



Appendix 3

Report of initial user-centred design visit to Blantyre area of Malawi

9-16 October 2019

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Report of initial user-centred design visit to Malawi

Purpose of visit

A visit was made to the Blantyre area of Malawi from 9-16 October 2019 by Lynn McGoff of SOWTech C.I.C. as the initial consultation in the user-centred design process for the developing of an eCook stove using solar pv as the stoves energy source.

The visit was made in conjunction with that of Josie Charter, UK trustee of Aquaid Lifeline who run a number of educational establishments for boarders and day pupils in southern Malawi including Namisu Children's Village. The Children's village was the base for the visit being close to the city of Blantyre but also located in a rural setting.

The objectives of the visit were:

- to observe the current status of cooking in rural Malawi
- to introduce the concept of a solar powered eCook stove to the women in local villages
- to obtain feedback as to what is important for a cook stove
- to investigate the availability of solar panels in Malawi
- to find out about buying behaviour
- to establish if there were any social or cultural issues that could effect the buying of an eCook stove.

Location of visit

The visit was to Namisu, a rural village near Blantyre, in the south of Malawi. Namisu comprises a primary school for boarders and day pupils, Namisu Children's Village run by the UK charity Aquaid Lifeline, and a rural village where the workers at the orphanage live independent from the charity with their families. These workers include kitchen staff, cleaners, maintenance men, farmers/gardeners and other low paid workers as well as teaching staff. There is also a police station and a centre for handicapped people in the village.

The school has around 200 day pupils. The boarders are housed in separate buildings with dormitories for up to 4 children. Each boarding house is home for up to 15 children.

Methodology

A series of in-depth interviews were held with ladies involved with the cooking of meals in different situations in and around the area of Namisu.

These included:

- in the main kitchens at the schools in Namisu and Khombwe
- in the boarding houses in Namisu
- in village houses in Namisu

The interviews were conducted using local interpreters. Open questions were used to provide a framework for discussions that centred around the objectives of the visit where possible.



A practical lesson on the cooking of Nsima was given by one of the village ladies to show how this staple food stuff is cooked. This was done on an LPG cooker so not as to use anyone's wood supply.

A solar panel supplier in Blantyre had been identified before the visit. An appointment was made and discussions were held with him regarding the cost and availability of panels in Malawi.

In addition to the primary purpose of the visit, there was an opportunity to be involved in a debate with secondary school children at Gorman on "The impact of technology on the new generation". The initial debate centred around mobile phones and internet but this was broadened to include their views on the sustainability of wood as a fuel and the use of a solar-powered eCook stove to replace wood and charcoal cook stoves.

Findings

Objective 1 – the current state of cooking in rural Malawi

Current stoves in use

There are a number of stoves in use in various situation.

Large stoves at the day school

The school uses large purpose built rocket stoves. These stoves are large vessels which the cooking pot is lowered into. This sits on a pedestal with a fire at the bottom. This type of stove uses less wood than a conventional fire. They also use large 3 stone fires.



Stoves in the boarding house

These stoves are built to cook meals for around 15 people. They appear to be an *in situ* clay built structure with an L shaped hole. The fire is built inside with a stoke hole to feed wood in and a hole at the top over which the pan sits. These are double stoves so that two things can be cooked at the same time. The stoves are located within a building and when the fire is lit the room is filled with smoke. The walls of the building are blackened with smoke.



Cooking fires in village houses

The village houses use 3-stone cooking fires. These fires are outside of the houses. The pot sits on top of the stones and the wood is fed in between the stones. Long pieces of wood are used with the fire lit in the middle. The wood is then pushed in as the fire burns. While they are cooking they do other chores and come back to the fire about every 20 minutes to look after the fire.

Improved cooking stoves

In the market a different type of stove was being made and sold. These were two pots, one on top of the other, with holes between them. They had moveable supports on the top to hold big and smaller pots. These were for burning charcoal rather than fire wood.



Firewood and charcoal

It appears that firewood is the fuel of choice in rural areas and charcoal in urban ones. In Malawi it is forbidden for motorised vehicles to bring charcoal into the town. It therefore comes in on bicycles for the charcoal ovens in the hillsides. The men travel 70-80km all through the night to bring in the charcoal.

