar cooking information exchange of over 10,000 contacts, 700 solar cooker promoters and several manufacturers (including one in Nairobi) were to be aided by the Eastern Africa and International Resource Centers in Nairobi Kenya and in Sacramento California respectively in supporting project implementation. This was to bring a wealth of knowledge into the project implementation

b). Provision of resource materials such as (educational guides, instruction booklets on topics such as making and using solar cooker, school teaching aids), that are rich in how to teach others on how to solar cook

c) Engage highly qualified and motivated management and support staff.

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<sup>3</sup> Description of Sunny Solutions (Nyakach) Evaluation, Pg 1 of 4

<sup>4</sup> Sunny Solutions Project Proposal; Executive summary

<sup>5</sup> Sunny Solutions Project Proposal; Section 2.2; Target Community

### **Project implementation<sup>6</sup>**

Elements favoring community ownership of the project and sustainability, accelerated commercialization, promoting knowledge about the product to the young people, local fabrication and interagency promotion was taken as the vehicle of implementation through community groups such as women groups. This was to be done in phases;

**Planning phase:** Was to run from April 2002 to May 2004 and was to involve the following activities;

- Site selection
- Recruitment
- Baseline survey
- Pilot phase implementation
- Promotion campaigns
- Project design
- Procurement of supplies
- Training of users

**Implementation Phase:** Was to run from April 2002 to December 2006 and was to involve the following activities;

- Promotional activities to reach 100,000
- Training of personnel and users/organizations
- Monitoring and evaluation
- Promotion of business in solar cooking
- Documentation of issues in the project
- Networking

**Phase out:** Impact assessment survey

- Project handover to community(Commercialization of project)/Planning for next stage

**Financial resources:** The project had a financial budget of Ksh. 18,652,986 for a period of six years<sup>7</sup>. This was to be disbursed in annual installments (Table 1below).

### **What Benefits/Results Were To Be Realized**

The project log frame has the following as the key expected impact results;

- 30% of Nyakach population accept solar cooking as method of cooking
- 3,000 families to save 40% of budget on fuel
- Increased activity of the girl child and woman who are the two primary cooks in Nyakach
- Existence of business plan to promote solar cooking equipment business in Nyakach incorporating business plans from the identified entrepreneurs in Nyakach
- Existence of a document analyzing stakeholders of cooking energy programme in Nyakach

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<sup>6</sup> Sunny Solutions Project Proposal; Section 4.2; Project Schedule

<sup>7</sup> Sunny Solutions Project Proposal; Table 5; proposed yearly expenditure.

**Table 1: Financial disbursements to Sunny Solutions Project in Nyakach from 2002 - 2007**

<b>MONTH</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
Jan	74,014.00	122,863.00	226,663.50	545,313.00	510,896.00
Feb	74,014.00	99,795.00	226,663.50	460,140.50	450,844.00
March	74,014.00	117,288.00	226,663.50	520,017.00	615,120.00
April	74,014.00	340,011.00	226,663.50	352,691.00	360,779.20
May	37,007.00	340,011.00	226,663.50	353,215.20	352,589.00
June	37,007.00	340,011.00	226,663.50	379,502.00	293,976.00
July	347,896.50	347,896.50	338,967.00	469,090.00	413,454.00
Aug	212,893.00	90,636.50	341,141.00	705,633.00	617,526.00
Sep	139,408.00	90,636.50	240,425.00	376,704.00	377,372.00
Oct	74,014.00	180,276.00	473,972.00	453,403.00	363,053.00
Nov	114,884.20	372,202.00	349,111.50	693,627.00	469,774.00
Dec	100,813.00	719,229.00	522,656.50		492,060.00
	<b>1,359,978.70</b>	<b>3,160,855.50</b>	<b>3,626,254.00</b>	<b>5,309,335.70</b>	<b>5,317,443.20</b>

## 2.2. Review of Baseline survey report.

The report on the baseline survey conducted in 2003 was the guiding tool in understanding the prevailing situation before commencement of the project in 2003. The results are the basis on which Archway findings has done comparative analysis to get the changes that have brought benefits/impacts on the community lives. This survey had the following objectives;

- To document types, sources, costs and quantities of biomass energy and paraffin used for cooking and heating water;
- To gather information on the main foods cooked, the technologies used to cook and times when meals are served;
- To describe the socio cultural aspects of obtaining and using biomass fuel and of cooking and eating food;
- To describe patterns of water collection for household and document current drinking water treatment practices;
- To gather information from community health workers and community members about factors influencing the incidence of water borne diseases, to describe the community and community development activities as this is the context within which the Sunny Solutions project was to take place.

### **SECTION III: METHODOLOGY, TOOLS AND PROCESSES**

#### **3.1. STAKEHOLDER WORKSHOP**

Archway adopted **interactive participation method**<sup>8</sup> that involved the full participation of the stakeholders in developing action plans, implementation of the action plans and analysis of findings.

A stockholder's workshop was organized for 30 participants to take them through the process of understanding the project within the context of impact evaluation. The workshop generated the indicators around the community experiences and observations that were used to develop the questionnaire for the household survey. This ensured the development of a people driven tool that accommodated their views on the research questions. The stakeholders involved in the exercise represented the following interests in the community;

1. Community Health Workers (CHWs)
2. SCI Development partners eg NYACODA
3. Government officials; Provincial administration and Environment and Forestry representatives;
4. Jua kali artisans/Food vendors;
5. Fuel wood/charcoal vendors;
6. Representatives of cook it users (Households)
7. Learning institutions;
8. SCI field staff and EARO representative
9. Archway consultants.

Each of the four regions brought a representative in each of the interests listed above. Group work sessions were organized with the participants to deliberate over the following three issues;

- The benefits experienced since the introduction of solar technology in Nyakach;
- The challenges experienced since the introduction of solar cooking technology in Nyakach;
- How the challenges experienced could be addressed/improved

The information generated at the groups discussions were subjected to further enrichment at the plenary (Table 4.2 a). It's at the plenary that indicators for measurement were jointly agreed on. The indicators were then sorted into five categories forming the impact domains. These included social, economic, health and environment, Institutional and educational and technological domains (Table 4.2 b).

#### **3.2. HOUSEHOLD FUEL EXPENDITURE EXPERIMENT**

Samples of 12 household volunteers were picked during the stakeholders' workshop to help in the household fuel expenditure experiment. These comprised of 6 households using Cookit (TEST) and 6 non users (CONTROL). The survey was to determine whether there is difference in expenditure between the control and the test. Household fuel expenditure tools were designed for both the Test and the Control (Appendix 3a and 3b). The data was collected as follows for 15 days;

- The Control group was to register amount spent in buying firewood, charcoal or paraffin and indicate occasions where gas or electricity is used.

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<sup>8</sup> Participatory Learning Action, A trainer's Guide; Pg 61; (Julies N. Pretty et al 1995); International Institute for Environment and Development; 3 Endsleigh Street, London, WC1H ODD, UK.

- The Test group was to register amount spent in buying firewood, charcoal or paraffin and indicate occasions where gas, electricity or solar was used.
- The two groups were to estimate number of people they cooked for and the types of food cooked on daily basis.

### **3.3. MEETINGS**

Archway had several meetings with the SCI Nairobi office staff and field staff in preparation for the impact survey exercise. During the meetings, the research design including the research instruments were developed, shared and agreed by the two parties. There was also one meeting organized for SCOREPs to get an insight into the work they do, how they have gained from it, the challenges they have faced and possible ways of addressing the challenges. In attendance were 14 participants representing the four Zones under study.

### **3.4. HOUSEHOLD SURVEY**

The household survey design was to identify social, economic, health and environment impact on the people of Nyakach. The questionnaire developed in English was shared with the research assistants who managed to generate a Luo version (local vernacular) that was used for data collection. The research assistants comprised of local people with minimum of secondary school education, drawn from the four Zones of Nyakach. Each Zone had two research assistants and a team leader. The team was taken through a one day training workshop on understanding, translation and administration of the questionnaire.

#### **Sampling**

A total of 404 questionnaires were administered representing 15.9% of the population. The population under survey was 2,523 households who were using CookKit in Nyakach. The sample was subjected to stratified sampling method by zones and Systematic random sampling methods by household. All the 404 questionnaires administered were all returned and two were rejected. This high response rate was as a result of the fact that the stakeholders designed the tool and implemented data collection hence were familiar with the tool; Secondly, because the sample was drawn from a list of all those who bought or given cookers hence it was easier for the research assistants to identify the respondents; third, all those involved in data collection were selected from the same localities hence they were familiar with the environment.

**Table 2: The distribution of Population and Sample sizes**

Name of Zone	Population of CookKit users	15.9% of population
North	1,232	196
Central	619	100
Southern	416	67
Western	256	41
<b>Total</b>	<b>2,523</b>	<b>404</b>

The data collected was subjected to descriptive statistics (SPSS version 11.5) to meaningfully describe distribution and do measurement of scores. Content analysis was done on qualitative data from project reports and meetings with Stakeholders, meetings with SCI staff and SCOREPS.

