

Version 1 ECOCA pilot test

Learning Study – Consolidation of findings across pilot contexts

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Introduction

This report is a learning evaluation of the pilot test of the 1st version of the ECOCA. The ECOCA is a small home unit cooking device powered by solar energy designed by Danish engineering start-up PESITHO.

In 2019 Caritas Denmark and PESITHO partnered up in an innovative partnership for humanitarian development to test the ECOCA in two settings: the Bidibidi Refugee Settlement in Uganda, and in the villages of Kapen and Kapaungpin in Myanmar. The test has been monitored starting with a baseline data collection, a real time evaluation, and lastly an endline data collection resulting in this learning evaluation report, all of which have been conducted in close collaboration with local partners in both locations, Caritas Uganda and Caritas Myanmar (KMSS), throughout the design, implementation, and learning of the pilots. The tests have been conducted to find out if the ECOCA can act as a well-functioning solution that can aid in the mission of reaching the United Nations (UN) Sustainable Development Goals (SDGs) worldwide. Additionally, it is an attempt to respond to the severe challenges experienced by the local target groups included in the pilot, while at the same time potentially offering a number of livelihood improvement options for the poor and vulnerable households that Caritas Denmark are targeting in various countries.

The data collection for and creation of this report has been carried out by four MA level anthropology students from Aarhus University as part of an internship with Caritas Denmark and PESITHO. Two students, Nikolaj Mørk Thorsen and Emma Ladefoged Rasmussen, have conducted field studies in Uganda, and two students, Laura Østergård Carstensen and Jannik Degn Grann, in Myanmar. This report displaying the findings will be structured around the Development Assistance Committee (DAC) criteria and the UN's SDGs and indicators hereof. After the preparation of the first draft, PESITHO has had the opportunity to verify the facts provided related to the ECOCA, and Caritas Denmark has commented on the report for quality assurance purposes. The provided comments can be shared with interested parties upon request.

Background: challenges faced by target groups

Bidibidi Refugee Settlement, Uganda

Uganda is currently hosting over 1.2 million refugees¹, which is the highest number of refugees in the history of the country, as it is receiving influxes from neighbouring countries experiencing violent conflict like South Sudan, Burundi and DRC. This puts an enormous strain on the resources of the humanitarian system as well as on the social and natural resources of the host communities and the surrounding environment. The Bidibidi Refugee Settlement is located in the Yumbe district of Northern Uganda, very close to the border of South Sudan. In just over two years the settlement population has grown to over 280.000 people in 2019. The residents rely heavily on energy from firewood or charcoal to cook food. A study by FAO and UNCHR from 2017 estimated that the total population of Bidibidi uses approximately 952 tonnes of wood fuel per day, amounting to approximately 347,480 tonnes per year. As the number of refugees increases due to continued conflict and famine in South Sudan, this number will only increase as well. The same study estimates that if nothing is done to urgently alleviate the situation, the local area could be totally depleted of wood by 2020². The current dependency on wood fuel is therefore highly unsustainable. With Bidibidi being only one of several refugee settlements and neighbouring host communities in Uganda experiencing similar tendencies, the situation is dire and needs resolution as fast as possible. Deforestation is also one of the leading causes of climate change and has a severely negative impact on the level of CO₂ in the Earth's atmosphere.

Kapen and Kapaungpin, Myanmar

Myanmar has experienced the worlds' longest civil war so far.³ The prolonged state of war has caused mass migration and internal displacement for millions of people in the country. This has caused internally displaced people (IDPs) to reside in remote rural areas of the Karen state. In

¹ UNHCR, Government of Uganda, Office of the Prime Minister. 2019. *Uganda Comprehensive Refugee Response Portal*.

² FAO & UNHCR. 2017. *Rapid Woodfuel Assessment: 2017 Baseline for the Bidibidi Settlement, Uganda*.

³ Ashley South. 2011. *Burma's Longest War - Anatomy of the Karen Conflict* (B. Nick Ed.). Burma Center, Netherlands: Drukkerij Primavera Quint.

2016 only 40% of the rural population of Myanmar had access to electricity⁴, while still 85% of the total population were still dependent on solid fuels for cooking. Consequently this has led to the third-highest annual rate of forest reduction in the world, with almost 2 % of the country's forest cover being lost each year, since 2010.⁵ Armed conflicts in the Karen state has been put on hold due to a ceasefire agreement made in 2010, but the systematic infringements of human rights has widened the gap between ethnic groups, and a state of disorder and uncertainty is still augmenting poverty in these off-grid locations.⁶ On the border of the northern Karen State lies the two villages Kapen and Kapaungpin, which are home to several IDPs, mostly coming from the Karen state about 10 years ago. The villages are not connected with the national electricity grid, and depend on charcoal or firewood for cooking, forcing the families to search for firewood several times a week. Kapen and Kapaungpin currently consist of around 300 inhabitants each.

Health risks

The use of firewood and charcoal in areas like the Bidibidi settlement and the villages in Myanmar is not only unsustainable due to environmental issues, but also has a major impact on people's health due to household air pollution associated with cooking activities. This is generally a problem in parts of the world where people cook using open fires and cooking stoves fueled with biomass such as charcoal or firewood. As shown by WHO in 2018, the smoke that this cooking method produces impacts people's health resulting in premature deaths, as many instances of e.g. pneumonia, lung cancer and strokes can be attributed to air pollution⁷. Every year close to 4 million people die prematurely from illness attributable to household air pollution, which is even more than those dying annually from malaria and tuberculosis put together. Another major effect on people's health is also the strenuous physical activity connected to collecting and carrying

⁴ World Bank. 2016. *Access to electricity, rural (% of rural population)*. Available at <https://data.worldbank.org/indicator/EG.ELC.ACCS.RU.ZS?end=2016&locations=MM&start=1990>

⁵ FAO. *Global Forest Resources Assessment 2015*.

⁶ Michael Gravers. 2015. *Disorder as Order: The Ethno-Nationalist Struggle of the Karen in Burma/Myanmar - A Discussion of the Dynamics of an Ethnicized Civil War and Its Historical Roots*. Journal of Burma Studies, Vol. 19(No 1), pp. 27-78.

⁷ WHO 2018. *Household air pollution and health*. Available at: <https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health>

firewood over long distances and durations of time, as well as potential violent conflicts over scarce resources.

Selection of beneficiaries

In both countries, 50 beneficiary households were selected for receiving the ECOCA for pilot testing. In Uganda, 38 of these were refugees, while 12 were from the surrounding host community, reflecting the Government of Uganda ratio of 70:30 beneficiary breakdown between refugees and host communities. Specific criteria set up by Caritas Denmark was used as guidance in order to find the most vulnerable households. These included instances of: pregnancies, lactating mothers, teenage mothers, orphans, widows, elderly people, physical disabilities and chronic or serious medical issues. In Uganda, beneficiaries were selected in a focus group consisting of community extension workers, community leaders, religious leaders and the local councils from the settlement and the surrounding host community.

In Myanmar, it was also taken into account that the villages had to be approved by the burmese government, who would only approve villages with decent road access, such as Kapen and Kapaungpin. This procedure took place between KMSS and government officials. The group of 50 beneficiaries were selected based on a vulnerability criteria which include the poorest IDP families, and priority was given to those contributing actively to the common good of the village and who had also lived in the village for a long time (such as representatives in village CBOs.) in order to benefit the whole village indirectly. Based on these criteria, the village administrators, the village elders and religious leaders in the two villages selected the 50 beneficiaries. Caritas Denmark visited a selection of the beneficiaries before they received their ECOCA to ensure that these lived up to the selection criteria.