The firewood is bought by the ladies in the village. They walk up to 6km to fetch it and they spend about 500kwacha/day. It was unclear if this was bought everyday or how many meals were cooked on a day's worth of wood.

Last year they were spending 400k/day. This price can go up in the rainy season to 1,000k/day due to a lack of available wood.

The cost of charcoal is about half as much again but it burns for longer.

Meals cooked

There are three main types of food cooked:

Maize flour – this is made into porridge or nsima and is the main staple food

Protein – this is normally red beans (kidney beans) but can also be meat or fish

Relish – this is a vegetable mix of green leaves, Chinese cabbage, cabbage and pumpkin leaves are grown locally and used. Tomatoes and onions can then be added. Tomatoes are also a popular crop locally grown.

The number of meals cooked per day depends upon the circumstances of the people. The ladies interviewed said that they cooked three meals a day, breakfast, lunch and dinner but this did not appear to be the norm. Breakfast is porridge which is just for the children before school. Cooking of the meal starts about 4am and is served at 6am. Lunch is nsima. Cooking starts at 11am and is served at 12noon. Dinner is nsima, beans and relish. Cooking starts at 6pm and, depending on what is being cooked, is served at 7-8.30pm.

It appears to be more normal to have just one meal a day. It might be that the ladies wanted to appear that they ate better than they actually did.

The family size of the people interviewed was 5-8 people. They put the water onto boil for the nsima first and that is the first thing they cook. They then cook the red beans and finally the relish. After finishing cooking, once a day, they put a metal pail of water on to heat up with they use to wash themselves with. They wash clothes in cold water.

In the school the boarders have two meals a day. They have porridge for breakfast and then the main meal of nsima, beans and relish at 3.30pm when school ends. The cooking for this meal starts around 9.30-10am.

The red beans take the longest to cook as they need to boil for around 2 hours.

The time taken to cook the nsima depends on the quantity to be cooked. The meals for the main school takes 75-90mins to cook whereas in the boarding houses it takes 45-50mins and for the families 30-45mins.

Pots used for cooking

There are two types of pots used by the local people. The first is made locally in a scrap metal area and the second is imported from South Africa.

Local pots

The pots are made by hand in an area that appeared to be a scrap yard. A circle of metal is worked first (the sides of the pan). The base of the pan was then added. The pans come in a variety of sizes from small household ones to large ones for institutions but between the makers they appear to be fairly uniform in size. The Children's Village at Namisu uses these locally made pots. They do not have lids but handles can be fitted, either two curved ones or a single one like a saucepan.



Imported pots

These are imported from South Africa and come with handles and a lid. The village ladies use these pots because, although they are more expensive, they last longer (4 years) than the locally made ones which rust and last only 1-2 years.

The pots used in the household were of 2 sizes. The smaller pot was 12 cm high and 22cm diameter giving a volume of approx 4.5 litres. The larger pot was 16cm and approx 30cm diameter giving a volume of 11 litres.

The cost of the bigger imported pot is 7,000k compared to a similar sized local one which would be about 5,000k.



Objective 2 - to introduce the concept of a solar powered eCook stove to the women in local villages

The ladies in the village were familiar with solar power as the children's village uses solar power to pump the water up from the borehole. They got very excited about being able to use it to cook with. They appreciated that they would have to buy the stove initially as opposed to the free 3-stone cooking method but this outlay was preferred to the ongoing expense of having to buy firewood.

Objective 3 - important design features for a cook stove

The input from the local ladies was limited when open questions were asked. It is unclear whether this was due to translation issues or not knowing what sort of information was required. When closed questions were asked it invoked more discussions.

The time needed to cook the food was one concern to some of the ladies. Although some would be prepared to start cooking earlier there was a preference for the cooking time to be no longer than it is at present. Normal cooking involves using only one pot at a time. If the cook stove could incorporate 2 pots then this would reduce overall cooking time.