**SECTION IV: FINDINGS**

**4.1: IMPACTS OF SOLAR COOKING IN NYAKACH IN GENERAL AND VULNERABLE GROUPS**

**4.1.1: HOUSEHOLD SURVEY FINDINGS**

**Households experiences with solar cooking.**

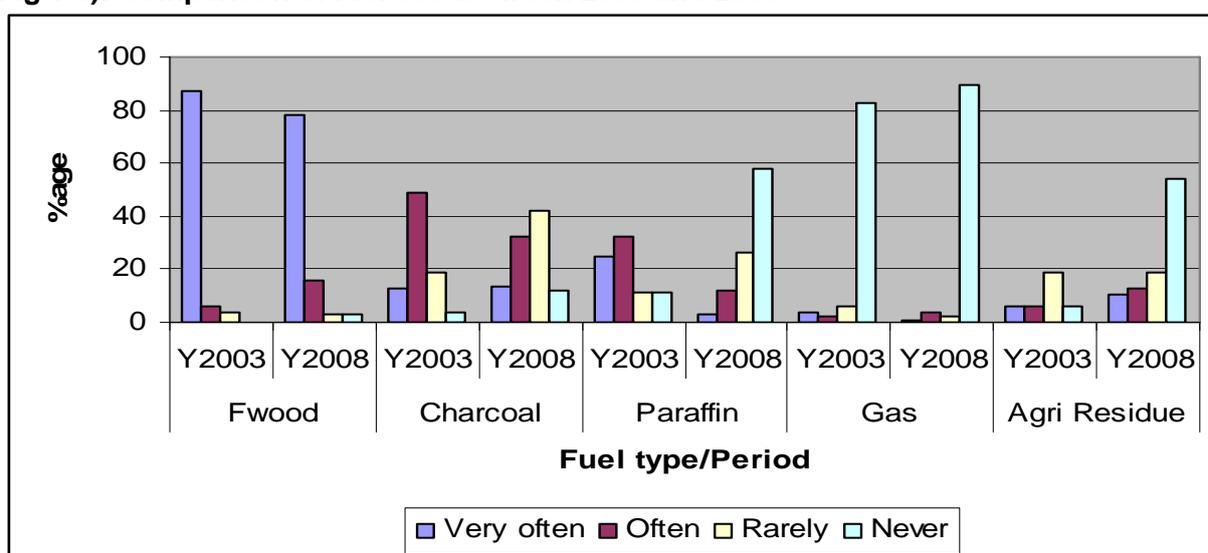
The respondents were asked to confirm through a Yes or No response on five statements that explain benefits they have experienced since they started using solar technology. An analysis of these responses showed high rates of approval. These include cases of reduced utensils with soot with approval rating of 95%; Ability to prepare meals early with approval rating of 95.5%; Reduced cases of stealing firewood with approval rating of 93.6%; reduced cases of using firewood from the fence with approval rating of 95.5%; and Increased cases of men cooking in the house with approval rating of 94.3%.

From the stakeholders' validation of findings workshop, it was confirmed that attitudes have changed greatly on different fronts. There is demystification of the notion that cooking is mainly a woman affair. The workshop also learnt of reduced family conflict on meals prepared late and on cases where firewood from the fence and sections of the house are used in cooking.

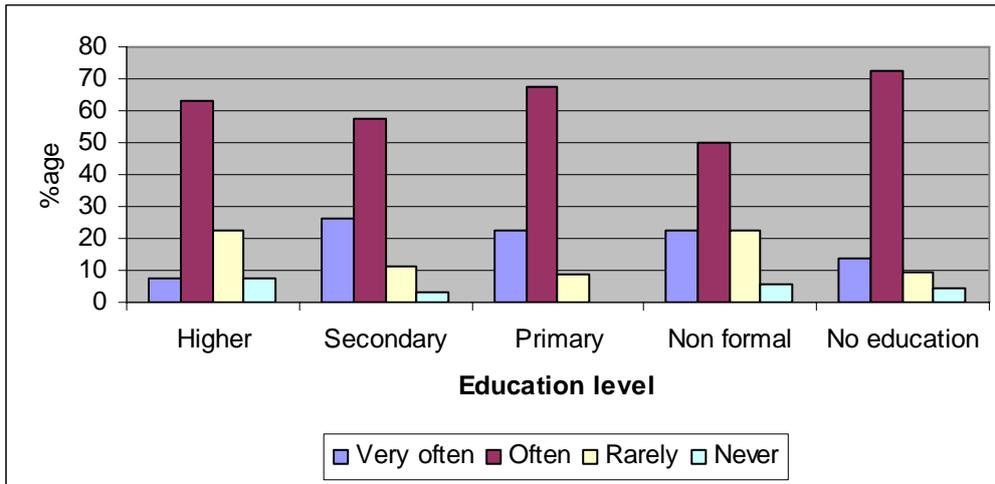
**Frequency of households need for fuel for daily use**

Through an ordinal scale of Very often, often, rarely and never use to measure the extend to which households use respective fuel energy, solar cooking was found to be often used by 62.7% households with 22.4% very often use it. 11.4% rarely use solar cooking while only 2.2% never use it. Significant proportion of the respondents (89.6%) never uses gas for cooking. Over half of the respondents (54.2%) said they never use agricultural residues with 18.9% rarely using it. The community has been able to identify with and adopted use of solar as an alternative to other conventional fuels. Relationship analysis on use of solar by education levels does not show any significance difference.

**Fig 1 a): Comparison of fuel use between 2003 and 2008**



**Fig 1 b) Relationship between education level and extend of solar usage.**



Firewood is looked for mostly only daily and weekly basis by 72.1% and 18.7% households respectively. House holds using charcoal look for it throughout the month (weekly 23.6%, twice a month 20.4% and monthly 36.8% respectively). Paraffin is largely sought on weekly and monthly basis 13.2% and 14.7% households respectively.

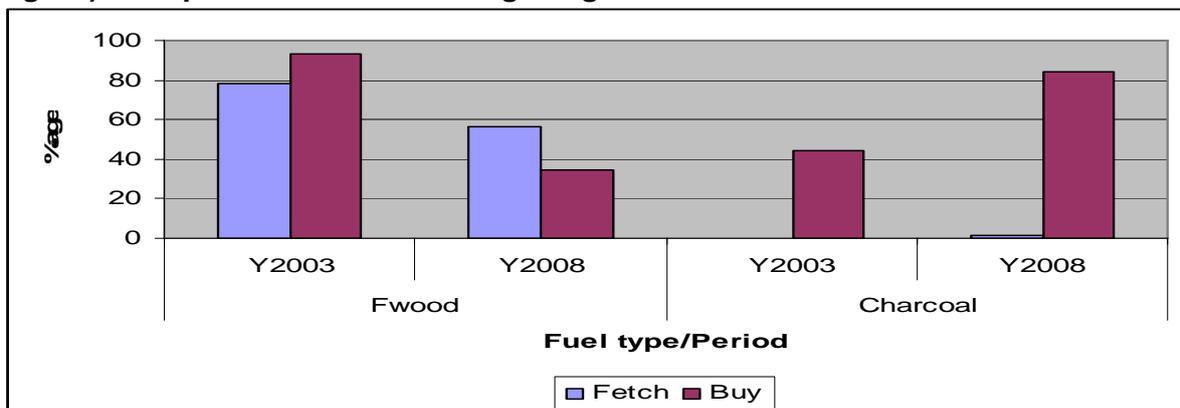
**Types of fuel households normally use for particular activities**

Firewood was found to be the most common form of fuel used for cooking in 49.3% of the households. About 36.8% of the households uses more than one form of fuel for cooking. Solar cooker was found to be prominent with boiling of water for drinking in 52.7% of the households. To keep food warm, firewood and charcoal are used at almost same rates (26.6% and 23.4% households respectively). This is also the case with warming food where firewood and charcoal are normally used at 35.5% and 14.7% respectively. About 22.6% also use more than one form of fuel for warming food.

**Methods of accessing different types of fuel for use**

The survey found that firewood is normally fetched or bought by 56.5% and 34.8% households respectively. About 84.3% of the households buy charcoal while 10.9% of households don't use charcoal. This is similar case to agricultural residues where 53.2% of the households never use it but 38.4% of the households who use get it by fetching. Most households represented by 57.2% don't use paraffin while 38.3% of the households who use buy. CookKit were given to 31.8% of the households while 53.5% of the households bought them.

**Fig 1 c): Comparison of methods of getting fuel between 2003 and 2008**



It's worth noting that fetching and buying firewood has drastically reduced between 2003 and 2008. However, there is a big increase among those who buy charcoal.

### **Who fetches firewood in the households?**

When asked who normally fetch firewood, it was found that majority are the girls in 45.5% of the households. The other categories represented by 19.4% each is that of boys and girls and women. It was only in 1% of the households where men fetch firewood.

### **Type of fuel used for particular foods**

Solar cooking was found popular with boiling water by 72.6% of the households. Cake baking, Vegetables and meats are also mainly prepared using solar in 78.9%, 41.5% and 33.8% households respectively. Tea and porridge is mostly cooked using firewood by 50.5% households. The other significant fuel used for tea and porridge is charcoal by 14.4% households. Firewood is common with ugali in 68.9% of the households. About 17.7% households combine use of firewood with other forms of fuel for cooking ugali. "Nyoyo" is largely cooked with firewood and charcoal at 39.1% and 28.9% households respectively with about 23.1% households using more than more form of fuel. This is also the case with potatoes where 49% and 23.1% households respectively use firewood and charcoal with about 10.9% households combining more than one form of fuel.

Relationship analysis by cross tabulating education level and form of fuel preferred for particular foods showed that use of solar on vegetables and meat reduces with increase in education levels with no much difference in boiling water and in cake baking (Appendix 1.1 – 1.6). Level of education dictates earnings, knowledge affects attitude, hence ability to understand and embrace change.

### **When particular types of fuels are normally used**

Firewood was found to be normally used all times represented by 52.5% households although about 28.9% households normally use it for breakfast. Charcoal is normally used for supper by 39.6% households although about 10.2% and 15.9% of the households use it for breakfast and lunch respectively. Although not used by many households, paraffin was found to be used normally for breakfast at 18.7%. CookKit is normally used during lunch at 59.2%.

### **Source of community knowledge of solar cooking**

Through SCI staff and SCOREPS are the most popular ways through which the people got to know of the solar cooking technology. 36.6% got to know it through SCI staff while 38.6 got to know it through SCOREPS. Public demonstrations also significantly contributed to this awareness at 18.2%. This is also the case with all the Zones as revealed by cross tabulation.

### **Identified economic benefits**

The respondents said they are able to save time to do other activities and that they are able to save some money on fuel budget that they use attend to other family needs. These are both represented by 98.8% approval rating. There is divided opinion on whether the technology is useful for income generating activities. About 55.2% said they use it for income generation while 42.3% said no.

### **Identified Health and Environment benefits**

The respondents were unanimous on some the health benefits experienced as a result of using solar technology. These benefits include reduced cases of infections of ENT, Chest/lungs, Eyes and Diarrhea among children and adults. The approval ratings ranged from

about 70% to 85% in all the cases. A similar approval is also with environmental benefits of reduced cases of littered firewood and reduced cases of use of firewood and charcoal at 99% and 97.8% respectively.