The beneficiary selection was done in this way in order to gather understanding and support for the selection from the local community, thus avoiding jealousy and conflict from those who were not chosen, while at the same time acknowledging that knowledge exists within the community

leadership to determine which households were the most vulnerable and in need of help.

Methodology

As a starting point, a baseline survey was conducted by Caritas Denmark and local partners in both countries in 2018. The students' research in Myanmar and Uganda were conducted over two visits. The first visits took place over two weeks in February and March of 2019 and the second ones in May/June of 2019. In between these visits, a Real Time Evaluation was conducted in both countries by staff from Caritas Denmark⁸. During the first visits the installation of the ECOCA was observed, and semi-structured interviews with the beneficiaries receiving the ECOCA in both settings were conducted. The interviews focused on their daily life, cooking practice, expectations for the ECOCA and general thoughts and hopes for the future. On the second visit, the beneficiaries had been using their ECOCA for two months, and the interviews were structured around the beneficiaries' experiences with the ECOCA, the impact of the ECOCA on their daily lives, and on their thoughts for improvement in function and design. In Myanmar, a total of 34 interviews were conducted with 28 different households (some were interviewed on both visits). The interviews were conducted through a translator from the local KMSS office. In Uganda a total of 39 interviews covering 23 refugee households and 8 host community household were made, also through translators from the local partner Caritas Uganda. In both countries, language barriers posed a challenge due to the limited English skills of the translators whom were not professional interpreters, but people from local office or the community who spoke the relevant languages. In Myanmar, the semi-structured interviews were complemented with unstructured interviews with the village administrators and different villagers, some of whom were beneficiaries, and some who were not. In both settings, participant observation, including of the cooking practice, was also part of the field study

⁸ Caritas Denmark. 2019. Real Time Evaluation Report, PESITHO ECOCA Pilot, Uganda, 2nd-9th April 2019 & Real Time Evaluation Report, PESITHO ECOCA Pilot, Myanmar, 30st April – 3rd May 2019.

On the second visits focus group interviews were conducted. In Myanmar these took place in both villages with nine different women, including the two super users (users that have been especially trained in using the ECOCA and helping other users with issues). In Uganda one was for a group of super users, while the other was for regular beneficiaries. The purpose of the focus groups was to create a space for sharing thoughts on the experience with using the ECOCA as well as about possible improvements to be made.

Since the data was collected using qualitative methods, the description of the findings in this report will therefore mainly be of a qualitative nature, though clarifying quantifications of the data will be presented wherever possible and necessary. Sometimes some of the beneficiaries were not able to answer some of our questions for various reasons, e.g. language barriers or cultural differences, and thus throughout the report the number of respondents will not necessarily correspond with the number of total interviewees.

Findings related to Impact

In the following section the findings will be presented according to the following categories related to the following SDGs: Food security (SDG 2.1.2), Income Generating Activities (SDG 2.3.3), Air Pollution (2.3.2), Clean Water Access (SDG 6.1.1), Conflict and Violence (SDG 16.1.3), Access to Electricity (SDG 7.1.1), Reliance on Clean Technology (SDG 7.1.2.). The findings in each section will be divided into the regional contexts of Uganda and Myanmar. At the end of each section there will be a sub-conclusion. The findings here are short-term impacts, since the project needs more time to unfold before long-term consequences can be seen.

SDG 2.1.2 – Food Security

Uganda

In Bidibidi, the staple foods that are given in food rations from the World Food Programme (WFP) and grown in the gardens are: porridge or tea for breakfast, and posho (a maize meal) with “sauce” (meaning anything from beans to greens to silverfish) for lunch and supper. Other meals are prepared using crops from the households’ own gardens like okra, cassava and beans or eggs,

and some foods such as onions, tomatoes and fish are most often bought in the market or local stalls in the community and used as a supplement to the food rations.

100% of beneficiaries report saving time from not collecting firewood or collecting fewer times pr. week. On average, they save 7,25 man-hours every week pr. household, ranging from minimum 2 hours to maximum 15 hours saved every week (see figure 1). This means that almost 30 hours pr. month are extricated for other activities. Many households state that the time the ECOCA extricates is primarily used for gardening the before mentioned crops (as well as other minor household chores), thus producing more food for the household and enabling them to eat a more diverse diet. In addition to the crops they produce themselves, many families explain that through income generating activities from the ECOCA or money saved on fuel, they can also prepare a more diverse diet using food bought in the market or local stalls in the settlement.

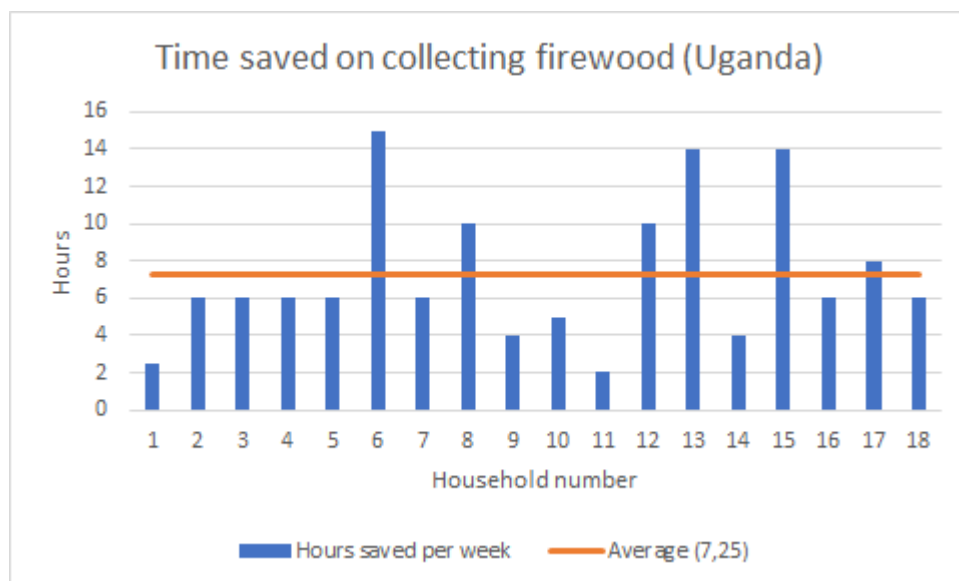


Figure 1

11/20 (55%) refugee beneficiaries also stated that prior to receiving the ECOCA, they would exchange food from their WFP rations for money in order to buy everyday necessities such as batteries or fuel. All of them reported that they no longer have to do this, and therefore their food security has increased.

All respondents reported using the ECOCA every day for at least one meal. The average use of the ECOCA is 2 meals pr. day (not including boiling water for tea). The average amount of people cooked for is 7, ranging from 1 to 15 people. It should be noted that some of the beneficiaries state that they only use the ECOCA once or twice pr. day because they prepare a large portion for lunch which will also be used for supper, or due to lack of food. It is thus not because they use other sources of fuel for the other meals of the day.

7/15 beneficiaries stated that they eat the same amount of food after receiving the ECOCA, 4/15 stated that they eat more due to not having to sell part of their WFP rations, and 4/15 stated that they eat less now than before. 75% of those stating that they eat less food explain that the size of the cooking pot (6 litres) limits the amount of food they can produce for one meal. One household explained that even though that is the case, the fact that they do not have to worry about collecting firewood compensates for the smaller amount of food produced. They (as well as every other beneficiary asked) also thought the food prepared on the ECOCA tasted better since it does not absorb flavour from the smoke. One household stating that they eat less explained that it was because of a food shortage in the WFP.