Although the kitchens are undercover in separate rooms in the school and boarding houses, the fires are outside of the village houses. The houses are not large enough to accommodate the cook stove so it would have to remain outside. Concern was expressed about the security of the solar panel if left unattended outside of the house.

The cook stove would have to accommodate two sizes of pan. These are normally 10 L and 5 L pans and are used to cook the different parts of the meal.

Objective 4 - the availability of solar panels in Malawi

Discussion with Power-Aid Ltd

Power-Aid Ltd is a UK registered company with offices in Blantyre, Malawi. It is a supplier of solar panels. The company is run by Brett Pallister and his wife Katherine and is a sponsor of the NGO Making Friends Malawi.

The solar panels supplied by Power-Aid Ltd are imported from China and have an aluminium frame and a 2mm toughened glass cover. They are available from 10W to 455W. The panels up to 200W are available as 12V or 18V. Above 200W a 36-38V panel is available.

A 100W solar panel will cost 38,000 K. Recently solar panels have been made VAT exempt in Malawi.

In addition to the solar panel there is a requirement for MC4 waterproof connectors which are 3,500k /pair and aluminium sleeved single core DC cable to run from the panel to the stove. This costs 900k /m.



Power-Aid are interested in setting up a manufacturing company to be able to make the panels locally. The solar cells would still be imported in and they would then be mounted locally possibly in recycled plastic frames.

Ideas for production included

- modular panels so more could be added when needed
- an add-on package to be able to charge mobile phones

- an add-on night package with a battery for powering lighting
- mounting the solar panel frame with legs so that they can be taken indoors for security.

Objective 5 - buying behaviour

Purchasing issues

Any purchasing decision would be made in discussion with their husbands but they thought that their husbands would be in favour of the cook stove as it would be cleaner and healthier.

Saving up to buy something is not an option due to the low wages. The ladies interviewed said that they would be willing to pay up to 80,000k for a solar-powered eCook stove and that they would take out a loan to pay for it.

Objective 6 - social or cultural issues that could affect the buying of an eCook stove.

The ladies in the villages could see the advantage of not using wood. They were aware of the health issues of using wood. They were also aware of the available wood getting scarcer. However their concerns were not about deforestation and the environmental effects but not being able to find/buy wood for cooking and having to use maize stalks and husks which don't burn so well and they would need more of them.

The possible implication of solar power taking longer to cook the food was discussed. Some thought a longer time would be a disadvantage whereas others just said they would start cooking sooner.

The main concern was the solar panel being stolen and that they would have to move it into the house when there was no one around.

There was a preference to have the cook stoves made locally if possible rather than to import them. The ladies would be interested in being part of an initiative to make them.

Mobile phones

Mobile phones were in evidence everywhere. They are a status symbol. It is mainly the young men that have them but some ladies have them also. They have to take them to a charging station where it cost 100k to charge the phone.

They said that a mobile phone charging unit attached to the solar panel would be a good idea.

Discussion with secondary school children

On a visit to Gormani the secondary school children were debating the impact of technology in the new generation. Primarily this was about mobile phones and the internet. After the main debate I

was introduced and I explained what I was in Malawi to do. The discussion was then opened up to include solar-powered cooking. They were all very enthusiastic about the possibility of using solar-power to cook with. They were aware of deforestation and the impact of it.

They discussed the pros and cons of using solar energy.

Pros:

- It would save wood
- it would use a sustainable energy source
- there would be less contamination in the food
- it would be more healthy
- it would be cleaner

Cons:

- the cost of the stoves
- food might taste different
- it might take longer to cook the food

Overall they agreed that using solar to cook with was a good thing.

Results

There is a need and an appetite for a solar-powered cook stove in Sub-Saharan Africa. People are aware of the dwindling wood supplies and are in principal ready to embrace new technology.