The stakeholders' workshop validation on household survey findings confirmed increased use of herbal medication as a result of reduced deforestation. This has come about due to increased biodiversity conservation as a result of SCI trainings on environmental management in the community. The workshop also learnt that there is improved hygiene particularly among school going children who prepare their lunch from school. The school uniforms are not stained with soot or smell of smoke as they cook. They also manage to prepare their lunch on time which has reduced cases of afternoon lateness to school.

**Table 3: Approval/disapproval ratings on witnessed reduction in diseases among adults and children**

	%age reduction in Children	% age reduction in adults
Reduction in Ear Nose and Throat diseases	71.4	85.6
Reduction in chest related diseases	70.4	83.8
Reduction in eye infections	71.4	85.3
Reduction in diarrhea	77.6	78.1

### Challenges

The respondents managed to identify some of the challenges affecting the use of solar cooking technology. The table below shows the approvals and disapproval ratings (in percentage) of some of the challenges affecting use of CookKit as identified during the stakeholder forum

**Table 4. Approval/Disapproval ratings on challenges experienced by adoption of solar cooking**

Challenges	%age agreeing with statement	%age disagreeing with statement
Cannot cook large quantities of food	84.1	14.9
Cannot cook all the time	93	4.7
Does not cook well	46.3	52.5
People are averse to outside cooking	25.9	72.1
Solar cooker is not durable	23.6	72.1
Solar cooker is expensive	61.9	31.8
Solar cooker is slow	88.6	7.2
Solar cooker cannot cook other foods	25.6	68.9

From the stakeholders findings validation workshop it was learnt that some of these reactions did not have in depth analysis of solar cooking technology. It was agreed that those households with more than one CookKit are able to prepare large quantities of food which was a response to the challenge that CookKit is slow cooker.

In response to the challenges that CookKit is not durable and expensive, there was unanimous agreement in the second stakeholders workshop to validate household survey findings that with a lifespan of the improved CookKit (OYWA CookKit) of 2 – 3 years, it lasts as long as the normal charcoal stoves people use whose cost of operation is far much above that of the CookKit. This also makes use of CookKit less expensive. The workshop also confirmed that people prefer slow cooking for tastier and soft foods such as meat particularly for the old people and children.

### Proposed improvements

The following improvements are suggested by the respondents at an approval rating of over 90%;

1. Should be made to cook large quantities of food
2. Credit facilities should be started to enable many people purchase CookKit,
3. Increase on awareness activities on use of solar technology,
4. CookKit should be made to store energy such that it can be used all the time,
5. CookKit should be made with durable materials
6. CookKit should be diversified to be able to perform other activities such as generation of electricity

#### 4.1.2: FUEL EXPENDITURE MEASUREMENT EXPERIMENT

Six CONTROL and six TESTS experiment tools that were given out were all returned and the findings are captured in Tables 5 (a) and 5 (b) below.

**Table 5 a: Household fuel expenditure experiment findings for TEST**

Cases	TESTS (Users)				
	Firewood Ksh.	Charcoal Ksh	Paraffin Ksh	Days use solar	People
1	210	130		10	110
2	150	0	0	10	60
3	155	375	0	15	60
4	365	290	205	7	102
5	420	0	0	7	75
6	340	105	0	12	210
<b>Total</b>	<b>1640</b>	<b>900</b>	<b>205</b>	<b>61</b>	<b>617</b>

The six household TEST group had a total expenditure on fuel (firewood, charcoal and paraffin) of Ksh. 2,745. This they supplemented with 61 days of solar cooking for 617 people

**Table 5 b: Household fuel expenditure experiment findings for CONTROL**

Cases	CONTROL (Non Users)			
	Firewood (Ksh)	Charcoal (Ksh)	Paraffin (Ksh)	People
1	230	160	50	64
2	570	240	150	60
3	390	475	0	123
4	500	60	0	81
5	255	350	50	62
6	480	0	0	84
<b>Total</b>	<b>2425</b>	<b>1285</b>	<b>250</b>	<b>474</b>

The six household CONTROL group had a total expenditure on fuel (firewood, charcoal and paraffin) of Ksh. 3960 and cooked for 474 people

We can deduce the following from these findings;

If the TEST group were to cook the same foods to same number of people as the CONTROL (474 people) under the same conditions, they would spend;

$$\text{Ksh } [(474 \times 2,745)/617]. = \text{Ksh.2108.8}$$

\*\*This represents 46.7% savings on cost of fuel.

### 4.1.3: MEETINGS

#### a) Meeting with SCI staff

All the field staff were recruited locally and were fluent in the local language Luo. This made project implementation effective as the staff easily interacted with the locals. The staff were taken through series of trainings in management, business development and customer service. This was to prepare them for project implementation

At the start of the project, SCI identified active women groups in the communities to work with and were given CookKits for free as a way of creating awareness. SCOREPs were selected from the first women groups selected for the demos and later trained on the usage of Solar Cookers technology. Those who performed well were short-listed for application to be trained as SCOREPs.

The first training for SCOREPs took place for one week in 2003 for the women who had been short-listed from the active women groups. The second specialized training took place in 2005. These trainings were both formal and informal with focus on Solar Cookers technology and the benefits to the community; business skills and record keeping.

#### b) Meeting with SCOREPS

There were various trainings in communication skills, business management and health and environment among others. These proved very useful during their work of promoting and selling of SCI products. The training improved their confidence and social status in the community and general knowledge. Through traveling and meetings they were able to gain exposure to the outside world including attending global meetings such as Africa Women Water Conference - 2008 in Nairobi. SCOREP is now an institution/vehicle through which Sunny Solutions Project can be implemented upon SCI pulling out.

Despite the recorded success cases, the SCOREPs and the project have nevertheless been faced with some challenges. There was strong resistance in adopting this new technology. People never believed that CookKit was able to cook food with good taste. The other reasons people had were that CookKit is weather dependant and prone to destruction given that its only made from paper. Other people also felt that SCI is a not for profit organization and should give out free CookKits. A lot of effort was needed to convince them otherwise.

The SCOREPs group suggested improvements to CookKit, it needs to be made to look durable, store energy and diversify its use into lighting and powering radios and Televisions. This should make it attractive and improve on its sales. Though these were their suggestions, it may point out other needs within the community that may be met by renewable energy. It also enhances the point on community awareness on the potentials of the sun.

### 4.2: SIGNIFICANT FACTORS THAT MAY HAVE AFFECTED PROJECT IMPLEMENTATION

**Circumstantial:-**Sunny Solutions Project is SCI's largest and only project amongst a free settled community. The lessons learnt in refugee camps could not fully inform its implementation in free settled community; hence new methodologies and processes had to be developed that took some time to actualize. It was too large an area.

**Structural:** - The government does not have a strong policy that promotes use of renewable energy such as solar cooking technology. There are no government middle level officers at divisional levels to reinforce use of solar cooking technology.

**Organizational:** - Given the uniqueness of the project, staff with relevant experience in solar technology could not be found locally. Series of staff capacity development had to be conducted to prepare for the implementation of the project. The project design to cover the entire Nyakach was also ambitious given that there were no adequate transport and communication facilities at initial stages of the project.

**Financial:** - The constant fluctuation of exchange rate of the shilling against the dollar and inflation eroded the real value of the financial resources.

**Natural:** - CookIt is weather dependant gadget and was difficult to promote during rainy seasons. This has come out as one of the major hurdles in its promotion to the community.

#### 4.3: ACHIEVEMENTS OF THE PROJECTS CORE OBJECTIVES AND SYSTEMIC OBJECTIVES

The Sunny Solutions Project was built on Core and Systemic objectives.

##### a) Core objectives:

###### i) Introduce and spread solar cooking in Nyakach to 100,000 people in 4 years.

The solar cooking was directly introduced to 113,616 adults and children by end of 2007. This was through Public demonstrations (PD), Group demonstrations (GD), Group meetings (GM), School demonstrations (SD), Home visits (HV) and Market demonstrations (MD). More adults were reached compared to children during the project implementation.

**Table 6: Number of people reached from 2003 to 2007. (Adopted from project monthly activity reports 2003 -2007).**

	2003	2004	2005	2006	2007	Total
Adults	5,528	27,560	20,811	18,300	9,683	81,882
Children	220	6,804	10,913	9,678	4,119	31,734
Total	5,748	34,364	31,724	27,978	13,802	113,616

###### ii) Promote solar water pasteurization to 15,000 people in Nyakach in 3 years

The project implementation was such that every one who received CookIt also received Water Pasteurization Indicator (WAPI). By extension, a total of 2593 (from list of those sold CookIts) people received CookIt hence got equal number of WAPIs.

###### iii) Foster links with other common groups and agencies in Nyakach to ensure broad access to solar cooking technology

At inception in 2003 the project started trials with 150 women from 15 different women groups in Nyakach. By the end of 2007, the project had managed to work with 247 different women groups, churches and Schools in Nyakach. These included World Vision International and AVI Agro forestry among many others (Appendix 4).

###### iv) Enable commercialization of solar cooking supplies through support of 4 entrepreneurs selling 3,000 CookIts in 4 years.

The entrepreneurship model developed in the early stages of the project did not work well. This was largely because the CookIt as a product was still new in the community/market and its promotion and sale by the entrepreneurs relied heavily on support from SCI by means of subsidized financial support. As a result the business of selling CookIt could not break-even when left on its own. However, the SCOREP concept which was implemented alongside it worked well and has been used to promote and sale CookIt to the people of Nyakach. By the end of 2007, a total of 3,154 CookIts had been sold mainly by this model. The number of CookIts sold includes the 1,000 sold to World Vision which benefited mainly the venerable

groups in Nyakach. At the time of the evaluation, there was about 1,000 CookKits for which people made down payments, the number is not part of CookKits sold. The matter is being addressed by SCI Management to review who deserves to receive CookKit and under what terms. Out of 21 SCOREPs who were recruited at the start, 19 are still at work.

**b) Systemic objectives:**

**i) Significantly contribute to change of attitude toward use of renewable sources of energy**

A comparative analysis on the PMC Baseline report findings and Archway household survey findings shows significant change of attitudes and practices towards solar cooking technology as a way of using renewable energy. There is reduction in firewood buying and gathering/fetching at 55.7% and 21.5% households respectively. 52.7% of the households use CookKit for water pasteurization. There is significant revelation that most men in the households in Nyakach can now cook using CookKit an activity that was predominantly conducted by women and children.

