

KAKAMEGA SOLAR OVEN PROJECT

REVIEW REPORT

JULY 2022

**Commissioned by: LIONS CLUBS
INTERNATIONAL. MD 107 FINLAND
& LIONS CLUB KAKAMEGA AND
NAIROBI GREATER**

**Executed by: MARGARET C.A.
OWINO**



PREAMBLE

In 2018, the Lions Club Helsinki partnered with Lions Club Kakamega, Kenya in a project aimed at sustainable solar oven technology transfer to the residents of the County. This project begun after extensive research and trials of various types of solar cookers. The Club settled on the solar oven cooker as the best option. After getting all materials in the country and fabricating the ovens locally in Kakamega, the two sister clubs were ready to work with the local community in disseminating the technology. In collaboration with Kakamega County officials in the relevant departments, it was resolved that working with organized, registered women's groups would be the best approach.

In February and April 2019, two successful sessions of Training of Trainers was undertaken for 40 women from 20 different women's groups.

The training objectives focused on enhancing the women's knowledge and skills including:

- Exposing participants to general energy issues, such as sources of energy
- Solar energy and its uses
- Energy technologies used for cooking
- What one needs to be able to solar cook, familiarity with the solar oven cooker
- Being able to set up and cook, bake, roast, boil at least 10 different local and exotic recipes
- Care and maintenance of the solar oven
- Be familiar with complementing cooking energy saving techniques and technologies
- Be able to teach about and demonstrate solar oven use.

At the end of the training sessions, each participant was awarded a certificate as a Trained Trainer, in addition each one went back to their groups with a solar oven, cooking pot and a user manual. For ease of visibility they also received branded T- shirts.

Project promoters, expected that the beneficiaries would act as the first adopters, the pioneers and teach other members of their groups, community and the general public. Thus, spurring inquiry, raising awareness and interest in the new way of meeting the basic need of cooking even as environment also benefits in the long run.

It was also expected that project coordinators would monitor usage of the solar oven and the spread of knowledge and skills in the county. Unfortunately, Covid 19 pandemic hit the world and many planned activities were suspended.

As the world opened up late in 2021, project promoters resolved that before they would start activities again it would be wise to undertake a **rapid review** of what had happened since the training to inform project direction and possible scale up. 30 beneficiaries were interviewed by phone and asked to narrate what they had done with their ovens since the training event, thereafter 20 were invited but 27 turned up for the validation workshop. Apart from the participants, the following project promoters were also in attendance.

- Sembi Pepe - Project Coordinator, Kakamega Lions Club
- Heikki Torkkel - Finland
- Mrs. Irma Torkkel - Finland



REVIEW OBJECTIVES:

- Assess solar oven usage by beneficiaries
- Assess benefits cited by beneficiaries
- Assess ease of handling the technology by other family members or group members other than the trainers
- Assess knowledge, skill and interest amongst beneficiaries sampled.
- Assess solar oven durability and ease of repair and replacement of broken parts.
- Assess demand for solar oven in the market / area to supplement cooking needs in the area.

METHODOLOGY / ACTIVITIES:

- Email consultation and discussion with project promoters on way forward for the review
- Questionnaire formulation
- Telephone interviews between consultant and beneficiary trainers sampled.
- Formulation of validation workshop questionnaire
- On site workshop with selected trainer beneficiaries
- Visit to a beneficiary home to assess actual status of oven
- Visit to Masinde Muliro University to initiate discussions on possible partnership.
- Report writing

Outcome:

Report and Recommendations



Group discussions



FINDINGS OF THE REVIEW

The review sought to establish if the solar ovens were in use often and for what activity. The questions posed to the beneficiaries on the phone included:

- Do you use your solar oven?
- How often?
- What do you use it for?
- Do other members of your family love what you cook, bake or roast in your solar oven?

At the onsite validation workshop, similar questions were posed to the four groups:

- How often do you use your solar oven
- What do you cook, boil, bake or roast in it?
- How often do you boil or bake or roast foods in your solar oven?
- What time of the day do you undertake the activities listed above?
- What else do you use your solar oven for?
- What benefits have you gained from using your solar oven?

At the individual level, each of the 28 of the 30 beneficiaries called answered in the affirmative, that they use the solar oven especially in the **sunny seasons**.

One responded in the negative and stated that she had used her pot on fire, while the other stated that she now lives in Mombasa and did not take the oven with her.