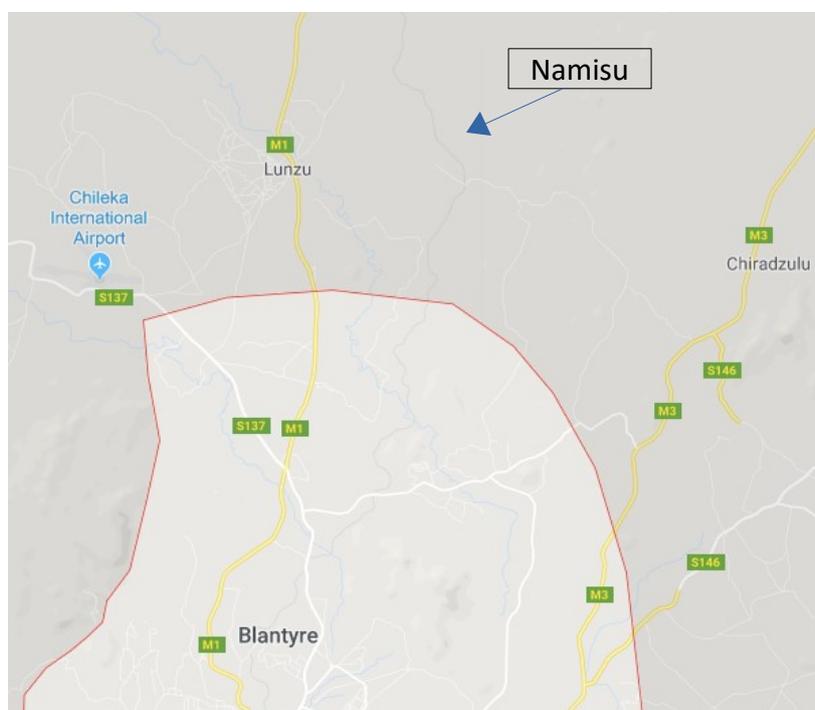
It was difficult to talk about design issues and what the people wanted from their cooking. This was partially due to having to use an interpreter and also asking what was wanted when they had no experience of anything other than wood fires. They did however want something that was cleaner and healthier than wood but were concerned about the security of the panel and any increase in cooking time.

The ladies in the rural village were willing to try the new cook stoves and volunteered to try them out.

Appendix 1 – Area of Malawi surveyed

The ladies interviewed for this report were located in Namisu Children’s Village and Namisu village. They are located just outside Lunzu to the north of Blantyre in the Shire Highlands region of southern Malawi.

It is a very rural location accessed by dirt track roads that are soon to be tar-maced. There is no electricity supply. Although pylons have recently been put in to the children’s village (but not the people’s village) it has not yet been switched on and there is no indication of when this might happen.



Local village



Namisu school

Appendix 2 – Financial considerations

Wages in Malawi (October 2019)

A cleaner at Namisu Children's Village earns 35,000 K/month

A young waiter in Blantyre earns 50,000 K/month

A casual labourer can earn 500 K/day

Example prices of food and household items (October 2019)*

Tea bags (box of 25)	315 K
Maize flour (ready ground) 2 kg	1,060 K
Maize flour (ready ground) 5 kg	2,480 K
Punnet of carrots	386 K
Punnet of green beans	239 K
Tomatoes (1 kg)	1,000 K
Onions (1 kg)	775 K
Bananas (1 kg)	1,000 K
Milk (1 L)	830 K
Beef mince (1 kg)	3,006 K
Fruit squash (1 L)	595 K
Tin of baked beans (410 g)	795 K
10 L cooking pot (locally made)	5,000 K
10 L cooking pot (South African import)	7,000 K

* Source – local information and https://www.numbeo.com/cost-of-living/country_result.jsp?country=Malawi

Appendix 3 – Recipe for Nsima

For 3 people

1250 ml water

750 ml maize flour

1. Put the water onto heat until bubbles just start to form



2. Slowly add about $\frac{1}{4}$ - $\frac{1}{3}$ of the flour with stirring to give a runny constituency



3. Leave to boil, stirring occasionally.



4. For porridge the cooking is stopped at this stage, salt added and the dish served.



5. For nsima boil for 5-10 mins. When it begins to thicken add the rest of the flour stirring vigorously.



6. Beat vigorously using a motion of pulling the nsima to the edge of the pan and scrapping it up the side until the mixture is smooth.



7. Remove from the heat and put portion sized spoonfuls into the serving dish (as would serve scoops of mashed potato). This is then kept until ready to eat.