Myanmar

In Myanmar the staple foods are rice and curries, made from vegetables (pumpkin, jackfruit) and edible leaves from the beneficiaries' own farmland or from a local shop. Most meals are supplemented by fried food (chili, fish paste). Some beneficiaries mentioned that they mostly eat rice with fried chili, because they cannot afford to buy vegetables or have crops to harvest yet. A mother of 6 children mentioned that her son was malnourished, because she was only able to give him rice and sometimes edible leaves, if she had time to collect them.

The amount of members of the households varies from 2 to 10 people, with an average of 6 people in the household. However many beneficiaries mentioned that they also have guests or friends coming over to eat a few times a week. The beneficiaries eat 3 meals a day, but most only

cook two times a day (for both breakfast and lunch in the morning), which enables them to work most of the day at their farm. This means, however, that they cook double the amount of portions in the morning, which poses a challenge to the size of the ECOCA pots and the battery. Since they received the ECOCA, all respondents (24/24) use the ECOCA every day, cooking an average of 2 meals on the ECOCA. They turn on the ECOCA 5,5 times a day on average, for cooking rice and curry (3 times) and boiling water (2,5 times). 18/24 respondents cook both rice and curry on the ECOCA, while 4/24 use the ECOCA only for cooking curry and 2/24 respondents use the ECOCA only for cooking rice. This is in addition to boiling water which all of the beneficiaries do.

Before receiving the ECOCA the 22 households collecting firewood used an average of 8,3 man-hours pr. household a week collecting firewood. Because of their use of the ECOCA the 22 beneficiaries now use an average of 3,4 hours a week collecting firewood, which save them 4,87 man-hours pr. week on average (see figure 2), equivalent to 59% time saved. The extra time gained is mainly spent on their farm for both diversifying the food grown and cultivating larger areas (18/24 respondents) or foraging for more food (5/24 respondents). 13 respondents (13/24) eat more food after they started cooking on the ECOCA, mainly because the food is more tasty, but also because they feel it is more nutritious and they digest it faster.

The long term impact of the ECOCA on the beneficiaries' food security is not visible at the moment, as the first harvest is yet to come. However all respondents (24/24) stated that they will use the first harvest primarily on more food for their own family, and then sell the rest of the crops to increase their income.

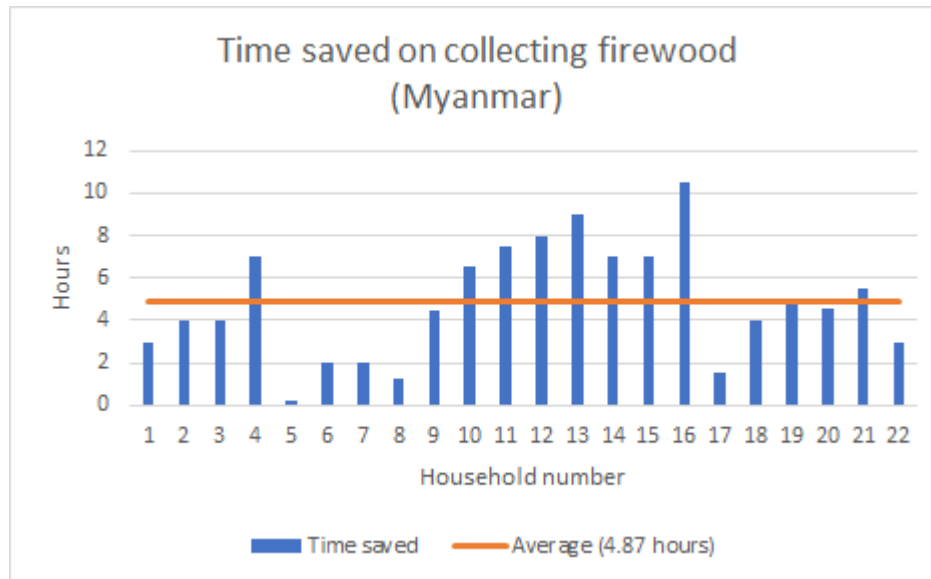


Figure 2

Sub-conclusion on SDG 2.1.2

- In Uganda the beneficiaries save 7,25 man-hours pr. household a week on average from not collecting firewood.
- In Uganda, the ECOCA enables beneficiaries to eat a more diverse diet.
- In Uganda, the amount of beneficiaries selling part of their WFP food rations has dropped from 55% to 0%.
- In Myanmar the beneficiaries save 4,87 man-hours pr. household a week on average from not collecting firewood, equivalent of 59 %.
- In Myanmar the ECOCA is on average turned on 5,5 times a day (boiling water, cooking rice, making curry etc.)
- In both countries the food security has increased due to extricated time used on cultivating diverse foods.

SDG 2.3.2 – Income generating activities (and savings)

Uganda

11/20 refugee households (55%) report that they save money on fuel (charcoal and firewood) which they used to buy primarily from the host community. Money saved weekly on fuel is on average 8545 UGX (2,30 USD). One beneficiary who used to spend 25.000 UGX (6,76 USD) every week on fuel now only uses the ECOCA, and thus she does not need to buy fuel anymore. The people who state that they do not save money on fuel explain that the reason for this is that they did not pay for the firewood before, since they collected it or exchanged their WFP rations, and therefore only saves time from collecting.

The beneficiaries also report saving an average of 1813 UGX (0,5 USD) on candles or batteries every week after receiving the USB-light that comes with the ECOCA. None of the beneficiaries reported using the availability of light after dark to take part in income generating activities, as these mainly happen during the day.

As previously stated, households save an average of 7,25 man-hours pr. week, but only 2/25 stated that they use this time for income generating activities. One simply stated that he does “business”, while the other (a super user) explained that he had extra time in his market stall in which he sells used shoes. The income from this extra time in the stall combined with savings on fuel and batteries for lighting earns him a total of 150,000 UGX (40,57 USD) extra pr. month, which is the largest amount reported by any of the beneficiaries.

Furthermore, 8/25 (32%) beneficiaries state that they generate money from charging phones using the USB output in the ECOCA. The price they take for charging phones in the community is 200-500 UGX (0,05-0,15 USD) which earns them an average of 6575 UGX (1,78 USD) pr. week, ranging from a weekly income of 600 to 20.000 UGX (0,16 to 5,41 USD). In addition, 6/25 households do not take money from charging phones for their neighbours or people in their local community, as one beneficiary stated that she “received the ECOCA for free and my neighbours did not - so why should I try to make money out of it?”. 14/25 (56%) of households report that

they do not have a charger for phones and therefore cannot generate any income, but believe that if they were given a charger it would be a good business. A charger is reported to cost around 15.000 UGX (4 USD) on the local market, but most of the beneficiaries do not have that amount of money in their monthly budget. Another way of generating an income was seen in one household where the husband had a local shop for repairing and charging phones. He used the ECOCA 24V output for soldering when repairing phones. This had increased his monthly income from 50.000 UGX (13,5 USD) to 75.000 UGX (20 USD). See table 1.