Frequent usage of the solar oven was confirmed at the validation workshop when the responses that came back included:

Group 1

- Use it often when there is sun
- Daily
- Cook: nduma, sweet potatoes, cabbage,
- Boil: Water, tea
- Bake: scones, bread and cake
- Roast: meat and ground nuts
- Use it once a day (9 AM - 2PM)

Group 3

- When it is sunny
- Cook: Rice, vegetables, fish stew
- Bake: cake, bread and scones
- Roast: "Omena" (small fish), potatoes, meat
- Can use it multiple times (8AM - 4 PM)

Group 2

- When there is sun
- Cook: meat stew, cabbage, vegetables
- Roast: Meat, ground nuts, broiler chicken
- Boil: "Dengu" / pulses, eggs,
- Bake: Cakes
- Can use it twice a day (8 AM - 4 PM)

Group 4

- Use it when there is sun
- Boil: water for bathing, for drinking, eggs, potatoes, "githeri"
- Bake: cakes, scones
- Roast: Meat, small fish, ground nuts
- Can use multiple times (8 AM - 4 PM)

From the above responses:

- It can be confirmed and concluded that the solar oven is used frequently especially during sunny seasons.
- It can also be confirmed that the solar oven is used mainly to bake cakes, boil eggs and roast ground nuts for income, this came out clearly from individual stories as well.
- The beneficiaries also noted that they have large families and that the solar oven cannot be used to make the staple food "Ugali" that would satisfy them all.
- They stated that they use it to make light foods.

To further validate the responses above these two questions were also posed:

- ***Do members of your family like what you cook, boil, roast or bake in the solar oven?***
- ***What else do you use your solar oven for:***

i) All the groups answered in the affirmative

ii) One stated that at times even the husband would buy the flour for baking the cake!

iii) Another stated that at her home people only want omena roasted in the solar oven,,

iv) To cup it all the " governor had guests, he loves cabbage made in the solar oven and when he had guests, we borrowed other ovens to have 5 in all, so we roasted meat and made cabbage and roasted meat for the guests. They loved the food!"

- Other uses of the solar oven cited was warming bathing water even when the day is not so sunny.
- Two groups stated that they use it to keep the food warm until night time when it should be consumed.
- Some users pasteurize their drinking water in the solar oven.
- Lastly one ***unintended use*** was as a safe storage of cooked food overnight, so that rodents and cats do not steal it!

What benefits have you experienced from using the solar oven?

This question was intended to gauge impact in the lives of the beneficiaries:

- In some areas firewood and charcoal is bought everyday so using the solar oven has made some of them save money since solar is free and available daily during sunny seasons.
- It is clean so the ladies hygiene had improved, they do not smell of smoke, and their nails are clean, no coughs and tearing eyes as when one uses firewood.
- It has made several have a business, selling boiled eggs, roasted groundnuts and baked cakes.
- Increased respect in the family and community, they are called upon by chiefs to give demonstrations. One beneficiary was invited to give a cooking demonstration on the 8th of March during International Womens' Day.
- Using the solar oven has made some save time...that has been used in doing other chores since it is unattended cooking and food does not burn.
- Other savings on meagre family income come from less need for cooking oil and salt, in addition the pots do not require too much scrubbing.
- The food is delicious and nutritious.
- Using the solar oven has instilled in some the skill of planning as solar cooking requires that one starts early in the morning.

Clearly from the afore mentioned, the solar oven had a positive impact especially on those who used it frequently.

The Review also sought to assess the level of knowledge, skill and technology transfer in the communities the beneficiaries came from. The following questions were posed to them both at the telephone stage and the on site workshop level:

- ***Do other members of your family appreciate what you do with the solar oven?***
- ***Do they know how to use it?***
- ***Have you taught other members of your group about the solar oven and how to use it?***
- ***What are other members of the community saying about the solar oven?***
- ***Would they buy one if the solar ovens were made available?***
- ***Have you seen or heard of other types of solar ovens / cookers or even projects promoting solar ovens?***

The current beneficiaries were selected from various women's groups, each group had two representatives hence they took back two solar ovens. It was expected that they were to go back to their groups and teach them and spread awareness in their communities:

Respondents stated:

- That members of their families liked the food and by inference the technology.
- Those who are doing business with their ovens were guarding them and did not want anybody to handle them...in case they spoil the ovens.
- They had shown their groups the oven,
- Gave them demonstrations,
- A few had been to chiefs "barazas" meetings,
- One had been to International Women's Day celebration
- Another to the governor's residence to cook for guests.
- Several stated that many admired the oven,
- Other group members were waiting their turn when they would be called to pick their ovens.
- The **BIG** question was **how and where** do they get them?
- Between the time of the TOT and the review only 2 beneficiaries made calls on where to find the ovens. One called John and one called Margaret and each was asked to check with the Lions Club Kakamega.