**vi) Run an effective program that ensures continued relevance and sustainability upon phase out of SCI in 2007**

SCI adopted a people driven approach in the Sunny Solutions Project by co-opting community members through group system at the centre of project implementation. At inception, active women groups in the communities were used for piloting phase. From this caucus Solar Cookers Representatives (SCOREPS) were selected to spearhead the process. They underwent a series of trainings for purposes of capacity building. The trainings prepared them in many ways to roll out the business of selling and promoting Solar Cooking technology and products in Nyakach.

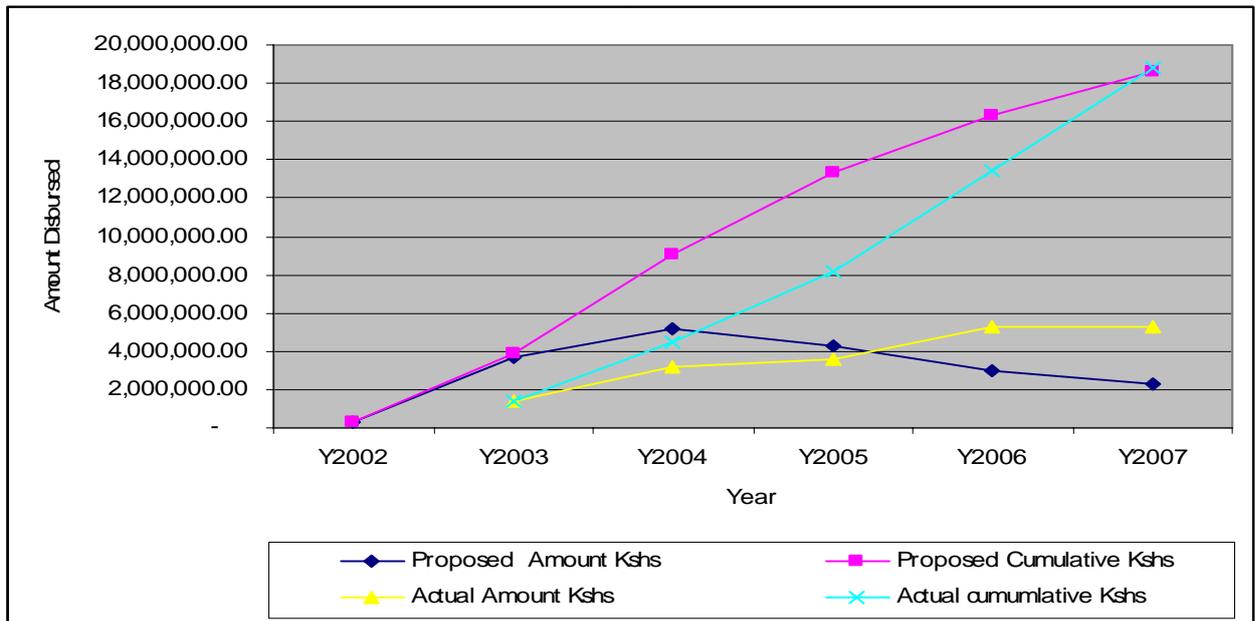
Sunny Solutions project managed to directly reach 113, 616 people through the SCOREPs system that were trained to perform selling and promotion of solar cooking in Nyakach. This was achieved through demonstrations in public, group members, market places and schools. A total of 2,593 households were sold 3,154 CookKit and WAPI for water pasteurization. By the end of 2007, the project had managed to work with 247 different women groups, churches and Schools in Nyakach.

These promotions have encouraged majority of households use solar technology to boil water and cook other foods which were previously done using firewood and charcoal. There is significant revelation that most men in the households in Nyakach can now cook using CookKit an activity that was predominantly conducted by women and children. As a result of introduction of CookKit, uses of other conventional fuels have reduced.

**vii) Run an efficient, cost effective and replicable project that depicts a responsible image among other organizations, agencies and community in Nyakach.**

The project managed to meet all its objectives within the stipulated time and the budgetary allocation. Despite variation over time between proposed budget and expenditure, final analysis shows that by the end of the project life the proposed budget and actual expenditure are in harmony.

**Table 7: Comparison between proposed budget and expenditure over 5 years**



The Sunny Solutions project has developed a responsible image locally and internationally. The regional office has been awarded and honored in the following;

1. Ashden Renewable Energy Awards -2002
2. Pan African Women Inventors and Innovators Award – 2005
3. International Net Forward Energy Awards – 2007
4. Energy Globe Awards (National prize) – 2008
5. Honored by IX World Renewable Energy Congress (WREC)- 2006

#### 4.4: FACTORS THAT POSITIVELY AND NEGATIVELY INFLUENCED USE AND USAGE OF SOLAR COOKER

During the first stakeholder workshop, the forum was able to identify critical factors that positively and negatively affected solar cooker use and usage. The factors were categorized under social (attitudes and practices), economic, health and environment, educational and institutional and technological.

##### Factors promoting use of solar cooker

Social	Economic	Health and Environmental	Institutional and Educational	Technological
<ul style="list-style-type: none"> <li>• Peace in the house is enhanced as food is cooked early.</li> <li>• Houses remain tidy due to reduced cases of littered firewood/charcoal and smoke.</li> <li>• Utensils remain clean due to lack of soot</li> <li>• Both Men, Women and Children can now cook easily</li> <li>• Reduced cases of stealing firewood among women and using wood for fencing</li> <li>• Families can bake own cakes usually used during special functions</li> <li>• Families can cook different foods with several kits at the same time</li> <li>• Reduced drudgery</li> </ul>	<ul style="list-style-type: none"> <li>• Money saved from buying other firewood and charcoal is used in attending to other families needs eg buying food, books, etc</li> <li>• Time saved in cooking is put to other economic use eg washing, farming, doing home work etc hence being more productive</li> <li>• The garget is affordable for an average families</li> <li>• The project has both direct (SCI staff) and indirect (Entrepreneurs who engage in making and selling of the cookits and their suppliers) gainful employment</li> </ul>	<ul style="list-style-type: none"> <li>• Families eat tasty foods and nutritional values which is good for their health</li> <li>• Families eat hygienic foods hence reduces cases of diarrhea diseases</li> <li>• Families have clean surroundings not littered with firewood and black charcoal stains</li> <li>• There is reduced cases of use of firewood hence reduced deforestation</li> <li>• Smoke related ailments are reduced amongst households members</li> <li>• There is reduced cases of fire accidents</li> <li>• Families can take pasteurized water for drinking leading to reduced water borne diseases</li> <li>• Water conservation as less water is used in cooking and washing</li> </ul>	<ul style="list-style-type: none"> <li>• Families have adopted the culture of planning for cooking and baking</li> <li>• Promotes learning of science</li> <li>• Gives opportunity for self studies/homework among school children</li> <li>• Reduced absenteeism and lateness in schools</li> <li>• Children can afford to keep their home work books clean</li> <li>• Families and other groups working closely with SCI have mainstreamed environmental conservation into their activities</li> <li>• Networking and collaboration between SCI and other organizations/CBOs has ensured the sharing of resources, synergy.</li> <li>• Capacity building in water testing and finance management</li> <li>• Promote environmental education in community</li> </ul>	<ul style="list-style-type: none"> <li>• Families and businesses have easy ways to boil water</li> <li>• Keeps food warm for long</li> <li>• Its portable and easy to manage</li> <li>• Enables families harness free natural/renewable energy (transformation)</li> </ul>

**Factors undermining use of solar Cooker**

<b>Social change</b>	<b>Economic change</b>	<b>Health and Environmental change</b>	<b>Institutional and Educational changes</b>	<b>Technological changes</b>
<ul style="list-style-type: none"> <li>• Cannot be used in cloudy/rainy season</li> <li>• Cannot cook other foods</li> <li>• Cannot be used on emergency cases</li> <li>• Attitudes that solar foods are not well cooked/Slow acceptance</li> <li>• Destruction of foods by animals</li> </ul>	<ul style="list-style-type: none"> <li>• Needs training before use</li> <li>• Has affected their business</li> <li>• Not durable</li> <li>• Expensive</li> <li>• Has affected charcoal/firewood vending business</li> </ul>	<ul style="list-style-type: none"> <li>• Large families continue taking non pasteurized water because cookit cannot boil large quantities of water for drinking</li> </ul>	<ul style="list-style-type: none"> <li>• Needs training to use</li> <li>• Lacks capacity to communicate with the deaf</li> </ul>	<ul style="list-style-type: none"> <li>• Weather dependant</li> <li>• Time limit</li> <li>• Takes long to cook</li> <li>• Cooks small quantities</li> <li>• Cannot cook other foods</li> <li>• Materials for making are not found locally</li> <li>•</li> </ul>

It is worth noting that some of the factors under “Economic Change “were contested during the second stakeholders workshop, whose purpose to validate the household survey findings

## **SECTION V: CONCLUSION AND RECOMMENDATIONS**

The success of the Sunny Solutions Project in Nyakach is a strong case for replication of the solar cooking technology in other settled communities living in sun rich areas as alternative to conventional fuels. For sustainability, the Cookit market will boom when cost efficiency attains parity with other competing energy sources. It can be supported to attain critical mass so that it is competitive enough against other existing forms of fuel.