Table 1: Savings and income per week in UGX per ECOCA component

Respondent no	Income	Money saved on fuel in UGX	Money saved on light in UGX
1	20000	10000	3000
2	4000	15000	1500
3	1500	8000	1500
4	5000	8000	1500
5	3000	8000	3000
6	600	2500	1500
7	1000	8000	1000
8	17500	25000	1500
9		4000	
10		2000	
11		3500	
<i>Total</i>	52600	94000	14500
Average	6575 (1,8 USD)	8545 (2,3 USD)	1813 (0,5 USD)

Other than buying food, the money accumulated is used for salt, soap, baking powder and other objects for what one young woman labelled as “the good life”. She explained that they are extra

things they do not necessarily need in their every day when money is short. Some households report that they use the extra money for savings and one beneficiary explained that him and his family would “use it for savings for *the next future*”.

Myanmar

In Myanmar the most substantial income activities has been generated by the additional time that the ECOCA extricates. 22 (22/24) of the households feel that they have more time because of the time saved on collecting firewood. The two households who do not save time use charcoal for cooking and do not collect firewood. Instead they save 140 MKK (0,09 USD) on charcoal every week. On average the other 22 households save 4,87 man-hours per week (see figure 2). 18/24 of the beneficiaries use the extra time on farming, 8/24 use it on domestic work while 5/24 use it on foraging in the nearby forest. All the beneficiaries have at least one plot of land where they cultivate vegetables such as bananas, turmeric and rubber trees for consumption and profit. The extra time used on farming will most likely prompt extra crop yield and thereby more income. Making and selling home brew or selling goods in a small shop, and foraging foods are also activities that contribute to an increased produce and thereby income. As these activities are subtle changes, and because of the long-term investment of agricultural yield, it cannot yet be estimated how much the income has increased from the extra time available.

In addition to the time saved on collecting firewood, the rechargeable lamps have created new opportunities during night time as well as saved the households a substantial amount of money on candles. The money saved on indoor lighting has almost eliminated the use of candles and the beneficiaries save 1279 MKK (0,85 USD) pr. week on average. As one of the ingenuitive respondents expressed; “If we are creative, we can use the solar cooker in many ways to get income”. 7/24 beneficiaries also use the light for income generating activities at night such as agricultural activities and day labour. Examples of this are the cutting and loading bamboo, night fishing, lighting up their shop or making bamboo products like baskets and roofing sections.

Sub-conclusion: SDG 2.3.2

- In both countries, the ECOCA has extricated time and saved the beneficiaries money on fuel, batteries/candles and food.

- The extricated time is to some degree spent on income generating activities that combined with the savings increase the households' total amount of capital.
- In Uganda the total amount of money saved is approximately 10358 UGX (2,8 USD) pr. Week on average.
- In Myanmar the average amount of money saved is approximately 1279 MMK (0,84 USD) pr. week plus an increased crop yield.

SDG 3.9.1 – Air Pollution (and general health condition)

Uganda

In Bidibidi, all beneficiaries reported improved health conditions after receiving the ECOCA. They all mentioned that when cooking on firewood, the smoke caused pain in their eyes and lungs, as well as making them suffer from coughing. Due to communicative difficulties, it was not possible to clarify whether these problems were present constantly or only while cooking. Almost everyone also mentioned that burning themselves on the fire was an issue before the ECOCA.

One of the most pressing health issues according to all of the respondents was the strain on their bodies caused by the long distance walks they endure while collecting firewood, as well as the strain caused by carrying the heavy loads long distances back to the settlement. All beneficiaries stated that the reduced amount of times they had to endure this was a great improvement to their health. Before they experienced dizziness and headaches from walking in the heat and back and shoulder pain from the weight of the wood. On the first visit, prior to receiving the ECOCA, one elderly woman showed us her legs which were covered in injuries from walking into obstacles that she could not see due to her poor eyesight. Another aspect is mental health, as one beneficiary said it was a great relief for her to not have to think about whether or not she had to go collect fuel in order to feed her family, and it made her not have to worry about the dangers and strains this trip entails. This is also worth mentioning in an environment where psychological distress and worry is ever present. While all experience that health issues are *reduced*, only 3 households use solely the ECOCA for cooking (elaborated on page 22). Thus only 3 households

are completely *relieved* from all health issues. The rest of the households still use firewood or charcoal to some extent.

Myanmar

Prior to receiving the ECOCA all beneficiaries (50/50) stated that cooking on firewood/charcoal caused various health issues, such as headache, coughing, breathing difficulties, heat strokes, sore eyes and skin burns. Several women stated that it was especially the process of lighting the fire inside the house, that gave them health issues, as the fire is usually lit by igniting small pieces of plastic while blowing continuously. One woman explained how the smell of plastic and smoke made her dizzy. She further elaborated that to prevent lighting the fire several times a day for cooking or boiling water, they used to keep the fire going all day. This meant that the women were bound to stay near the fire and in the toxic smoke it causes. After receiving the ECOCA, all of the respondents (24/24) reported that their health has improved, as they spend much less time near the fire and do not suffer headaches, coughing or burns anymore.

Even though the ECOCA has significantly reduced the amount of cooking the beneficiaries do on firewood, most families still light fires 2 times a day for stir-frying and occasionally for boiling hard foods (e.g. bamboo shoot, beans). The beneficiaries who cook for more than 4 people (15/24) also still cook rice on firewood, as the ECOCA pot is not big enough. However, they no longer keep the fire going all day, as they are able to cook curry and boil water on the ECOCA. When asked about their health changes after the arrival of the ECOCA the beneficiaries also pointed out the relief of not having to collect firewood as much as before. The collection of firewood causes back pain, exhaustion and headache to the majority of the beneficiaries (48/50). One woman explained how she could only help her husband collect firewood 2 times a week, since she had to carry her 1-year-old infant on her back while collecting firewood, causing her severe back pain.

Sub-conclusion: SDG 3.9.1

- In both countries the beneficiaries are to a large degree relieved from the effects of smoke and the strenuous activity of collecting firewood, which increases their health and feeling of well-being significantly.
- In both countries the amount of exposure to smoke from firewood is reduced, however they still are still prone to collecting firewood for boiling hard foods such as beans and rice, and for stir-frying (in Myanmar).

SDG 6.1.1 – Clean Water Access

Uganda

In the Bidibidi settlement clean water is collected from local wells and is ready for consumption. This means that the use of the ECOCA for boiling and thereby cleaning the water is not relevant in this context. The beneficiaries report that besides cooking they use the ECOCA for boiling water for tea and some for hot bathing in the rainy season.

Myanmar

The water in Myanmar is collected from local wells and boiled before consumption. Since they received the ECOCA all respondents (23/23) boil water only on the ECOCA, with an average of 2,5 times a day (see table 2). Some respondents stated that they now boil more water since they can invite more people over for tea, while the majority boil the same amount as before.

The ECOCA pot has a volume of 4 liters, however it may differ greatly how much water each household puts into the pot. The quantities are unknown.

Table 2: Pots of water boiled pr day

Number of pots	1 pot	2 pots	3 pots	4 pots	Average	2,5 pots pr. day
Number of respondents	2	10	11	1	Total number of respondents	24 respondents

Sub-conclusion: SDG 6.1.1

- In both countries the beneficiaries use the ECOCA for boiling water.
- In Uganda the beneficiaries already have access to clean drinking water, so they only boil water for tea and hot baths.
- In Myanmar the beneficiaries no longer boil water on firewood, instead they use the ECOCA for boiling all water consumed.
- In Myanmar the beneficiaries boil water 2,5 times a day on average. For most respondents the amount of water consumed is the same as before receiving the ECOCA.