On whether they would be willing to buy solar ovens if made available?

Many said they would since they know the benefits but when asked how much would they be willing to pay for the oven, there was a long debate at the plenary session with quotes ranging from Ksh. 1,000 - 7,000. When pressed to be realistic the participants settled for Ksh. 5,000/=.

About **knowledge of other solar oven projects or types of solar cookers**? Respondents stated that they had heard of none in their areas, only the ones demonstrated to them during the TOT.

Technical issues with the solar oven.

The review sought to know if the solar ovens were still intact, or even if they required repairs, in other words, the **durability** of the solar ovens.

To begin with there was a test given to the respondents. 5 were asked to come forward and each time the others mentioned a main part they were to identify it on the oven in display. This was done successfully with members clapping for the participants identifying the parts.

At the group discussion level they also listed all the main parts of a solar oven:

- The reflector
- The insulation,
- The plastic cover
- Cooking chamber
- Painted cooking pot and lid
- Metallic / wooden supporting rod.

This confirmed that their knowledge was still intact with regards to the solar oven.

Are all the parts of your oven intact?

Have you lost any parts or have you repaired/ replaced any parts?

Who repaired it for you? Are the parts easy to find?

Most participants answered in the affirmative that the ovens were still intact, however those who use their cookers frequently noted that the screws holding the reflector fell off, though these are easy to replace even with a kitchen knife if one does not have a screw driver.

One respondent stated that she lost the rod that hold the reflector and replaced it. It only costed Ksh.100/-

From the findings above it can be concluded that the ovens are durable even with frequent usage and handling (Note. This was after 3 years)

This was also confirmed when we visited a frequent user and took pictures of her oven, this same oven was brought to the workshop and all present assessed its condition.

Are there any welders / carpenters in your area who can repair the ovens?

Since there had been minimal requirements for repairs, participants could not confirm or deny the existence of such skill and expertise, but from the above need to replace a rod, we can safely conclude that Kakamega has such expertise should need arise.

At the onsite workshop a metallic box cooker was presented though without a reflector, and when asked which one they would prefer, the wooden or the metallic oven, participants stated that the metallic one appeared nice aesthetically but was also heavy, they would have loved to see a finished product so as to be able to compare.

Some stated that if the efficiency was measured that it was better than the wooden one then they would like it. Others were afraid that the metallic one may be more expensive.

Recommendations by beneficiaries:

- The solar oven is useful to us during sunny seasons, however if the size can be bigger to accommodate two pots it would be better.
- Solar ovens should be made available and affordable
- Make the trainers sales agents
- Can more research be done so that solar ovens can be used at night or early morning e.g. having batteries to store the heat?
- Can the ovens be made such that they rotate automatically following the sun?
- Can other types of solar cookers also be provided so as to offer varieties?
- To support and enhance sales of solar ovens can other technologies be also provided such as solar lights, solar for cooling and water pumping.
- Would project promoters consider a full time project and make the Trainers - partners?
- The trainers recommended that those willing should be included in the fabrication of the ovens and also train them to undertake small repairs.
- Timely project implementation since it was three years since their training without any follow- up

RESEARCH FINDINGS

- Though a new technology, the solar oven as a complimentary cooking technology has been well received by the first batch of beneficiaries.
- That the training they received was useful in impacting knowledge and skills necessary for them to sustain the gainful usage of the solar oven technology.
- That the beneficiaries are using the ovens frequently, some more often than others as they have found income generating activities spurred by using the solar oven and several knock on benefits and activities as cited in one of the success stories (annexed)
- That frequent use of solar ovens have led to multiple social and economic benefits to the users and their families.
- That there is a measure of awareness in the communities the trainers come from with regards to using the sun to cook, boil, bake and roast foods.
- That the solar oven technology is appreciated as the beneficiaries asked for more so that their group members may also benefit.
- That the Kakamega community appreciate the project and they see the solar oven project as a way through which other energy devices can reach them.
- That the project pilot is a success and can be scaled up.
- That when this is done; the current project trainers be made part of the project so that they become sales agents, trainers and monitors of the project.
- With regards to the technology: the proposed metallic oven was rather heavy and so if the weight can be looked into as well as further research on it so that it is able to track the sun, it would be ideal.
- As stated by beneficiaries, the size does not serve them well with the large families they have, this too can be looked into by the research and development team.
- There is need to identify project monitors from amongst the active Trainers and not any persons from outside.
- Project promoters should avail the two versions of the oven, the wooden as well as the all metallic one.
- That the move from free to subsidized solar ovens must be handled carefully to avoid product rejection.
 - i) One way of handling this, is by having project officers who will undertake free and frequent demonstrations all over the county and create awareness and mention benefits at all the functions.
 - ii) Developing promotional materials such as posters, sponsoring TV program there cooking demonstration.
 - iii) Working with partners e.g. Churches, Mosques, Clubs who may offer venues, food and mobilize audiences.
 - iv) Allowing pay as you use or any other instalment payment for the solar oven.
 - v) Partnering with institutions that are already promoting clean energy technologies such as Equity Bank.
 - vi) Making the technology available and affordable and training technicians who can assist with repairs if need be.