### ***Lessons learnt from the Sunny Solutions Project in Nyakach.***

1. The project can effectively work in settled communities living in sun rich areas as alternative to conventional fuels;
2. Families are able to save substantial money from fuel budget by supplementing conventional fuels with solar energy. The savings can be significant enough to meet other family needs;
3. The project is able to minimize deforestation as it relieves pressure on the use of firewood and charcoal for daily cooking;
4. Socio-cultural beliefs and practices can be major impediment to adoption of new technologies such as solar cooking;

### ***Recommendations***

- There is need for SCI, government and private sectors partnership investment to promote the product development to make it attractive to the people. This should make it a demand driven product that is a recipe for business viability and sustainability. This partnership model calls for the government addressing the technological challenges in its research institutions such as Kenya Industrial Research Institute (KIRDI), Polytechnics and Universities and subsidizing cost of production and develop structural instruments to support promotion of renewable energy. The private sectors should promote the commercialization of the product while SCI owns the idea.
- SCI should continue with sustained awareness creation to enhance the people's knowledge which is a recipe for attitude change towards use of solar cooking technology. This should be achieved through improved networking and collaboration with other stakeholders including decentralized government funds such as Constituency Development Fund (CDF) hence need for extension of SCI promotional activities in the community. On the other hand, SCOREPs need to be institutionalized as a business entity to manage the commercialization of Solar Cooking products.
- The scaling up of awareness creation should target children and the youth particularly in schools and colleges for long term sustainability. Solar technology clubs can be started as entry points to be used as vehicles in the education on renewable energies. Seek MoH's involvement to support water pasteurization.
- Develop loan programs that stimulate Cookit favoring market forces with attractive return rates, buffer initial deployment costs and entice consumers to consider and purchase Cookit. Similar initiatives succeeded with solar panels in rural communities in Southern India with the support of UNEP under the "India Solar Loan Programme".<sup>9</sup>
- There is need for development of comprehensive participatory monitoring and evaluation (M&E) frame work to track the progress of solar cooking technology. This should enhance lesson learning to inform future interventions.

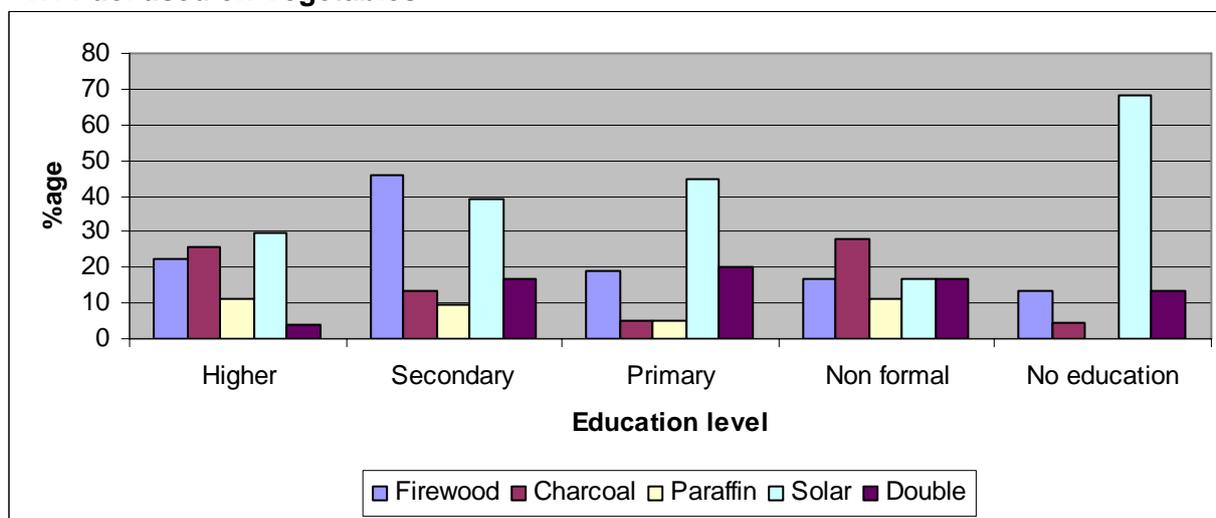
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<sup>9</sup> [http://en.wikipedia.org/wiki/Indian\\_Solar\\_Loan\\_Programme](http://en.wikipedia.org/wiki/Indian_Solar_Loan_Programme)

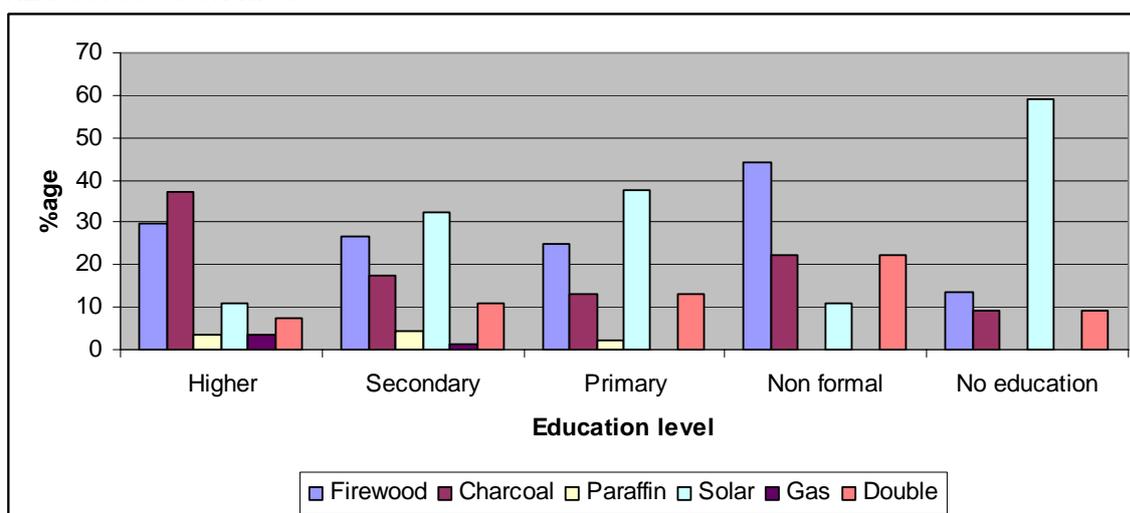
## APPENDICES

### Appendix 1: Graphical relationship analyses of education levels and types of fuel used on particular foods in Nyakach