SDG 16.1.3 – Conflict and Violence

Uganda

The decreasing availability of wood reportedly creates tension between the refugees and the host communities as they have to compete for the natural resources. The baseline survey indicated that the refugees in many cases already in 2018 were no longer allowed to collect firewood but were forced to pay the host population for firewood or chased away with threats of violence. As the resource is becoming increasingly scarce there is an added risk of this escalating into a serious conflict. This must be avoided, not least due to Uganda's important role as stabilizing factor in the region⁹. Furthermore, some beneficiaries told us that the women collecting firewood were fearful of the risk of being raped while out, as some had experienced threats of this from people in the host community. The ECOCA helps reduce this anxiety, as it eliminates or limits the number of trips necessary for collecting enough firewood.

Before implementing the ECOCA, it seemed plausible that it could escalate tension or conflict between neighbours who did and did not receive the ECOCA. This turned out not to be the case, as the interviews with beneficiaries reported no conflicts with neighbours and some even reported that the neighbours were happy on behalf of the beneficiaries, as the neighbours knew that they were families with limited funds. In one of the focus groups the interviewees expressed

⁹ Danish Foreign Ministry. 2017. *Denmark-Uganda partnership – Country Programme Document 2018-2022*

a concern of jealousy from the neighbours but said that there had never been an actual conflict. Some even stated that the receipt of the ECOCA would benefit the small local community as the neighbours had the opportunity to charge their phones for free.

Another concern expressed by 16/25 (64%) is the fear of theft. Many households had a concern of having such a valuable item in a community where most of the families have limited resources. One of the beneficiaries was an old lady who lived alone and expressed that since her lock for the solar panel was broken, she had difficulty sleeping at night because she feared that somebody might steal the ECOCA or the solar panel. Most beneficiaries report that they did not trust the lock enough to leave the ECOCA outside if they were not around the house, especially because they felt that the lock made of plastic was not efficient enough. They explained that they would feel safer if the wire would be directly connected to the aluminium frame of the solar panel.

Myanmar

Although the villages now consist of people from previously rivaling ethnic groups, KMSS as well as the village administrators actively seek to maintain seamless conditions through dialogue and cooperation. As described the ECOCA's are distributed according to certain vulnerability criteria. When the respondents were approached regarding this issue the consensus was seemingly that of gratitude and not that of envy. Because the selection of the beneficiaries took the local system of decision making into account it created a favorable distribution of the ECOCA's. Only one person mentioned a fear of theft, as the majority of the beneficiaries feel safe in their small communities.

The Real Time Evaluation report¹⁰ stated that 10 (10/15) beneficiaries experience conflict and harassment when collecting firewood. The ten reported that they either do not have land of their own or they have cultivated the entire plot so that there is no wood left to collect. This leaves them with the choice of either walk to the forest, which (especially from Kapen village) is too far to reach on a normal day or to collect on the farm of others, which of course is not very popular

¹⁰ Report produced by Caritas Denmark

with the land owners. There is no conflict in the forest, except in the summer time when everyone is collecting for the rainy season and even the forest becomes busy with fire wood collectors.

On the other farms, they are shouted at, and when caught they are escorted out and have to give back what they have collected. A very poor lady with a large family explained that in these situations, in the presence of her children who contributes with the task of collecting firewood, she begs to be allowed to keep the firewood and that sometimes permission is given to her if she promises never to come back.

Another respondent explained that it used to be acceptable to collect firewood on the land of others, but in recent years since people have started collecting firewood for sales in the local market to make an income, this practice is now much less accepted. The four respondents who reported not to experience conflict when collecting firewood, explained either that they collected only on own land or because they make sure to ask first and only collect if acceptance is given in advance.

Several women mentioned the risks of snakes and of rape, though none reported any incidents of either actually happening.

Sub-conclusion: SDG 16.1.3

- In Uganda, conflicts over scarce resources such as firewood are becoming an increasing problem.
- The Real Time Evaluation report showed that 10/15 beneficiaries have experienced conflict, violence and dangers when collecting firewood.
- In both locations, there has not been any actual conflict and/or envy between neighbours caused directly by the ECOCA, however in Uganda several beneficiaries have expressed concern about possible theft.

SDG 7.1.1 – Access to electricity

Uganda

The ECOCA has increased access to electricity for cooking, lighting and charging of other electrical appliances. Other than allowing the possibility for income generation (as presented in previous

section), access to lighting has created several new opportunities for the beneficiaries. Unfortunately, many of the light bulbs or the chargers had broken at the second visit, leading most beneficiaries to go back to the lighting methods used before. When asked, all respondents mentioned that they use(d) the light for "security purposes," which could mean both checking their sleeping area for snakes and other venomous creatures, as well as security from theft and attacks at night, as this is less likely to happen when the compound or house is illuminated. 11/25 of beneficiaries also reported that an added advantage of the light was that the school children could study and do their homework at night. Many also reported that the neighbours children would come to study after dark. Another way in which the ECOCA benefits the children's education is regarding their ability to attend class. One woman explained that because she is alone with five children, and is disabled herself, it is not possible for her to collect firewood. Two of her kids took care of this instead, and they had to go for 5 hours three times pr. week to collect firewood, which meant that they could not attend their afternoon classes these days. After they received the ECOCA the children only have to collect firewood on Saturdays, which means that they can attend all of their classes.

Myanmar

The access to electricity has created very similar opportunities in Myanmar as those in Uganda. Only two respondents (2/24) reported having two functional lamps, as the rest had only one lamp left.

The light is mainly used in the living room (15/24), in the kitchen (11/24) or for lighting up their indoor altar (5/24). The most common indoor activities at night are studying (9/24) and cooking. A woman explained that she uses the light, when she brews alcohol outside at night, while another woman uses the light in her small shop, which enables her to keep it open for longer. All the respondents also enjoy having the light for walking to the bathroom, inviting friends over or spotting dangerous animals like scorpions or snakes. As in Uganda, a beneficiary in Kapaungpin reported that his children's schoolmates would come over at night to study by the light.

Sub-conclusion: SDG 7.1.1

- In both countries there have been problems with non-functioning lamps, but the functional light bulbs have been very beneficial for security at night and activities such as cooking.
- In both countries, children use the light for studying at night, thus improving their learning and education.

SDG 7.1.2 – Reliance on clean technology & SDG 15.2.1 - Halting deforestation

Uganda

24/25 (96%) beneficiaries state that they have reduced their use of fuel after they received the ECOCA and only 1/25 state that they use the same amount of firewood after they were given the ECOCA. 3/25 (12%) households report that they never use firewood or charcoal anymore thus relying solely on the ECOCA and 13/25 (52%) state that they only use firewood during overcast days which are more frequent during the rainy season. These households explain that they would like to use only the ECOCA, but when it is overcast, there is not enough sun to fully charge the ECOCA. This does not mean it cannot be used at all, but that there is not enough power to cook all the meals that the given family would cook if the power had been full. There is data available on this from loggers installed in the ECOCAS that can maybe help cast a light on this issue, but this has not yet been analysed at the time of writing. It was difficult to estimate the *amount* of firewood saved, as there is not a fixed entity for this. It is therefore more easily measured in the amount of time saved collecting firewood pr. week (7,25 hours). One also stated that before, “a sack” of fuel would last him 1 month, whereas now it lasts 3.