REMARKS BY LIONS CLUB KAKAMEGA Representative and Project Coordinator: Mr. SEMBI PEPE

- He was glad to hear from the beneficiaries that the solar ovens were useful to them.
- He said, their partners Lions Club Helsinki were already working on a newer version of the oven and that it was going to be more efficient.
- He said that the Trainers were the foot soldiers of the project and he expected them to take the lead. He urged them to share the knowledge and skills widely as this was not a secret and their aim was to spread it to the whole country.
- The reiterated that the vision of the project promoters is that Kenyans should own the project.

REMARKS BY Heikki Torkkel

- He was glad to be at the workshop and to hear about active use;
- He stated that two years of COVID stopped all activities of fabrication of the oven
- That they had come up with a new version of the solar oven (Ametallic one with shinier reflectors).
- Currently, on site there are materials to make 500 solar oven units for sale to the community.
- He was happy that the success stories he was hearing would assist in raising more funds for the project.
- He encouraged the participants not to shy away from pointing out challenges as these too will help them in improving the project.

REMARKS BY OFFICERS FROM COUNTY GOVERNMENT OF KAKAMEGA:

Mr. Wandera Patrick and Mr. Stephen Mzee from the department of Industrialization and Trade

- Mr. Wandera gave a brief about the cooking energy situation in Kakamega county, he stated that Kakamega was the largest rural county in Kenya.
- It has only 2 industries, that means that majority are farmers and their cooking energy is wood fuel: firewood and charcoal.
- This is becoming a big challenge as a sack of charcoal costs 1,500/=.
- The need for cooking fuel has led to a lot of conflicts with forest guards of the Kakamega forest.
- That technologies such as solar ovens and biogas will be very beneficial to the people of the county and to the environment eventually.

The reviewers later met with Heikki Saarinen and Mrs. Leena Sarinen together with Mr. Sembi Pepe, Heikki Torkkel and Mrs. Irma Torkkel: A brief was shared on what has been reported above and Mr. Saarinen conveyed the appreciation of Lions Club of Helsinki to the project Coordinator and to the Consultant Margaret. He regretted having missed the workshop but stated that he was looking forward to reading the detailed report of the review.

Findings from Masinde Muliro University: Margaret and John made a brief visit to the University, department of Engineering. On Discussion with the Chairman of the department we found:

- Indeed there is a section of Study dealing with renewable energy.
- That students are exposed to mainly to industrial energy needs more than households.
- That there are no technologies for display and Yes they are aware about the advances made in the use of solar as a source of lighting in many rural homes, but not for cooking.
- When asked if they would be interested in partnering with Lions Club, Kakamega so that the students are at least exposed to the potential of solar as a source of cooking energy in households, the Chairman said they would.
- Since this was just an introductory visit, we left it at that and would recommend a follow up visit by project Coordinator to work out further details of such a partnership.



List of participants and their contacts:

	Name	Telephone	Group	Signature
1	Frida Omia Hamsa	0726595291	Ninda S.H. Group	
2	Florence Odongo	072620369	Ushida Group	
3	Agnes Shitwala	0700800469	Bukaya Women Group	
4	Melda Mwenje	0711368089	Bukaya women Group	
5	Jane Rose Ashiono	0721955814	Kwisero women Group	
6	Leba Kagai	0724750898	Shiangala Women Group	
7	Grace Shikanga	0711381995	ShiangalaWomen Group	
8	Salima Wasiki	0720643435	Nakhayo Women Group	
9	Eunice Munyasa	0710729741	Nakhayo Women Group	
10	Gladys Ayuma	0708956141	Tumaini C.B.O	
11	Sonia Nyanduko	0723008423	Kakamega	
12	Evelyne Akoth	0723008423	Kakamega	
13	Phanice Chiuli	0724094160	Baraka Women Group	
14	Violet Shikolo	0715213237	Lima Women Group	
15	Rebecca Shitanda	0728423939	Lima Women Group	
16	Sara Shihasha	0704383132	Mwikhomo Women Group	
17	Caroline Mbaraza	0713746241	Mwikhomo Women Group	
18	Perez Oduk	0721718292	M.Y.W.O	
19	Lydia Josam	0729385599	Ushirikiano Women Group	
20	Rebecca M. Ihaji	0722623171	Vitendo Women Group	
21	Violet A Kweyu	0700213524	Eshirikwa Women Group	
22	Everlyne Asitsa	0760722488	Milimani Women Group	
23	Joy Malesi	0716690107	Mlimani Women Group	
24	Judith Andika	0727840362	Sawa Sawa Women Group	
25	Mary Ochango	0718650127	Women of Focus	
26	Millycent Mbakaya	0722889035	Baraka Women Group	
27	Alima Mulanji	0705016883	Malaha Women Group	
28	John Amayo	0720450727	Assistant	
29	Margaret C.A. Owino	0722305895	Lead Consultant	

Review workshop Program
Date: TUESDAY, 19th July 2022

TIME	ACTIVITY	FACILITATOR	COMMENT
8.00 - 9.00 AM	Arrival and Registration	John Amayo	
9.00 - 9.45 AM	Opening prayer and Introductions	John Amayo	
9.45 - 10.15 AM	Tea - break	All	
10.15 - 11.00 AM	Opening Remarks and Objective of workshop	Margaret, Sembi & County Official	
11 AM - 12.15 PM	The place / status of solar oven in Kakamega County	Group work	
12.15 PM - 1.15 PM	Reporting / Plenary	Margaret	
1.15 PM - 2.15 PM	LUNCH	All	
2.15 PM - 3.00 PM	Reporting and Recommendations	Margaret	
3.00 PM - 4.00 PM	Concluding remarks and Departure	Margaret	

Success stories

"Since my training, I have become famous in my village. I have made profit by baking birthday and wedding cakes. I also cook my rice while in the farm this saves me time so I like my solar oven very much." Eunice Munyasa:

"I use my solar oven often whenever I roast groundnuts, boil eggs and cook rice. We also visit each other with Nancy Sayo whom we were trained with and share ideas on how we have used our ovens. A few people have asked us how they can access the ovens." Lydia Josam

Phanice Chiuli

Phanice was one of the beneficiaries of a solar oven, by then he was employed, when COVID 19 set in she lost her job and begun thinking of what to do to earn some income. She then thought of baking cakes using her solar oven and selling to people in her community. Initially, when she came home with solar oven her husband laughed at the "toy" she came with.

She baked her first cake and the family enjoyed it, she baked a second one and then the "Aha" moment came upon her, if her family enjoyed the cake what about baking and selling it with tea. While the cake baked she could also boil eggs for sale.

She approached it as a business and wrote down everything she used;

	Item	Cost	Est cost of what was used	Profit after sale
1	Baking flour	65/=	33.00	
2	Sugar	60/=	30.00	
3	Eggs @ 10/=	30/=	30.00	
4	Milk	40/=	40.00	
5	Vanilla extract 1 tea spoon	20/=	5.00	
6	Butter	50/=	25.00	
	Total		163.00	600 - 163 = 437/=
	15 eggs	150/=	150.00	300 - 150 = 150/=
	PROFIT			587/=

Having baked her cake Phanice cut the cake into 20 pieces @ costing 30/= hence the cake gave her

a total 600 less cost of making it she got 437/= plus the 15 eggs were sold @ 20/= earning her another 150/= hence her grand total was 587/= in a day. She then decided to take it on as a business and even if she only baked for 20 days in a month, she would earn 11,740/=.

While recognizing that cake baking would only be possible on good sunny days, she reinvested the profits into a poultry business and by now she has an incubator that can hatch 1,200 chicks, she sells chicks, and also gives hatchery services at a cost to other farmers, she also uses the droppings as manure for her vegetable and fruit farm. Phanice say she is busy and she no longer desires an office job, she makes more money than what she used to earn. Her vision is to one day buy and build a property for rentals and she would name it. SOLAR OVEN BUILDING!

This venture is the pride of her family and her husband is fully behind her, assisting with buying chicken feed from the whole sellers and marketing the chicks too! Hence PEACE, LOVE and family UNITY!

Phanice and her venture.