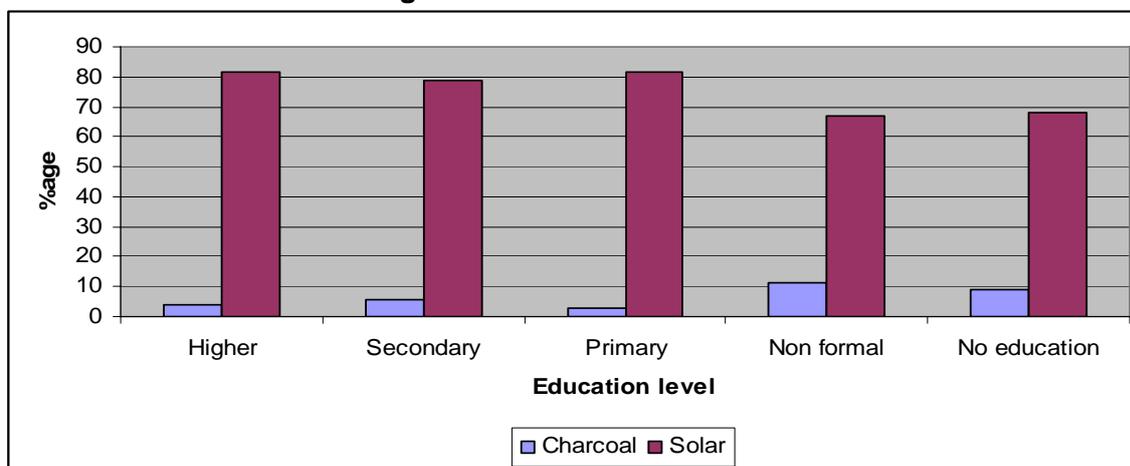
#### 1.1 Fuel used on Vegetables



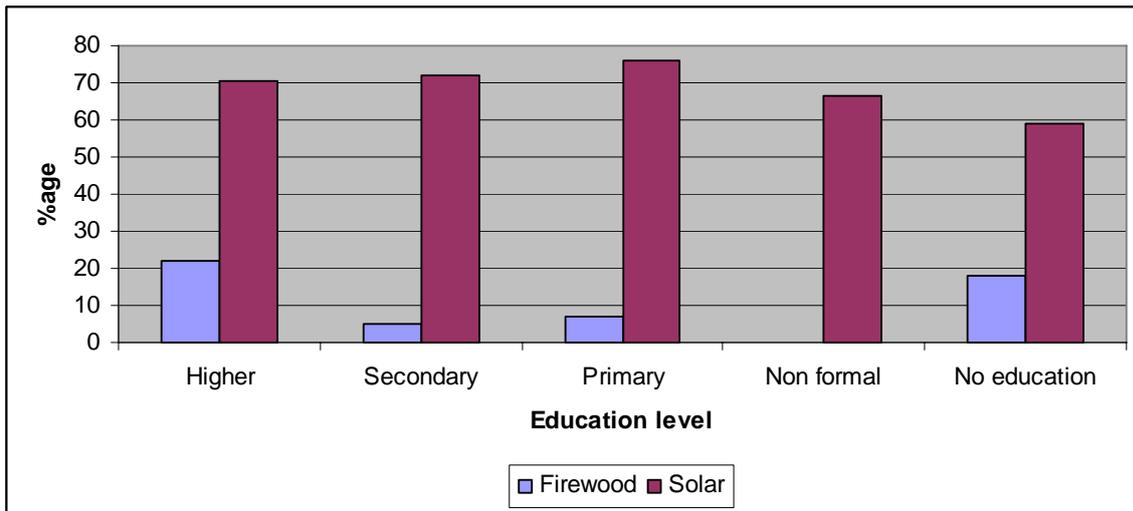
#### 1.2 Fuel used on meat



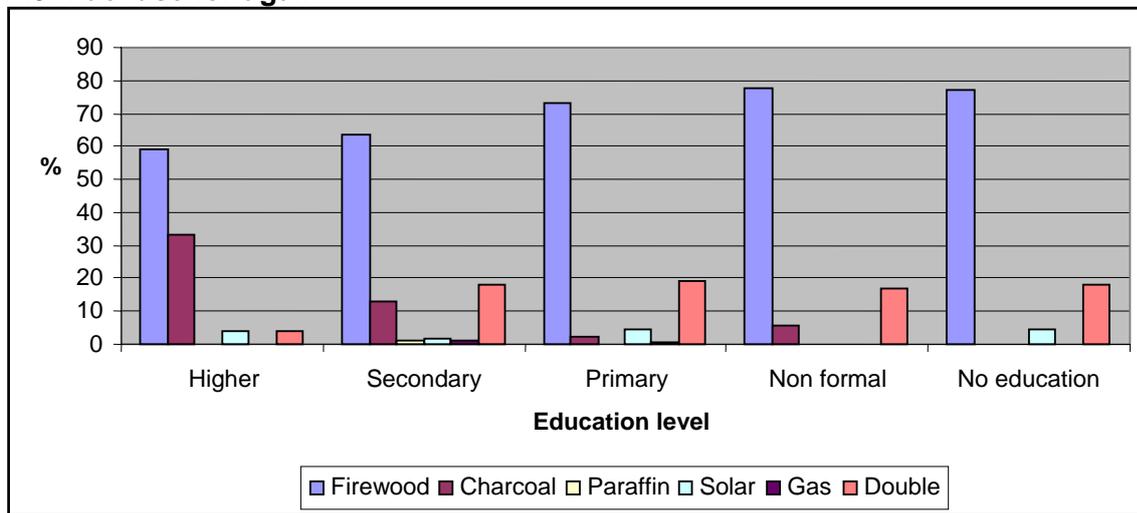
#### 1.3: Fuel used on cake baking



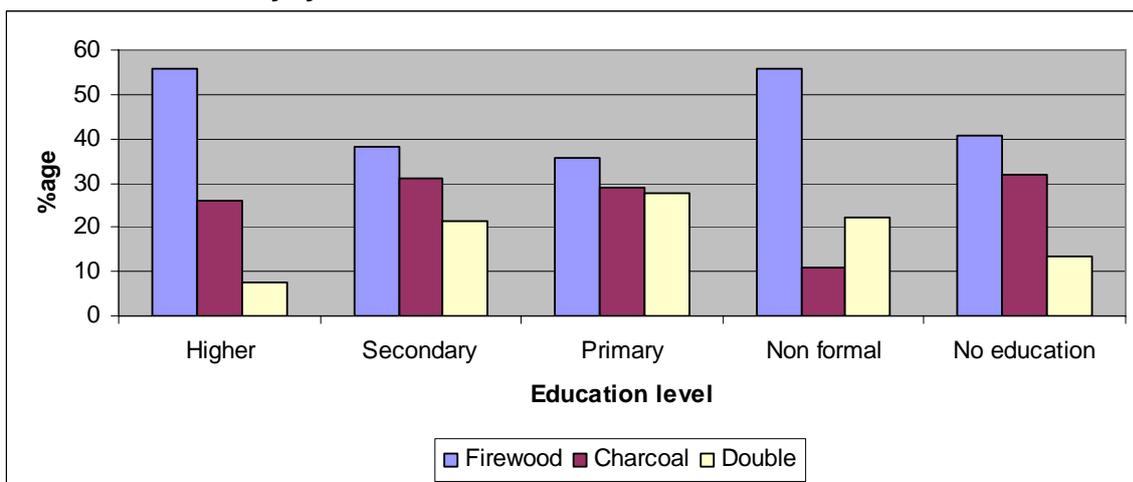
#### 1.4: Fuel used for pasteurizing water

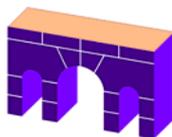


**1.5: Fuel use for ugali**



**1.6: Fuel used for Nyoyo**





**Appendix 2: Household survey Questionnaire**

**ARCHWAY TECHNOLOGY MANAGEMENT LTD  
Sunny Solutions Project Impact Evaluation (Nyakach) Questionnaire**

Zone.....

No.

**Introduction**

Amosi ahinya. Nyinga en.....Abiro neni kaluwore gi tich mitimo kod Archway Technology Management Ltd mar yudo kaka tedo kod solar cooker osekonyo oganda ma Nyakach. In achiel kuom ji 400 **manoyier ninyalo konyo miyo wa weche kuom tijni**. Kuom thuolo mari, adua penji penjo moko kani aduaro ni mondo iduoki kaluwore kod kaka tiyo gi solar cooker osedhi kodi. Ee ( ) Da ( )

*Good morning/Afternoon/Evening. I'm.....working for Archway Technology Management Ltd on the sunny solutions project impact evaluation. You are one of the 400 people chosen to participate in this exercise. With your permission I would ask you some questions which are going to help in determining some of the benefits, challenges and possible improvements about the solar cooking technology in Nyakach. May I assure you that any information you give is going to be treated with uttermost confidentiality. Would you allow me to proceed? Yes ( ) No ( )*

**Section I: Biodata**

**1.1. Da her ngeyo hiki (Respondent personal information)**

	18 – 30years	30 – 45 years	above 45 years
Dichuo (Male)			
Mine (Female)			

**1.2. Eodni, un ji adi e kidienje ma ondik piny kae (What is the age structure in your family?)**

	Female	Male
1 - 10 years		
10 - 15 years		
15 - 30 years		
Above 30 years		

**Section II: Social benefits (Awareness Attitudes and Practices)**

**2.1 Nyaka ne ichak tiyo kod solar bende iseneno ka .....** (Since you started using solar cooking technology, have you experienced any of the following?)

	Sufuria mag tedo ok mak chilo mangeny (Reduced cases of utensils with soot?)	Inyalo tedo chiemo chon (Can prepare meals early)	Kualo yiend tedo odok piny (Reduced cases of stealing your firewood?)	Modo chiel odok piny (Reduced case of using firewood from the fence?)	Joma chuo bende nyalo tedo (Cases where males in the house cook easily?)
Yes					
No					
Don't Know					
No comment					

**2.2 Ihinyo tiyo kod yore maopogore mag tedo kuom mawaketo kaeni.** (How often do you use the following types of fuel for your daily cooking?)

Frequency of use/Fuel type	Firewood	Charcoal	Paraffin	Solar	Gas	Agricultural residues	Fireless cooker	Others
1. Very often								
2. Often								
3. Rarely								
4. Never								

**2.3 Ihinyo tiyo kod ango kuom tedo, chuako pi, rito chiemo, muro chiemo?** (For each of the following forms of fuel, please tick the one you normally use for the lined activities)

Activities/Fuel type	Firewood (Yien)	Charcoal (Makaa)	Paraffin (Mafuta)	Solar (Tedo gi chieng')	Gas	Agricultural residues (Tiang)	Fireless cooker (Okapu)	Others
1. Cooking								
2. Boiling water								
3. Food preservation								
4. Warming								
5. Others								

2.4 Ere kaka uyudo yore maopogore mag tedo... (If you use any of the fuel types below, please state where they come from?)

Fuel access/Fuel type	Firewood	Charcoal	Paraffin	Solar	Agricultural residues	Fireless cooker	Others
1. Fetch							
2. Buy							
3. Borrow							
4. Given							
5. Never Use							
6. Don't know							
7. No comment							

2.5 Jomage majomoto ahinya eodu ka? (Who normally collects it?)

1. Girls
2. Boys
3. Boys and Girls
4. Women
5. Men
6. Not applicable

2.6 Kuom gik ma utedogodogi, ung'iewgi bang kinde marom nade? (How often do you buy or collect for the following types of fuel for your daily use?)

Frequency of access/Fuel type	Firewood	Charcoal	Paraffin	Gas	Agricultural residues	Others
1. Daily						
2. Weekly						
3. Twice a month						
4. Monthly						
5. Others						

2.7 Ihinyo tiyo kod angu kuom tedo chiemo maopogore gi? (What type of fuel do you use to cook the following foods?)

Activities/Fuel type	Firewood	Charcoal	Paraffin	Solar	Gas	Agricultural residues	Fireless cooker	Others
1. Ugali								
2. Nyoyo								
3. Potatoes								
4. Vegetables								
5. Meat								
6. Tea/porridge								
7. Cake baking								
8. Chuako pi modho								
9. Others								

**2.8 Ihinyo tedo kod ang'o e chiemb okinyi, chiemb odiechieng kod chiemb odhiambo?**  
(When do you use the following types of fuel?)

Frequency of access/Fuel type	Firewood	Charcoal	Paraffin	Solar	Gas	Agricultural residues	Fireless cooker	Others
1. Breakfast								
2. Lunch								
3. Supper								
4. Never use								

**2.9 Ne ing'eyo wach tedo gi solar kuom ngano kata eyo mane?** (From where/whom did you get to learn about solar cooking technology)

1. SCI staff
2. SCOREPS
3. Neighbors
4. Media
5. Public demonstrations
6. Others

**Section III: Economic**

**3.1 Iparo ni weche gi ni kare koso miriambo** (Have you experienced any of the following since you started using solar cooking technology?)

	Yes	No	Don't Know	No comment
<b>Inyalo timo tijenimoko sama itedo kod solar</b> (Time saved in cooking used in doing other chores?)				
<b>Pesa mading'iewo godo yien kata mafuta mar tedo itimogodo tije moko</b> (Attended to other family needs with the savings from firewood/charcoal)				
<b>Itedo kod solar chiemo moko maiuso kaka cake kod njugu</b> (Generated income)				

**Section IV: Health and Environmental**

**4.1 Nyaka ichak tedo kod solar bende tuoche kaka mag it, um, duol; kor, wang kod diewo ineno ka od piny kuom joodi?** (In your opinion, have you experienced reduced cases of the following infections amongst your household since you started use of solar cooking technology?)

Gender/Disease	ENT(Ear, Nose, Throat)	Chest/Lungs (Bronchitis)	Eyes	Diarrhea(Cholera, Typhoid)
Children				
Adults				

4.2 Bende iseneno ka ndalo ma itedo kod solar..... (Has your family experienced any of the following?)

	Yes	No	Don't Know	No comment
<b>Yiende tedo maokeyore kar tedo, kod chilo mar maka odok piny?</b> (Reduced cases of surroundings littered with firewood and black charcoal stains)				
<b>Tiyo kod yien kata maka mangeny odok piny?</b> (Reduced cases of cooking with firewood/charcoal?)				

**Section 5: Challenges**

5.1 Iparo ni kuom weche madwaro penji gi mage mamiyo tedo kod solar iyudo katek (Do the following factors affect your use of solar cooking technology?)