When asked whether the ECOCA ever runs out of power, 17/25 beneficiaries said that it runs out of power after dark, and out of these 17 households, 9 said that this was only the case during the rainy season. 8/17 responded that it never runs out of power. An explanation to the lack of power during the wet season is possibly that many beneficiaries explain that they do not bring the solar panel outside when it is raining or cloudy. One reason for this is that some fear that the rain will

damage the solar panel and another reason is that they simply do not think it will get charged when it is a cloudy and rainy day.

Another factor that explains why beneficiaries have a hard time eliminating firewood *completely* is the fact that beans is apparently difficult to cook on the ECOCA. In both focus groups it was stated that the WFP beans are too hard to cook on the ECOCA, no matter how long you soak them, and it takes up to 6-7 hours - one even reported 8-9 hours (compared to app. 3 hours on firewood). The problem is less pressing when cooking the beans they grow themselves, as these are softer, but it still takes a significant amount of time longer than on firewood. In the interviews, when asked “is there something the ECOCA cannot cook?” 19/25 (76%) stated that beans are too hard. 7 of these 19 people stated that it was only a problem during the wet season, while the rest experienced it as a year-around issue. Since beans are probably *the* main source of protein and nourishment in the refugees’ diets, it becomes clear that if the ECOCA cannot cook them well enough or fast enough, they will continue needing to use firewood.

Furthermore, the focus groups attendants agreed that one pot is not enough to cook a full meal composed of both “food” (posho) and “sauce” (various vegetables and/or meats). As long as they only have one, they will probably continue to use wood fuel, at least in bigger households.

Myanmar

In Myanmar all respondents (24/24) had reduced their use of firewood, since they received the ECOCA. Before receiving the ECOCA the beneficiaries would keep the fire burning all day to avoid lighting it several times a day. This resulted in an excessive use of firewood every day. Now, the respondents use the ECOCA on an average of 5,5 times a day, boiling water exclusively on the ECOCA, and using it for cooking curry or rice. When asked about the amount of firewood used before the ECOCA and now, all 19 respondents had reduced their use of firewood with an average of 58% with 33% being the lowest and 75% the highest (See table 3). Even though all respondents would like to reduce their use of firewood even more, they still have to light a fire two times a day to stir-fry food and a few times a week to cook hard foods or boil turmeric for selling. All

respondents stated that a stir-frying pan is needed to avoid lighting the fire every day. Several respondents (15/24) had experienced that the battery of the ECOCA had run out of power on cloudy days, which meant that they had felt the need to reduce their use of the ECOCA. As the rainy season had just begun at the time of the endline visit, it is unknown how it will affect the beneficiaries' use of the ECOCA.

However, the use of the clean technology is a relief for all respondents (24/24), as one woman expressed: "It is good that we can cook some when we want to, there is no need to collect firewood or start the fire".

Tabel 3: Amount of firewood saved in %

Amount of firewood saved in %	75 %	67 %	50 %	40 %	33 %	Average	<u>58 % saved</u>
Number of beneficiaries	1	11	3	1	3	Total number of respondents	<u>19</u>

Sub-conclusion: SDG 7.1.2 and SDG 15.2.1

- The ECOCA is not yet able to completely replace the use of wood fuel for the beneficiaries in Myanmar and Uganda, but beneficiaries in both locations report a significant reduction.
- In both countries, beneficiaries report that the battery is not efficient enough to cook hard foods (beans and rice).
- In Uganda, one pot is not enough, which is another reason why people sometimes still resort to using firewood. The wet season also poses a challenge, as people who report using solely the ECOCA during dry season still have to use firewood during wet season.

- In Myanmar, the respondents have reduced their use of firewood by an average of 58%. They report, however, that in order to stop using firewood every day, a stir-frying pan for the ECOCA is necessary.

Findings related to Coverage and Connectedness

Willingness to pay

To make the ECOCA available to as many people as possible, Caritas Denmark and PESITHO have considered the possibility of establishing a credit system option for purchase of the ECOCA. Placing the product on the market would expand the access to the ECOCA to groups with more purchasing power than the beneficiaries included in this project, while the credit system would still allow the poorest to be able to purchase the ECOCA.

As the target group for the project is the most vulnerable group in both Uganda and Myanmar, it has been difficult to examine people's willingness to pay. In many cases it was not possible to obtain reliable information through interviews. However, some beneficiaries noted that they would *be willing* to pay for an ECOCA if they had the money, but at their current state they were simply not *able* to. Neither were they able to imagine how much they, or other people, would be able to pay each month, or in what way the credit system should be implemented. In Myanmar two beneficiaries did mention that relatives from other villages had asked if they could buy the ECOCA. In Uganda the focus group stated that a credit system should work in a way that the ECOCA would not function unless the due amount of money had been paid - in the same way a telephone subscription operates. Otherwise they believed that people would stop paying.

It was clear, however, that the main concern for the beneficiaries in both Uganda and Myanmar right now is their lack of food security, which is why more food would be their first investment if they had more capital. Research of the possibility of paying for the ECOCA would therefore be more relevant within a less poor and vulnerable segment.

Sub-conclusion: Coverage and Connectedness

- In both countries, people are willing to pay, but not able to. It was not possible to obtain reliable information on how a credit system would work in either locations, as the major

concern for the target group of this project is their food security, and any income would be used primarily on more food at the current state.

- Research on willingness to pay should therefore be done among groups who would be able to pay (less vulnerable groups).
- In Uganda, it was expressed that a credit system would only work if it functions like a telephone subscription - meaning that the ECOCA should not work if you do not pay your dues. Otherwise people will stop paying.

Findings related to Effectiveness and Coordination

Timing

In Kapen and Kapaungpin, the ECOCA project was implemented while KMSS was already working on a Food Security Project in the villages, providing farmers with training, crops and market assistance. With the ECOCA project extricating time from firewood collecting, the Food Security Projects provides an opportunity for spending the extra time on the beneficiaries' farm in order to increase their own food security as well as earning an income from selling crops. In June 2019 a School Support Project is also being implemented in the villages, which provides among other uniforms and books for the children of the villages. The ECOCA project provides light bulbs which enables the children to study at night. The timing of the implementation of the ECOCA is therefore facilitating an interplay between the different projects, contributing to a more sustainable and long-term development in the villages.

In Uganda, the timing is also significant, as the pilot there is also backed by a humanitarian livelihood programme led by Caritas Denmark. The overall objective of this Caritas Denmark programme is to improve food security, livelihoods, and self-reliance of South Sudanese refugees and host communities in Zone 2 of the Bidibidi settlement (same one as the ECOCA pilot has been carried out in), through food production, non-agricultural income generation, and peacebuilding. The fact that Caritas Denmark is already active in the area ensures that the implementation of the ECOCA is supported by staff that already know the settlement as well as activities that complement the receiving of the ECOCA well, such as agricultural training, since for example

growing crops to eat while having a safe way to cook them is a good combination.

Training

The engineers from PESITHO, the local Caritas staff and the super users in both locations all collaborated on the implementation of the ECOCA. In Myanmar, PESITHO and the local project manager have been in close contact in case of technical issues, however to make the project long-term sustainable, it would be necessary to train a local technician, who is capable of solving the ECOCA technical problems.

Upon arrival in Myanmar it was discovered that many beneficiaries eat a particularly hard rice, as it is the cheapest. PESITHO, the local staff and the superusers sought for a solution by testing different types of rice on the ECOCA. Upon the second visit to Myanmar 4 respondents (4/24) mentioned that they would still like to improve their cooking skills, maybe through a manual more specifically made for their cultural food context. A user manual explaining how to use the ECOCA was distributed and much appreciated among the beneficiaries, however a cooking manual more adapted to the local cuisine would probably ease the learning curve. As the ECOCA has to be adapted to different food cultures, it is important to know how to cook the most common food well on the ECOCA before the implementation, in order to pass on the knowledge to the beneficiaries.

As part of the implementation PESITHO held workshops and demonstrations in the villages in Myanmar to show all of the beneficiaries how the ECOCA works, and to answer questions. These were organized at the house of one of the super users, since the two villages are quite small, and all beneficiaries could easily participate. This setting also meant that it was easy for the beneficiaries to share their different experiences with each other. The Bidibidi settlement was quite a different setting and posed certain challenges in organizing workshops and demonstrations, as the beneficiaries are spread over a large area both in- and outside the settlement, and either had to walk very far or be transported by the local staff. Also, the implementation in Uganda was done in less time than scheduled because of problems with the

Ugandan customs authorities, which caused the ECOCA's to arrive later than planned. This resulted in less time for training and following up on the beneficiaries after the implementation of the ECOCA's. It is crucial to have enough time for thorough introductions, as some beneficiaries might not feel comfortable ECOCA. For example, an elderly man in Uganda expressed that he was afraid of using the ECOCA. He tried to use it on the first day, but when the fan in the ECOCA switched on, he feared that a technical problem was causing it to break. Therefore, he placed it in a corner and did not use it for days.

Regarding the superusers, they have been a great asset to implementation, but the long distances between the beneficiaries in the Bidibidi settlement poses a problem to them, as they spend a significant amount of time walking from one end of the settlement to the other to help the beneficiaries. They explained that it would be easier and faster to get around if they had some means of transportation, e.g. a bike.

In Myanmar seven of the ECOCA's were redistributed based on the learning curve of the users. Households with elderly often had a hard time cooking on the ECOCA, and KMSS therefore choose to give it to someone else. Like in Uganda this calls for a thorough introduction, possibly through workshops, before receiving the ECOCA, followed up with a chance to express doubts, technical problems and ask questions after having had the ECOCA for a while. It is a difficult balance as most of the households have an easy time adapting to a new product and technology, but for some it is a difficult adaptation, when you have used firewood your whole life. For instance, two beneficiaries from Uganda stated that they did not trust that the water had boiled because they were not able to actually see the water boiling in the ECOCA (because of the lid).

Sub-conclusion: Effectiveness and Coordination

- The close collaboration between PESITHO, Caritas Denmark, the local staff and the super users has ensured that the ECOCA's were well implemented in both locations.
- It is crucial that the implementation includes a thorough demonstration and manual on how to cook the most common foods in the area.

- Training and workshops have been held in both locations to teach the beneficiaries how to use the ECOCA. In Myanmar these can easily be held as the community is small, while it poses a bigger challenge in the Bidibidi settlement, because of the considerable distances between the households.
- In both locations, it has become apparent that special attention has to be paid to some families who have a difficult time adapting to the ECOCA. A follow up visit to the beneficiaries after they have had the ECOCA for a while has proven to be an efficient way to solve issues and embrace any doubts and questions, and it must be ensured that these follow ups continue to happen.
- In both locations, the timing of this project was well integrated into other development projects in the area.

Findings related to Appropriateness and Efficiency

Design

As this project is centered around a technology for humanitarian development, core principles from design thinking were drawn on, which means that the focus lies on the users of the ECOCA and their experience, with the intention of increasing the long-term impact of the technology. Thus, during interviews respondents were asked to express any thoughts on, or suggestions for potential improvement points of the ECOCA.

Uganda

In Uganda, 6/14 wished for a better battery, so the ECOCA would charge better and they would be able to use it at night or to charge more phones. Many of the beneficiaries stated that a battery indicator would be useful so they are able to see how charged the ECOCA is. They sometimes fear there is not enough power to cook the whole meal, especially during the rainy season. Other suggestions were more or bigger pots. Every beneficiary stated that one pot is not enough, and almost everyone said that they would prefer to have 3 of varying sizes. One should be smaller than the current pot (which holds 6 liters), one should be medium (which would be the same size

as the current pot) and one should be larger. The small one is for tea and porridge, the medium for sauce, and the larger one for “food” such as posho or rice.

The focus groups were mostly centered around the design and function of the ECOCA, and the findings here echoed the ones of the other beneficiaries during the interviews. The ECOCA is designed to cook meals for a household of approximately seven people which is also the average amount of people cooked for according to the interviews. The number of people cooked for in the beneficiary households are ranging from one person to up to 15 people. Based on the two focus groups, it was the beneficiaries and super users’ assessment that the realistic amount of people that they could cook posho for with only one pot was 4-5 people. If they only had to prepare sauce, though, they could cook for 10. They reported that it simply takes too long to cook posho and other food (except sauce) with only one pot for more than 4-5 people, so they were forced to also cook with firewood. They also explained that if there was enough pots, and possibly more stove outputs, they would prefer to only cook with the ECOCA. They therefore also recommended two extra pots of varying sizes.

According to the users in the focus groups, the ECOCA is slower than firewood - but only if the time saved by not collecting firewood and lighting the fire is not counted. They all stated, as was also learnt in the other interviews, that beans are a struggle to prepare on the ECOCA, but most other foods also take a long time to make. Posho, for example, takes 1,5 hours on the ECOCA and less than one hour on firewood. Sauce takes as little as 30 minutes on firewood, while also taking 1,5 hours on the ECOCA. The users therefore also wished for a more powerful battery and a way to increase the heat. This being said, they still preferred the ECOCA, as the other activities necessary for cooking with fire are extremely time consuming. Some also mentioned that while they never left their premises while cooking, they were still able to get some domestic work done in the cooking time.

In the focus groups, a number of USB appliances was introduced to the users in order to get their assessment of whether some of them could be useful for future users in the settlement. One

item that was the number one priority of most in the groups were a USB chargeable beard and hair trimmer. Participants in the group stated that both children, men and some women go for haircuts at a salon app. Two times a month, at a cost of 1,500 UGX (0,41 USD) pr. head pr. visit. A trimmer could thus save a family consisting of two adults and two children 12,000 UGX (3,25 USD) each month. Moreover, it would be possible for them to use the trimmer for business purposes, as they could then charge people for haircuts. Everyone also wished for a multi-USB charger, so they would be able to charge any type of device and thus earn an income this way.

Myanmar

In Myanmar the overall experience of the ECOCA was positive, but there were three main issues surrounding the design of the ECOCA that all reduced the efficiency of the cooking. The first issue is the difficulty of cooking hard foods, the second is the size and amount of pots and lastly is the issue of the battery running out of power. As aforementioned the hard rice posed a challenge to the original cooking function of the ECOCA. It is however not only the hard rice, but also other hard foods, such as bamboo shoots or dried beans. When cooking hard foods and rice, the beneficiaries are required to press a button for up to one hour, and some sees it as an annoyance, thus resorting to firewood. Although this posed a challenge in the beginning, the majority managed to alter their use so that they could cook the rice properly. At the endline visit 23/24 beneficiaries were able to cook rice on the ECOCA.