	Yes	No	Don't know	No comment
<b>Solar ok nyal tedo chiemb jomang'eny</b> (Cannot cook large quantities of food)				
<b>Ok inyal tedo kode seche duto</b> (Cannot be used all the time)				
<b>Chiemo moko maoted kod solar ok chieg maber</b> (Feelings that solar foods are not well cooked)				
<b>Joodi okohero chiemo maitedo oko</b> (People are averse to outside cooking)				
<b>Solar cooker kethore piyo</b> (Not durable)				
<b>Bech solar cooker ni malo ahinya</b> (Its expensive)				
<b>Solar tedo mos</b> (Is slow in cooking)				
<b>Solar cooker oknyal tedo chiemo moko kaka kuon</b> (Cannot cook other foods)				
Others				

## Section 6: Improvements

6.1 Kuom weche madwaro penji gi, iparo ni kaotimgi to tedo gi solar cooker nyalo bedo maber? (Do you think the following should be done to improve the use of solar cooking technology?)

	Yes	No	Don't Know	No comment
1. <b>Olose manyalo tedo chiemb jomangeny</b> (Should be made in big sizes to cook large quantities of food )				
2. <b>Jomadwaro ng'iewe mondo ochul mos mos</b> (Give credit facilities so that poor families can pay over long period of time)				
3. <b>Omed puonj ji ber tiyo kod solar eyore machielo/mamoko</b> (Increase sensitization/ awareness on other uses)				
4. <b>Onego olose mondo okan mach mamiyo inyalo tedo kod seche duto</b> (Should be improved to store energy so that its not weather dependant)				
5. <b>Onego olose manyalo dak aminga</b> (Should be made with long lasting materials)				
6. <b>Onego olose manyalo timo tije moko kaka golo stima</b> (Diversify solar use to produce other products e.g. electricity)				

### Biodata cont.

1.3 Isomo nyaka klass adi? (Education of respondent)

1. Higher
2. Secondary
3. Primary
4. Non formal education
5. No education

\*\*\*END\*\*\*

**Thank you very much for your time.**

(Adwoko erokamanao kuom thuolo makende ma imiyowa)

**Appendix 3.a: Household Fuel Expenditure Experiment tool**

Instructions

*Document the amount you spent to buy fuel at every time for the next 14 days. When you fetch or get free fuel estimate the cost. On the Foods cooked column state the foods you cook at every time. For the solar, just put a TICK whenever you use it.*

COOKING FUEL MEASUREMENT SURVEY TOOL  
ASSESMNET OF FUEL CONSUMPTION

Name of Head of Household

Location			Sub location			Persons living in the house for next 30 days		
No.	Date	Fuel wood (Ksh)	Charcoal (Ksh)	Paraffin(Ksh)	Gas(Ksh)	Electricity(Ksh)	Solar	Foods cooked
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								

**Appendix 3.b: Household Fuel expenditure experiment tool for families without solar cookers**

Instructions

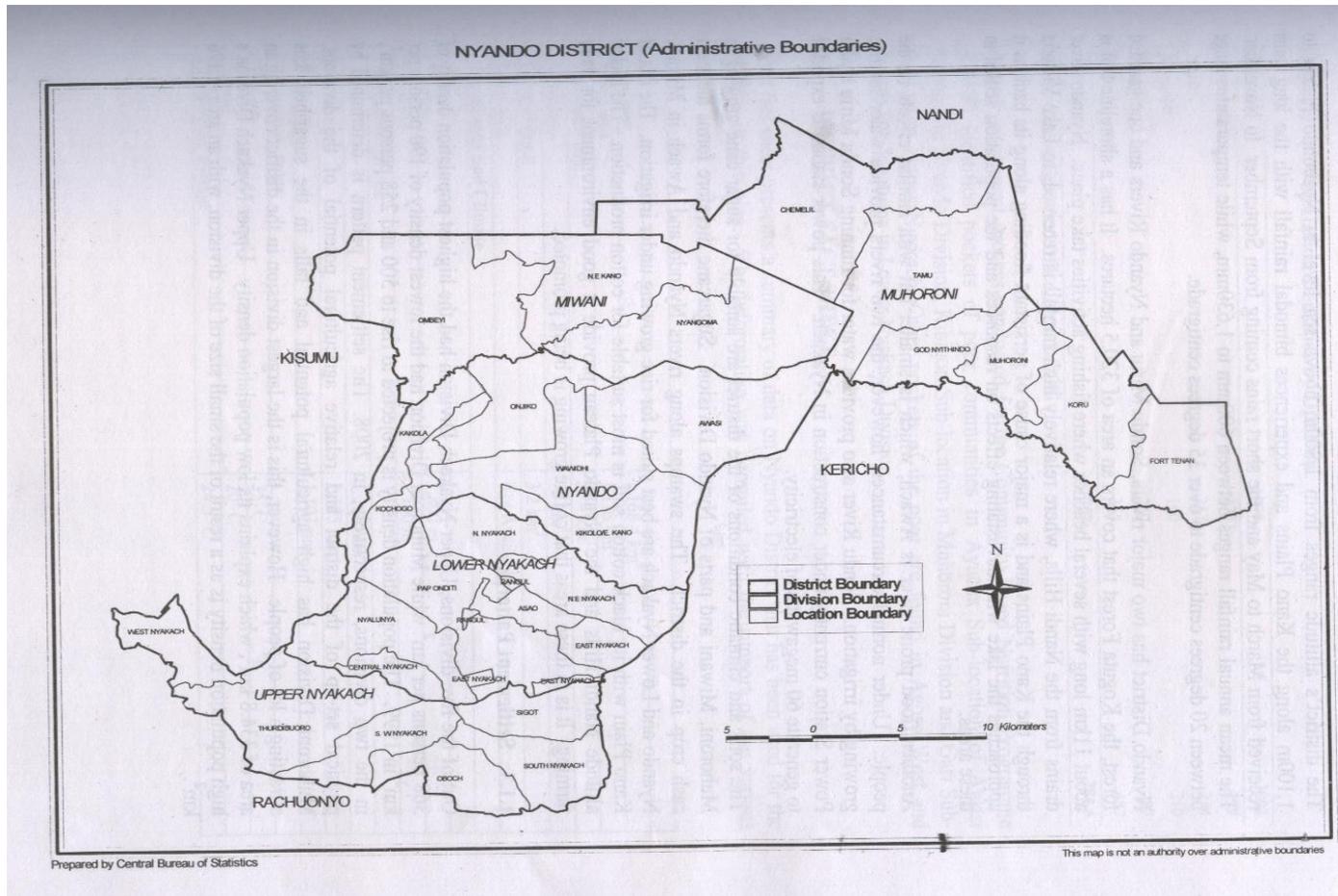
Document the amount you spent to buy fuel you at every time for the next 14 days. When you fetch or get free fuel estimate the cost. On the Foods cooked column state the foods you cook at every time.

COOKING FUEL MEASUREMENT SURVEY TOOL  
ASSESMNET OF FUEL CONSUMPTION

Name of Head of Household

Location		Sub location				Persons living in the house for next 30 days		
No.	Date	Fuel wood (Ksh)	Charcoal (Ksh)	Paraffin(Ksh)	Gas(Ksh)	Electricity(Ksh)	Foods cooked	No. of pple
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								

### Appendix 4: Nyando District Geographic map



Source: Nyando District Development Program 2003 - 2008

**Appendix 5: List of Community groups involved in Sunny Solution Project implementation**

	STAKEHOLDERS NAME	DIVISION		STAKEHOLDERS NAME	DIVISION
1	Orum Women Group	Upper Nyakach	49	Wath Rao Women Group	Upper Nyakach
2	Young Kawagwana Women Group	Upper Nyakach	50	Nyaoke Women Group	Lower Nyakach
			51	Mfungo Women Group	Lower Nyakach
3	Kawuoda Women Group	Upper Nyakach		Umoja ni nguvu Women Group	Lower Nyakach
4	Kananda womens's Group	Upper Nyakach	52		
5	Dembruok Women Group	Upper Nyakach	53	Kajonga Women Group	Lower Nyakach
6	Yaw Pachi Women Group	Lower Nyakach	54	Asunga Women Group	Upper Nyakach
7	Odembo Women Group	Upper Nyakach	55	Kagao Women Group	Upper Nyakach
8	Kabondo Women Group	Upper Nyakach	56	Rema Women Group	Upper Nyakach
9	Adot Women Group	Upper Nyakach	57	Malomalo Women Group	Upper Nyakach
10	Miloma Women Group	Lower Nyakach	58	Mbunje Women Group	Upper Nyakach
11	Umoja Women Group Sondu	Upper Nyakach	59	Njonyaso Women Group	Upper Nyakach
12	Omena Women Group	Lower Nyakach	60	Kanayango Women Group	Upper Nyakach
13	Amoko Women Group	Lower Nyakach	61	Wagalori Women Group	Upper Nyakach
14	New Oboch Women Group	Upper Nyakach	62	Bidii Women Group	Upper Nyakach
15	Gudha Women Group	Upper Nyakach	63	St. Veronica Women Group	Upper Nyakach
16	Were Women Group	Upper Nyakach	64	Cherwa Women Group	Lower Nyakach
17	Sinani Women Group	Upper Nyakach	65	Kobune Women Group	Upper Nyakach
18	Soya Women Group	Upper Nyakach	66	Sowenya Women Group	Upper Nyakach
19	Manna House Women Group	Upper Nyakach	67	Oguma Women Group	Upper Nyakach
20	Umoja Women Group	Upper Nyakach	68	Kapugo Women Group	Upper Nyakach
21	Wasenya Women Group	Lower Nyakach	69	Katiemo Women Group	Upper Nyakach
22	Agongo Remo Women Group	Upper Nyakach	70	Konnri Women Group	Upper Nyakach
23	Yamo Loko Women Group	Upper Nyakach	71	Hera Women Group	Upper Nyakach
24	Kinda Women Group	Upper Nyakach	72	Siatok Women Group	Upper Nyakach
25	Nyi Owuoth Women Group	Lower Nyakach	73	Apala Women Group	Upper Nyakach
26	Nwango Women Group *	Upper Nyakach	74	Kawuor Women Group	Upper Nyakach
27	Kipingu Women Group	Lower Nyakach	75	Ritri Women Group	Lower Nyakach
28	Maria Odero Women Group	Upper Nyakach	76	Masae Women Group	Lower Nyakach
29	Mercy Women Group	Upper Nyakach	77	Alpha Women Group	Upper Nyakach
30	Tin Toller Women Group	Upper Nyakach	78	Shida Women Group	Upper Nyakach
31	Mobado Women Group	Upper Nyakach	79	Sonye Women Group	Lower Nyakach
32	Bala Women Group	Upper Nyakach	80	Tim kinda Women Group	Upper Nyakach
33	Ajaka Women Group	Upper Nyakach		Nyakach Women Against Aids	Upper Nyakach
34	Udo Women Group	Lower Nyakach	81		
35	Kudho Kodi Women Group	Upper Nyakach	82	Upendo Women Group	Upper Nyakach
36	Kodero Women Group	Upper Nyakach	83	Upendo Women Group	Upper Nyakach
37	St. Hellen Women Group	Upper Nyakach	84	Okuyu Women Group	Upper Nyakach
38	Sigoti Joint Women Group	Upper Nyakach	85	Ngege Sayi Women Group	Upper Nyakach
39	Pendeza Women Group	Lower Nyakach	86	Kolio Women Group	Upper Nyakach
40	God Kanyango S.H. \women Group	Upper Nyakach	87	Kobala Women Group	Upper Nyakach
			88	Wembe Women Group	Upper Nyakach
41	Boda women Group	Upper Nyakach	89	St. Mary Magdaline Women Group	Upper Nyakach
42	Odinyo Women Group	Upper Nyakach			
43	Kasunye Women Group	Upper Nyakach	90	Ndapso Women Group	Upper Nyakach
44	Komuono women Group	Upper Nyakach	91	Tomatoes Women Group	Upper Nyakach
45	ODA Women Group	Lower Nyakach		Agoro West PHC Women Group	Lower Nyakach
46	Oban Women Group	Upper Nyakach	92		
47	Odula women Group	Upper Nyakach	93	Dremo Women Group	Lower Nyakach
48	South Nyakach women Group	Upper Nyakach	94	Yie Gi Tim Women Group	Upper Nyakach
			95	Onyalo Women Group	Lower Nyakach
			96	Improve Your Business	Lower Nyakach