The cooking of rice is also highly reliant on the number of people in the household. When there are more than four people in a household the beneficiaries feel that the pot is too small for everyday cooking. In total 19/24 beneficiaries feel that the pot is too small. During the focus group interviews the respondents suggested that the ideal rice pot should be able to cook over twice as much rice as it is able to now. Having a bigger pot the beneficiaries will be less likely to resort to firewood when cooking for the whole household or when guests come over. Additionally, the beneficiaries still stir-fry 2-3 times a day using firewood as the ECOCA does not allow for this practice. A stir-frying pan a therefore highly requested by the beneficiaries.

At the implementation of the ECOCA all beneficiaries expressed a need to have three different pots: one for boiling water, one for cooking rice and one for cooking curry. However, after having used the ECOCA for two months 11/23 beneficiaries expressed that two pots were enough, while 8/23 stated that two pots were acceptable, but three would be better, and 4/23 were unable to cook rice or curry, because they needed a third pot.

Lastly is the battery life of the ECOCA where 15/24 (62,5%) have experienced to run out of power. After experiencing this the beneficiaries become worried that it will happen again. If the ECOCA shuts down during cooking, the food may be undercooked and therefore not suited for consumption, which creates it an undesirable situation where food is wasted. The participants in the focus groups therefore suggested a battery indicator that would allow them to see the current power of the ECOCA, thus preventing a potential spoilage of foods. This might also lead to a greater use of the ECOCA, as the beneficiaries would not avoid cooking on it out of fear that it might run out of power.

Sub-conclusion: Appropriateness and Efficiency

- In both locations there have been difficulties with cooking certain staple foods, but overall the use of the ECOCA has been unproblematic.
- In both locations, users expressed a need for a more efficient battery, since it cannot cook beans or rice well, and it sometimes runs out of power or does not charge well enough. A battery indicator was mentioned by several beneficiaries, which would enable the households to time their cooking.
- In both locations the beneficiaries expressed a wish for 3 pots if they were to be able to cook all of their food on the ECOCA.
- In Uganda, multi-USB phone chargers and a trimmer for hair and beard showed great potential for income generation.
- In Myanmar, the pot is too small for cooking the needed amount of rice, and a bigger pot and stir-frying pan would reduce the beneficiaries use of firewood even more.

Conclusion

The results of this report conclude that the ECOCA has been well adopted by the beneficiaries and has a significant impact in various aspects of their lives pertaining to the SDGs. The endline visits to Uganda and Myanmar show that all 49 of the questioned beneficiary households use the ECOCA every day to some degree. The fact that 100% of the beneficiaries has adopted the ECOCA to their cooking pattern and are using it as much as they can for those purposes where they find this first version ECOCA useful, shows that the implementation of the ECOCA has gone very well. There have however have been a few challenges regarding the local cooking practice and overall design of the ECOCA. The close collaboration between PESITHO, Caritas Denmark and the local partners Caritas Uganda and KMSS has ensured that these to a large degree have been solved or are currently in the process of being solved. Workshops and training have proven crucial to this process. Special attention still needs to be paid to families who express difficulties, and this is best done through follow-up visits from super users and technicians.

The beneficiaries' use of the ECOCA has resulted in a great amount of time saved from not collecting firewood. In the Bidibidi settlement the respondents save an average of 7,25 man-hours pr. week pr. household, while in Kapen and Kapaungpin the beneficiaries save 4,87 hours pr. week on an average. The extra time is mainly spent farming in order to increase the families' food security (SDG 2.1.2), and in some cases for income generating activities (SDG 2.3.2), such as making alcohol for selling or spending more time in their market stalls. This is combined with savings on expenditures such as fuel, batteries and phone charging, contributes to an increased household capital. From all these factors, in Uganda beneficiaries save an average of app. 8375 UGX (2,27 USD) pr. week. Furthermore, the percentage of households selling part of their WFP rations in order to buy fuel, batteries or other every day necessities has dropped from 55% to 0%, as everyone reported that they no longer need to do this. This also mean increased food security for the households. In Myanmar, they save 1279 (0,84 USD) MMK pr. week on average, as well as increase their crop yield which they can sell.

Other than creating opportunities for income generation, the access to electricity that the ECOCA creates has supplied the beneficiaries with electrical light after dark (SDG 7.1.1). While there have been issues with the current light bulbs breaking for many beneficiaries, people report that when they function, they improve their sense of security from snakes, scorpions or attacks, as well as enable the children of the households to study at night. In Myanmar some also report doing income generating work after dark which was previously impossible.

In both locations the beneficiaries experience an overall improvement of their health and feeling of well-being, as they no longer have to endure as much exposure to smoke and fire as before (SDG 3.9.1). They also have decreased or eliminated the number of hours spent walking long distances with heavy loads when collecting firewood, which relieves their bodies from this strenuous activity. Another health benefit is the access to clean water in Myanmar (in Uganda clean water is already accessible), where the beneficiaries boil their water before consumption, and now report boiling water solely on the ECOCA (SDG 6.1.1).

In Uganda, conflicts between the host community and the refugees over the scarce amount of firewood left in Bidibidi are becoming an increasing problem as forestation decreases (SDG 16.1.3). Beneficiaries avoid confrontation and threats when they do not have to collect firewood anymore. In both countries there was also a potential for conflict or feelings of envy between neighbours as only a small number of beneficiaries were selected, but in neither location had anyone experienced this as a problem. In Uganda, though, beneficiaries were generally worried about possible theft of the ECOCA, but no one had experienced it.

In both locations the consumption of wood fuel has been reduced significantly (SDG 7.1.2, SDG 15.2.1). In Uganda, 96% of the respondents stated that their use of wood fuel has decreased without being able to specify the quantity, while In Myanmar, respondents have decreased their fuel usage with 58%. However, beneficiaries are not yet able to rely solely on the ECOCA for cooking activities, as there are still challenges related to the local cooking practice and the design of the ECOCA. These challenges include: lack of battery power during rainy season, problems with

cooking their staple foods (beans in Uganda, rice in Myanmar) and the size of the pot being too small. Additionally, in Myanmar, the cooking practice requires stir-frying, which the ECOCA is not able to do, thus leaving the beneficiaries to resort to firewood. These are part of the important inputs for improvement the beneficiaries had regarding the design of the ECOCA. A general consensus was the need for a more efficient battery, since many experience problems with cooking hard foods as well as issues with the ECOCA running out of power when not actively charging. Whether this is because of the battery or the beneficiaries' use of the solar panel is unknown, but the problem exists regardless. Many also wished for a battery indicator to enable them to see how much power is left in the ECOCA before starting to prepare a meal. In Myanmar, the current pot is too small for rice cooking, while in both locations, respondents expressed a need for more pots, with three pots being ideal. In Uganda, beneficiaries also showed great interest in a multi-USB phone charger, as well as in a USB chargeable hair and beard trimmer, as they could foresee these items generating a larger income for them.

Regarding willingness to pay, it became evident that this target group, being the most vulnerable, is not the best place to research this. In both locations, beneficiaries expressed that they were willing to pay, but not able to.

As this is a pilot project and the ECOCA is still under development it is difficult to assess the long-term impacts of the technology. However, the end line results show that 100% of the beneficiaries use the ECOCA every day and have incorporated it in their cooking routines as much as this version of the device allows, and have experienced overall improvements regarding their food security, health, economic status and general livelihood.

Lastly, it should be mentioned that PESITHO are already aware of the challenges that are described in this report and are now creating a version 2 of the ECOCA that seeks to eliminate the issues from the first version. This includes a bigger pot, smarter cooking functions with a display, battery indicator and a new manual and cooking guide with culturally specific dishes.