	Women Group		142	Par Bwana Women Group	Upper Nyakach
97	Ushirika Women Group	Lower Nyakach	143	Miyonga Women Group	Upper Nyakach
98	Ka Odongo Women Group	Upper Nyakach	144	Ajaka "A" Women Group	Upper Nyakach
99	Kawuor Women Group	Lower Nyakach	145	Nafina Women Group	Upper Nyakach
100	Katito Cent Big Women Group	Lower Nyakach	146	Ojongo Women Group *	Lower Nyakach
101	Mwangaza Women Group	Lower Nyakach	147	Atieno Jimo Women Group	Lower Nyakach
102	Mango Women Group	Lower Nyakach	148	Nyi Kisumu Women Group	Upper Nyakach
103	Kako Women Group	Upper Nyakach	149	Kanyango Women Group	Upper Nyakach
104	Kano Ladies Women Group	Lower Nyakach	150	Kawuoda Widows Women Group	Upper Nyakach
105	Konditi Women Group	Lower Nyakach		Kawuo Nyawro Women Group	Upper Nyakach
106	Yano Women Group	Lower Nyakach	151		
107	Kibogo Cent Big Women Group	Lower Nyakach	152	Seme Kandaria Women Group	Upper Nyakach
108	Ragen Teachers Dev.Women Group	Lower Nyakach	153	Ndori Home To Home Women Group	Upper Nyakach
109	Ndare Koboge Women Group	Upper Nyakach	154	Kawuor Nyanya Women Group	Upper Nyakach
110	Wang' Neno Women Dev. Group	Upper Nyakach	155	Nyi Kabuya Women Group	Upper Nyakach
111	Nyakach Dev.Women Group	Lower Nyakach	156	St. Teresa Women Group	Upper Nyakach
112	Kauma Women Group	Lower Nyakach	157	Omalo Biro Women Group	Upper Nyakach
113	Sanyo Women Group	Upper Nyakach	158	Nyagwe Women Group	Upper Nyakach
114	Nyakach Women Fish Traders Group	Upper Nyakach	159	Konyri Kendi Women Group	Upper Nyakach
115	Kabong'o Ndori Women Group	Upper Nyakach	160	Yaw Pachi Women Group	Upper Nyakach
116	Ulna Christian Women Group	Upper Nyakach	161	Bugo Women Group	Lower Nyakach
117	Kobiero Women Group	Lower Nyakach	162	Algeda Women Group	Lower Nyakach
118	Agoro East Widows & Orphans Group	Lower Nyakach	163	Wakenya Women Group	Lower Nyakach
119	Takeyo Women Group	Lower Nyakach	164	Nyi Kochieng Women Group	Upper Nyakach
120	Nyanjwa Women Group	Upper Nyakach	165	Kodhiambo Women Group	Upper Nyakach
121	Odiyo Wang'e Women Group	Upper Nyakach	166	Ndori Women Group	Upper Nyakach
122	Kokite Women Group	Upper Nyakach	167	Alara Women Group	Upper Nyakach
123	Rae Women Group	Lower Nyakach	168	Majuer Women Group	Upper Nyakach
124	Orudi Adult Reflect Dev. Women Group	Lower Nyakach	169	Omena Bad Awach Women Group	Lower Nyakach
125	Ogondi Women Group	Upper Nyakach	170	Gwala Women Group	Lower Nyakach
126	Oywa Devp.Women Group	Upper Nyakach	171	Menya Women Group	Lower Nyakach
127	Tinada Women Group	Lower Nyakach	172	Siabo Women Group	Lower Nyakach
128	Sinya Women Group	Upper Nyakach	173	WooiKibogo Women Group	Upper Nyakach
129	Nyakongo Women Group	Lower Nyakach	174	Kopiyo Sigoti Women Group	Upper Nyakach
130	Nyakarena Women Group	Upper Nyakach	175	Otiwa Kotieno Women Group	Upper Nyakach
131	Oneno Nam Women Group	Upper Nyakach	176	Ngop Nyowera Women Group	Upper Nyakach
132	Kojodo Women Group	Lower Nyakach	177	St. Vlentine Women Group	Upper Nyakach
133	Upendo Mtuala Women Group	Upper Nyakach	178	Ndori Konyri Kendi Women Group	Upper Nyakach
134	St. Margret Women Group	Upper Nyakach	179	Kokech Siany Women Group	Upper Nyakach
135	Lang'er Women Group	Lower Nyakach	180	Taya Women Group	Upper Nyakach
136	Moyie Women Group	Lower Nyakach	181	Koriedo Women Group	Upper Nyakach
137	Kamwami Women Group	Upper Nyakach	182	Salome Women Group	Upper Nyakach
138	Kanyabune Women Group	Upper Nyakach	183	Ndori Kotieno Women Group	Upper Nyakach
139	Soko Nyolendo Women Group	Upper Nyakach	184	Osiep "B" Ramogi Women Group	Upper Nyakach
140	Wilfrida Women Group	Lower Nyakach	185	Amalo Women Group	Upper Nyakach
141	Kopon Women Group	Upper Nyakach	186	Kinda Ber Women Group	Lower Nyakach
			187	Michura Women Group	Lower Nyakach
			188	Modero Women Group	Upper Nyakach

189	Kokech "A" Women Group	Upper Nyakach		Ondis Kajwang' Women Group	Upper Nyakach
190	Kachola Women Group	Upper Nyakach	219	Osiepe Business Women Group	Upper Nyakach
191	Koguta Widows Women Group	Upper Nyakach	220	Radso Women Group	Lower Nyakach
192	Osinde Women Group	Upper Nyakach	221	Nyagoda Women Group	Lower Nyakach
193	Odewa Women Group	Upper Nyakach	222	Gawo Bala Women Group	Upper Nyakach
194	Nyabondo Central Women Group	Upper Nyakach	223	Hera Mogen Women Group	Lower Nyakach
195	Miyeya Yaw Pachi Women Group	Upper Nyakach	224	Ojuki Women Group	Lower Nyakach
196	Ogwedhi Women Group	Lower Nyakach	225	Kagiela Women Group	Lower Nyakach
197	Janaam Women Group	Lower Nyakach	226	Ombo Kadero Women Group	Lower Nyakach
198	Soko Wagwe Women Group	Upper Nyakach	227	Ajiki Women Group	Lower Nyakach
199	Kaloka Women Group	Upper Nyakach	228	Katito Women Group	Lower Nyakach
200	Karogo Joint Women Group	Upper Nyakach	229	Kwe Women Group	Upper Nyakach
201	Ajaka Widows Women Group	Upper Nyakach	230	Kodong'a Women Group	Upper Nyakach
202	Kokaka Women Group	Lower Nyakach	231	Rabongo Women Group	Upper Nyakach
203	Achola Women Group	Lower Nyakach	232	Sarafina Women Group	Upper Nyakach
204	Lwanda Women Group	Upper Nyakach	233	Kongo Women Group	Upper Nyakach
205	Odonga Finacial Women Group	Upper Nyakach	234	Keyo Pharmacy Community Health Group	Upper Nyakach
206	Jokanyakach Women Group	Lower Nyakach	235	Huruma Sondu Women Group	Upper Nyakach
207	Rit Ngima Women Group	Lower Nyakach	236	Tinga Kasere Women Group	Lower Nyakach
208	Auma Women Group	Lower Nyakach	237	Kasang'o Women Group	Upper Nyakach
209	Ogwedhi Umbrella Women Group	Lower Nyakach	238	Bolo Women Group	Upper Nyakach
210	Amalo Women Group	Lower Nyakach	239	Kokun Women Group	Upper Nyakach
211	Pata Pata Women Group	Upper Nyakach	240	Sammar Women Group	Lower Nyakach
212	Madiya Women Group	Upper Nyakach	241	Kounde Women Group	Upper Nyakach
213	Lwande Women Group	Upper Nyakach	242	Obingo Chur Women Group	Lower Nyakach
214	Nyikwa ng'oche Women Group	Upper Nyakach	243	Kamgwa Church Women Group	Lower Nyakach
215	Aguonu Koro Women Group	Upper Nyakach	244	Lisana Women Group	Lower Nyakach
216	Temo Micro Women Group	Upper Nyakach	245	Jimase Women Group	Lower Nyakach
217	Soko Women Group	Upper Nyakach	246	Chuny Ji Moyie Women Group	Upper Nyakach
218	Kado Women Group	Upper Nyakach	247		